DRAFT
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR
THE CREATION AND USE OF RESTRICTED AREAS R-5602A AND R-5602B
AT FORT SILL, OKLAHOMA
PUBLIC ADVISORY

Public comments on the Draft Supplemental Environmental Assessment (SEA) were requested. Letters or other written comments provided to the U.S. Army at Fort Sill Garrison, Oklahoma, have been published in this Draft SEA. As required by law, comments will be addressed in the Final SEA and made available to the public. Any personal information provided to the U.S. Army, Fort Sill Garrison, is used only to identify your intent to make a comment or to fulfill requests for copies of the Final SEA or associated documents. Private addresses were compiled to develop a mailing list for those requesting copies of the Draft SEA. However, only the names of the individuals making comments and their specific comments have been disclosed. Private address information has not been published in this EA or released for any purpose unless required by law.
DRAFT FINDING OF NO SIGNIFICANT IMPACT

Supplemental Environmental Assessment for the Creation and Use of Restricted Areas R-5602A and R-5602B at Fort Sill, Oklahoma

The Finding of No Significant Impact (FNSI) included herein references the attached Draft Supplemental Environmental Assessment (SEA). The SEA has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations issued by the President’s Council on Environmental Quality (CEQ), the U.S. Army (Army), and the Federal Aviation Administration (FAA) (40 Code of Federal Regulations [CFR] §§ 1500-1508; 32 CFR 651, et seq.; and FAA Order 1050.1F). The FAA is serving as a Cooperating Agency (CA) with the Army on the SEA. The SEA was prepared as a supplement to the Environmental Assessment for Demonstrations for Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma (Electric Fires EA), which is hereby incorporated by reference. This FNSI has been developed as the final decision document for the SEA.

The SEA has been prepared to present and evaluate the proposed action and the No Action Alternative. The Valued Environmental Components (VECs) addressed in the SEA include airspace resources, air quality, biological resources, cultural resources, hazardous materials and waste, noise, and safety.

PROJECT LOCATION: The proposed location is airspace above and near Fort Sill, located near Lawton, Oklahoma.

PURPOSE AND NEED: The purpose of establishing the proposed Restricted Areas (RAs) is to segregate private and commercial aircraft from high-angle and above-the-horizon hazardous activities proposed at Fort Sill. Hazardous activities proposed below the horizon and with a backstop, as evaluated in the Electric Fires EA, included the use of advanced laser weapon systems and the fielding of new, advanced field artillery (FA) and air defense artillery (ADA) platforms and munitions, including the use of hypervelocity projectiles and electromagnetic (EM) launch railgun technologies. The proposed RAs would allow the demonstration, and eventual training, of laser technology for Army applications to defeat unmanned aircraft system (UAS) and aerial threats, and provide a venue for combat and trainer developers as well as operational unit leaders to observe emerging technologies. The hazardous activities require new RA to supplement the existing Fort Sill R-5601 RA complex and ensure the protection of nonparticipating air traffic when hazardous activities are occurring. The proposed RAs are needed because recent technological advancements in enemy use of UASs and aerial assets threaten troop security on the battlefield. The Army needs to demonstrate and train with new, advanced weapon systems at high angles and above the horizon to counter this emerging threat.

ALTERNATIVES: Two alternatives were considered: the No Action Alternative and the Proposed Action: Creation and Use of RAs R-5602A and R-5602B.

No Action Alternative. Implementation of the No Action Alternative would not change any airspace or create any additional RA at Fort Sill. Analysis of the No Action Alternative provides a basis for comparing the environmental consequences of the proposed action to the existing (baseline) conditions, over time. Under the No Action Alternative, lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above
Supplemental Environmental Assessment for the Creation and Use of Restricted Areas R-5602A and R-5602B at Fort Sill, Oklahoma

40,000 feet mean sea level (MSL). Implementation of the No Action Alternative would not allow ADA or FA Soldiers to use new, advanced weapon systems to engage targets above the horizon or at high angle at Fort Sill.

**Proposed Action: Creation and Use of Restricted Areas R-5602A and R-5602B.** The proposed action is to create and use R-5602A and R-5602B. The proposed lateral boundaries for R-5602A would overlie and extend upward over the ceilings of R-5601A, R-5601B, R5601H, and a portion of R-5601F. R-5602A would extend from 40,000 to 60,000 feet MSL. R-5602B would extend approximately 8 nautical miles (NM) east beyond the R-5601A and R-5601F eastern boundaries and would extend from 40,000 to 60,000 feet MSL.

The proposed time of designation for R-5602A is by Notice to Airmen (NOTAM), with an expected usage of approximately 8 hours per day and up to 200 days per calendar year. The proposed time of designation for R-5602B is by NOTAM, with an expected usage of approximately 8 hours per day and up to 25 days per calendar year. The activation period for both R-5602A and R-5602B is planned for 8:30 A.M. to 4:30 P.M. Monday through Friday, other times by NOTAM. A notice and graphic depiction will be published in the Notices to Airmen Publication (NTAP).

**ENVIRONMENTAL CONSEQUENCES OF IMPLEMENTING THE PROPOSED ACTION:** Implementation of the proposed action has the potential to result in minor impacts to airspace resources because all air traffic would be vectored around the active RA. These impacts would not be significant. No impacts to air quality, biological resources, cultural resources, hazardous materials and waste, noise, or safety would result from implementation of the proposed action.

**PUBLIC OUTREACH:** The FAA published a Notice of Proposed Rulemaking (NPRM) in the Federal Register announcing a 45-day public comment period for this action from July 3, 2017, to August 17, 2017. One comment was received during the 45-day NPRM public comment period. Although the commenter did not disagree with the proposal, the commenter recommended combining all of the RAs into one RA. The Army published a public notice in the Lawton Sunday Constitution on March 11, 2018, notifying the public that the Draft SEA and Draft FNSI were available at the Lawton Public Library in Lawton, Oklahoma, the Nye Library on Fort Sill, and via the Fort Sill website during the public review and comment period between March 11, 2018, and April 10, 2018.

**FINDING:** Based on the results of the Final SEA, implementation of the proposed action would not result in any significant impacts to human health or the environment. Therefore, no further environmental impact analysis is warranted at this time.

Samuel W. Curtis  
Colonel, U.S. Army  
Garrison Commander  
Fort Sill, Oklahoma

Date
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ACRONYMS AND ABBREVIATIONS

°C  degrees Celsius
°F  degrees Fahrenheit
ADA  Air Defense Artillery
AEDT  Aviation Environmental Design Tool
AFB  Air Force Base
AFRC  Air Force Reserve Command
AGL  above ground level
AHPA  Archeological and Historic Preservation Act
AIRFA  American Indian Religious Freedom Act
AIT  Advanced Instructor Training
ANSI  American National Standards Institute
APE  Area of Potential Effect
AR  Army Regulation
ARAC  Army Radar Approach Control
Army  U.S. Army
ARPA  Archaeological Resources Protection Act
ARTCC  Air Route Traffic Control Center
ATC  air traffic control
ATCAA  Air Traffic Control Assigned Airspace
CA  Cooperating Agency
CAA  Clean Air Act
CDID  Capabilities Development and Integration Directorate
CEQ  Council on Environmental Quality
CERCLA  Comprehensive Environmental Response, Compensation, and Liability Act
CFR  Code of Federal Regulations
CO  carbon monoxide
CRO  Cultural Resources Officer
DA PAM  Department of the Army Pamphlet
dB  decibel(s)
DoD  Department of Defense
DoDI  Department of Defense Instruction
DoI  Department of Interior
DOPAA  Description of Proposed Action and Alternatives
DPTMS  Directorate of Plans, Training, Mobilization, and Security
EA  Environmental Assessment
EIC  Environmental Impact Category
Electric Fires EA  Environmental Assessment for Demonstrations for Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma
EM  electromagnetic
EO  Executive Order
EPCRA  Emergency Planning and Community Right-to-Know Act
EQD  Environmental Quality Division
ESA  Endangered Species Act
FA  Field Artillery
FAA  Federal Aviation Administration
FCoE  U.S. Army Fires Center of Excellence
ACRONYMS AND ABBREVIATIONS (CONTINUED)

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<td>GPS</td>
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<td>PA</td>
<td>Predictive Avoidance</td>
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<td>Pb</td>
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1. PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Assessment (EA) is supplemental to a previous EA completed by the U.S. Army (Army) in April 2015 titled Environmental Assessment for Demonstrations for Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma [Electric Fires EA (Army 2015a)]. The Electric Fires EA is hereby incorporated into this EA by reference (see Appendix A).

This Supplemental Environmental Assessment (SEA) analyzes and documents the environmental consequences that could result from the proposed creation and use of two new Restricted Areas (RAs), R-5602A and R-5602B, located above and east of the existing R-5601 RA complex (see Appendix B) at Fort Sill Garrison, Oklahoma (Installation) (Figure 1.1-1). The proposed RAs are required to support field artillery (FA), air defense artillery (ADA), and the fielding of new, advanced FA and ADA platforms and munitions, including the use of hypervelocity projectiles and electromagnetic (EM) launch railgun technologies. In addition, the proposed RAs would support realistic demonstration and training employment tactics with advanced laser weapon systems that do not function in eye safe mode.

As part of the FA and ADA missions, many target engagements require FA and ADA platforms to be fired at high angles above the horizon. For the purposes of this EA, “above the horizon” means without a backstop. The FA and ADA platforms would shoot projectiles that would travel above the horizon and into the proposed R-5602A before landing back in the impact areas on Fort Sill. The proposed R-5602A would provide the flexibility and capability to complete high-angle shots as part of Soldier training and would segregate private and commercial air traffic from the hazards of projectiles fired above the horizon.

Although lasers have traditionally been used at Fort Sill for targeting and other purposes, lasers have never been used above the horizon. Lasers would travel above the horizon, into the proposed RAs, and beyond the boundaries of Fort Sill. The proposed R-5602A and R-5602B would segregate private and commercial air traffic from the hazards of using lasers above the horizon.

This SEA has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations issued by the President’s Council on Environmental Quality (CEQ), the Army, and the Federal Aviation Administration (FAA) (40 Code of Federal Regulations [CFR] §§ 1500-1508; 32 CFR 651, et seq.; and FAA Order 1050.1F, Environmental Impacts: Policies and Procedures). The purpose of this SEA is to inform decision makers of the likely consequences that could result from implementation of the proposed action or the No Action Alternative.

The CEQ issues guidance and interpreting regulations that implement the procedural requirements of the NEPA. Federal agencies have developed “agency-specific” procedures to implement the NEPA. The Army procedures for implementing the NEPA are prescribed in 32 CFR 651. The FAA procedures for implementing the NEPA are prescribed in FAA Order 1050.1F.

The Army is the proponent of this airspace proposal and is the lead agency for the preparation of this SEA. Congress has charged the FAA with administering all navigable airspace in the public interest as necessary to ensure the safety of aircraft and the efficient use of such airspace.
Figure 1.1-1. Regional Map of Fort Sill and Existing Restricted Areas
The FAA is the agency with jurisdiction by law and special expertise with respect to changes in the configuration of the National Airspace System (NAS). In accordance with CEQ regulations prescribed in 40 CFR 1501.6 and 1508.5, and the Memorandum of Understanding between the FAA and Department of Defense (DoD), Concerning Environmental Review of Special Use Airspace (SUA) Actions, dated October 4, 2005, the FAA is serving as a Cooperating Agency (CA) for this SEA (see Appendix C for the CA letter). This SEA is being prepared to satisfy the procedural requirements of the NEPA for both the Army and the FAA.

In addition to coordination with the FAA, the Army will also coordinate with the Laser Clearinghouse within the Joint Space Operations Center (JSpOC) in the Joint Functional Component Command for Space (JFCC Space) to ensure the protection of space assets. On July 3, 2017, the FAA published a Notice of Proposed Rulemaking (NPRM) in the Federal Register (FR) (82 FR 30805) to establish RA R-5602A and R-5602B above and east of the existing Fort Sill R-5601 RA complex (Appendix D). The NPRM advertised a 45-day public comment period from July 3 through August 17, 2017. Physical addresses, telephone numbers, and email addresses were published for the receipt of comments during the 45-day public comment period. One comment was received during the 45-day NPRM public comment period. Although the commenter did not disagree with the proposal, the commenter recommended combining all of the RAs into one RA. See Section 1.5 and Appendix D for additional details.

1.2 BACKGROUND

Fort Sill is located approximately 90 miles southwest of Oklahoma City, Oklahoma, and approximately 50 miles north of Wichita Falls, Texas, on Interstate 44. The city of Lawton, Oklahoma, borders Fort Sill to the south. The installation encompasses approximately 94,000 acres.

The installation is the home of the U.S. Army Fires Center of Excellence (FCoE), an organization combining the U.S. Army FA Center and School and the U.S. Army ADA Center and School. Principal operational units at Fort Sill include the 75th, 428th and 434th FA Brigades, and the 30th and 31st ADA Brigades. Fort Sill is also one of the five locations for Army Basic Combat Training. As the home of the FCoE, the installation mission is to train Soldiers and develop FA and ADA leaders, design and develop fire support for the force, support unit training and readiness, mobilize and deploy operating forces, and maintain installation infrastructure and services.

As part of the training mission, the Fort Sill Directorate of Plans, Training, Mobilization, and Security (DPTMS) is responsible for airspace management around Fort Sill. Fort Sill is the using agency for R-5601A through R-5601H, and the FAA Fort Worth Air Route Traffic Control Center (ZFW) is the controlling agency. Fort Sill Army Radar Approach Control (ARAC) is the Army’s second busiest air traffic control (ATC) facility, providing radar approach control service to Henry Post Army Airfield (HPAAF), Lawton-Fort Sill Regional Airport, Duncan/Halliburton Field Airport, and many smaller airports in the area. Fort Sill ARAC is designated the R-5601A through R-5601H airspace usage liaison with ZFW.

1.3 PURPOSE OF THE PROPOSED ACTION

The purpose of establishing the proposed RAs is to segregate private and commercial aircraft from high-angle and above-the-horizon hazardous activities proposed at Fort Sill. Hazardous activities proposed below the horizon and with a backstop, as evaluated in the Electric Fires EA,
included the use of advanced laser weapon systems and the fielding of new, advanced FA and ADA platforms and munitions, including the use of hypervelocity projectiles and EM launch railgun technologies. The proposed RAs would allow the demonstration, and eventual training, of laser technology for Army applications to defeat unmanned aircraft system (UAS) and aerial threats and provide a venue for combat and trainer developers as well as operational unit leaders to observe emerging technologies. The hazardous activities require new RA to supplement the existing Fort Sill R-5601 RA complex and ensure the protection of nonparticipating air traffic when hazardous activities are occurring.

1.4 **NEED FOR THE PROPOSED ACTION**

The proposed RAs are needed because recent technological advancements in enemy use of UASs and aerial assets threaten troop security on the battlefield. The Army needs to demonstrate and train with new, advanced weapon systems at high angles and above the horizon to counter this emerging threat.

The new RAs would permit the Army to continue to ensure national security by providing the best possible demonstration and training environment for Soldiers and Joint team members, allowing them to train as they will be required to fight on the battlefield. As part of the FA and ADA missions, many target engagements will require high-angle and above-the-horizon shots. The proposed RAs would provide the flexibility and capability to execute high-angle shots as part of training for Soldiers, Warrant Officers, and Officers in attendance at the schools.

The Training and Doctrine Command (TRADOC) Capabilities Development and Integration Directorate (CDID) is the capability developer and operational architect of the Army. TRADOC designs, develops, and integrates warfighting requirements; fosters innovation; and leads change for the Army. TRADOC Regulation 71-20, *Concept Development, Capabilities Determination, and Capabilities Integration*, describes the role of TRADOC relative to concept and capability development and integration. The need for the proposed action is a direct result of the requirement for the CDID to develop and integrate new technology to defend the Nation and its interests. The CDID plans new technologies that promise advancements in the ability of the warfighter to defend against enemy weapons and destroy enemy threats with levels of speed, accuracy, and safety not possible with current conventional weapons.

Army Regulation (AR) 5-22, *The Army Force Modernization Proponent System*, AR 73-1, *Test and Evaluation Policy*, and TRADOC Regulation 71-20 direct the FCoE and CDID to: serve as the force modernization advocate for FA and ADA branches; provide the link between science and technology and the Army acquisition community; and to conduct demonstrations to put capabilities in the hands of Soldiers earlier. This coordination between military and civilian entities allows the Army to maintain its technological advantage on the modern battlefield and facilitates an expedited transition from concepts to reality.

The Fort Sill DPTMS is responsible for maintaining safe airspace around Fort Sill and the R-5601 RA complex. Creation and use of the proposed R-5602A and R-5602B would increase safety of the RA complex near Fort Sill.

1.5 **PUBLIC INVOLVEMENT AND AGENCY AND TRIBAL COORDINATION**

Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, requires intergovernmental notifications prior to making any detailed statement of environmental consequences. Through the process of interagency and intergovernmental coordination, the
proponent must notify interested federal, state, and local agencies and allow them sufficient time to evaluate potential environmental consequences of a proposed action. Comments from these agencies are subsequently incorporated into the environmental analysis. To initiate the public involvement process for this SEA, the FAA published an NPRM announcing a 45-day public comment period for this action from July 3, 2017, to August 17, 2017 (see Section 1.1). One comment was received during the 45-day NPRM public comment period. Although the commenter did not disagree with the proposal, the commenter recommended combining all of the RAs into one RA. The NPRM and the public comment are included in Appendix D.

On December 22, 2017, the Army sent 38 interagency coordination letters with a copy of the Description of Proposed Action and Alternatives (DOPAA). The letters requested agency concerns regarding known environmental and land use constraints or other issues that should be addressed in the Draft EA. The interagency coordination letter and responses are contained in Appendix E.

The Army encourages and invites public/agency, tribal, and other participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, tribes, and members of the public with a potential interest in the proposed action were encouraged to participate in the decision-making process during the 30-day Draft SEA public review period.

Public participation opportunities with respect to this SEA and decision making on the proposed action are guided by both 32 CFR 651, Subpart G, and Section 2.5 of FAA Order 1050.1F (see Appendix D for public outreach information). The Draft SEA was available to the public at local libraries for 30 days from March 11, 2018, to April 10, 2018.

1.6 **SCOPE OF THE ENVIRONMENTAL ANALYSIS**

This SEA identifies, documents, and evaluates the human and natural environmental effects of the creation and use of the proposed R-5602A and R-5602B. Environmental impacts resulting from the use of new, advanced FA and ADA platforms within the existing R-5601 RA complex and below the horizon were previously evaluated in the Electric Fires EA (Appendix A). The existing R-5601 RA complex includes R-5601A through R-5601H (Figure 1.1-1).

As described in Section 1.1, federal agencies have developed “agency-specific” procedures for implementing the NEPA. For the affected environment section of NEPA documents, the Army refers to environmental resources as Valued Environmental Components (VECs) while the FAA refers to environmental resources as Environmental Impact Categories (EICs). Table 1.6-1 provides a cross-reference of environmental resources between the Army and FAA categories. Environmental resources will be referred to as VECs throughout this SEA.

<table>
<thead>
<tr>
<th>Army VEC</th>
<th>FAA EIC</th>
<th>VEC for this SEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetics and Visual Resources</td>
<td>Visual Resources / Visual Character</td>
<td>Aesthetics and Visual Resources</td>
</tr>
<tr>
<td></td>
<td>Light Emissions</td>
<td></td>
</tr>
<tr>
<td>Airspace Resources</td>
<td>(included as a separate section when applicable)</td>
<td>Airspace Resources</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Air Quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Climate</td>
<td>Air Quality</td>
</tr>
</tbody>
</table>

Table 1.6-1. Resource Area Cross Reference
### Table 1.6-1. Resource Area Cross Reference (Continued)

<table>
<thead>
<tr>
<th>Army VEC</th>
<th>FAA EIC</th>
<th>VEC for this SEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Resources</td>
<td>Historical, Architectural, Archeological, and Cultural Resources</td>
<td>Cultural Resources</td>
</tr>
<tr>
<td>Energy</td>
<td>Natural Resources and Energy Supply</td>
<td>Energy</td>
</tr>
<tr>
<td>Environmental Justice</td>
<td>Environmental Justice</td>
<td>Environmental Justice</td>
</tr>
<tr>
<td>Facilities</td>
<td>(included as a separate section when applicable)</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>Land Use</td>
<td>Land Use</td>
<td>Land Use</td>
</tr>
<tr>
<td>Noise Effects</td>
<td>Noise and Noise-Compatible Land Use</td>
<td>Noise</td>
</tr>
<tr>
<td>Safety</td>
<td>(included as a separate section when applicable)</td>
<td>Safety</td>
</tr>
<tr>
<td>Socioeconomics</td>
<td>Socioeconomics</td>
<td>Socioeconomics</td>
</tr>
<tr>
<td>Soil Erosion Effects</td>
<td>Farmlands</td>
<td>Soils</td>
</tr>
<tr>
<td>Threatened and Endangered Species</td>
<td>Biological Resources (including fish, wildlife, and plants)</td>
<td>Biological Resources</td>
</tr>
<tr>
<td>Traffic and Transportation Systems</td>
<td>Department of Transportation Act, Section 4(f)</td>
<td>Traffic and Transportation Systems</td>
</tr>
<tr>
<td>Water Resources Management</td>
<td>Coastal Resources</td>
<td>Water Resources</td>
</tr>
<tr>
<td></td>
<td>Floodplains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface Waters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wetlands</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wild and Scenic Rivers</td>
<td></td>
</tr>
</tbody>
</table>

An interdisciplinary team of airspace specialists, environmental scientists, biologists, planners, engineers, archaeologists, and military technicians has analyzed the proposed action relative to existing conditions and has identified the potential impacts associated with implementation of the proposed action. The proposed action and No Action Alternative are described in Chapter 2. Conditions existing as of 2018, considered the “baseline” conditions, are described in Chapter 3, Affected Environment and Environmental Consequences. The potential effects of the proposed action, also described in Chapter 3, are presented immediately following the description of baseline conditions for each VEC addressed in the SEA. Chapter 3 also addresses the potential for cumulative effects and mitigation measures are identified where appropriate.

### 1.7 Valued Environmental Components Not Carried Forward for Detailed Analysis

The determination of which VECs to analyze versus those not carried forward for detailed analysis is part of the SEA development process. CEQ, Army, and FAA regulations (40 CFR §1501.7(a)(3); 32 CFR 651.14(a)(1); and FAA Order 1050.1F §4-2(c)) encourage project proponents to identify and eliminate from detailed study the VECs that are not important or that have no potential to be impacted through implementation of their respective proposed actions.
The following VECs were found to have no applicability to the proposed action or the No Action Alternative, because there would be no potential for direct, indirect, or cumulative impacts. Therefore, the following VECs are not carried forward for detailed analysis in this SEA:

**Aesthetics and Visual Resources:** This VEC includes the following FAA EICs: visual resources /visual character and light emissions. Because no construction activities would occur as part of the proposed action, no changes to aesthetics, visual resources, or the visual character of Fort Sill or the surrounding areas would occur with implementation of the proposed action. Creation and use of the proposed RAs would not produce any light emissions that would be in the human visual spectrum and annoy people or create situations in which visual sight of light emissions would be intrusive. The impacts that could result from the use of new, advanced FA and ADA platforms were evaluated and described in the Electric Fires EA (Appendix A). This EA concluded that there are no significant impact to aesthetics and visual resources. Therefore, detailed analysis of aesthetics, visual resources/visual character, and light emissions is not required.

**Energy:** This VEC includes the natural resources and energy supply FAA EIC. Creation and use of the proposed RAs would not impact utilities or require any natural resources (water, energy [natural gas and electricity], wastewater treatment, solid waste management) beyond those already described in the Electric Fires EA. Generators and vehicle engines would be used to supply power to the weapon systems and support equipment, causing no impacts to utilities. Because no natural resources would be required to create the proposed RAs and no additional energy would be needed, detailed analysis of energy is not required.

**Environmental Justice:** This VEC includes the following FAA EICs: environmental justice and children’s environmental health and safety risks. Because there would be no significant impacts to human health and safety, there would be no possibility for disproportionate impacts to minority, low-income, or youth populations. Creation and use of the proposed RAs would not increase risks to the environmental health or safety of children. No children would be near the proposed RAs. Detailed analysis of the environmental justice VEC is therefore not required.

**Infrastructure:** Creation and use of the proposed RAs would not require the construction, renovation, or use of any infrastructure. Therefore, detailed analysis of infrastructure is not required.

**Land Use:** No changes to land use would result from the creation and use of the proposed RAs; therefore, detailed analysis of land use is not required.

**Socioeconomics:** Creation and use of the proposed RAs would not result in any adverse or beneficial impacts to socioeconomic resources. Creation of the proposed RAs would not impact ground-based economic activity, including employment. Detailed analysis of the socioeconomics VEC is therefore not required.

**Soils:** This VEC includes farmlands as the FAA EIC. No construction would be required to create the proposed RAs. Potential impacts to soils and farmlands resulting from the ground activities to operate weapon systems on Fort Sill were evaluated in the Electric Fires EA (Appendix A). In addition, although the geographic area over which the proposed action would occur (i.e., the area beneath the proposed RAs) contains prime farmlands, the creation and use of
the proposed RAs would have no potential to convert farmlands to non-agricultural uses. Therefore, detailed analysis of soils is not required.

**Traffic and Transportation Systems:** This VEC includes the Department of Transportation Act, Section 4(f) FAA EIC. The creation and use of the proposed RAs would not result in any impacts to surface transportation. Some gravel roads on Fort Sill would be closed during demonstrations and training. Road closures were evaluated as part of the Electric Fires EA and road closures are a common practice during existing training at Fort Sill. The Wichita Mountains National Wildlife Refuge (WMWR) adjoins Fort Sill to the north, but is located well below the 40,000 feet mean sea level (MSL) floor of the proposed RAs. No other Section 4(f) resources occur between 40,000 and 60,000 feet MSL, and creation and use of the RAs would not impact any Section 4(f) resources on the ground. Designation of SUA for military operations is exempt from Section 4(f). The National Defense Authorization Act for Fiscal Year 1998 (Public Law 105-85) provided that “no military flight operations (including a military training flight), or designation of airspace for such an operation, may be treated as a transportation program or project for purposes of section 303(c) of title 49, United States Code.” Therefore, detailed analysis of traffic and transportation systems is not required.

**Water Resources:** This VEC includes the following FAA EICs: Coastal Resources, Floodplains, Groundwater, Surface Water, Wetlands, and Wild and Scenic Rivers. The proposed RAs would not impact floodplains, groundwater, surface water, or any wetlands. In addition, the proposed RAs are not located over or near any coastlines or wild and scenic rivers. Therefore, detailed analysis of impacts to water resources is not required.

Table 1.7-1 provides a reference for how each VEC has been addressed in this SEA. Public and agency comments will be used to focus the analysis on those VECs of interest to participants.

**Table 1.7-1. Valued Environmental Components in this SEA**

<table>
<thead>
<tr>
<th>VEC</th>
<th>How Addressed by SEA Analysis (relevant section)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetics and Visual Resources</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Airspace Resources</td>
<td>Section 3.1, Airspace Resources</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Section 3.2, Air Quality</td>
</tr>
<tr>
<td>Biological Resources</td>
<td>Section 3.3, Biological Resources</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>Section 3.4, Cultural Resources</td>
</tr>
<tr>
<td>Energy</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Environmental Justice</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Hazardous Materials and Waste</td>
<td>Section 3.5, Hazardous Materials and Waste</td>
</tr>
<tr>
<td>Land Use</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Noise</td>
<td>Section 3.6, Noise</td>
</tr>
<tr>
<td>Safety</td>
<td>Section 3.7, Safety</td>
</tr>
<tr>
<td>Socioeconomics</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Soils</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Traffic and Transportation Systems</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
<tr>
<td>Water Resources</td>
<td>Eliminated from detailed study (See Section 1.7)</td>
</tr>
</tbody>
</table>
2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW

This chapter presents a description of the requirements for the proposed action and a discussion of alternatives considered but not carried forward. In accordance with CEQ regulations (40 CFR 1502.14[d]), this chapter also describes the No Action Alternative.

2.2 REQUIREMENTS FOR THE PROPOSED ACTION

The FAA is responsible for administering, managing, controlling, and charting all navigable airspace in the public interest to ensure the safety of aircraft. The FAA is the only federal agency in the United States with jurisdiction by law and special expertise to change the configuration of our NAS charts and maps. Creation and use of new RA is required to segregate private and commercial aircraft from planned hazardous activities.

Hazardous laser beams and hypervelocity projectiles associated with demonstrating and developing new, advanced FA and ADA platforms would traverse the proposed RAs. The hazardous laser activities are specifically intended to destroy simulated enemy threat UAS and other aerial targets. The high-angle shots require additional RA to supplement the existing Fort Sill R-5601 RA complex and ensure the segregation of nonparticipating air traffic when hazardous activities are occurring.

2.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

During the planning process, the Army considered a variety of alternatives to creating the proposed RAs. The Army considered creating a smaller RA directly above Fort Sill. This alternative was eliminated from further evaluation because only restricting airspace directly above Fort Sill would not contain the laser beam and hypervelocity projectiles from the various firing angles on Fort Sill and would not safely segregate private and commercial aircraft from hazardous laser energy.

No other alternatives were identified that could meet the demonstration and training requirements; therefore, only the proposed action and the No Action Alternative are evaluated in this SEA.

2.4 PROPOSED ACTION: CREATION AND USE OF RESTRICTED AREAS R-5602A AND R-5602B

The proposed action is to create and use R-5602A and R-5602B as shown on Figure 2.4-1. The proposed lateral boundaries for R-5602A would overlie and extend upward over the ceilings of R-5601A, R-5601B, R5601H, and a portion of R-5601F. R-5602A would extend from 40,000 to 60,000 feet MSL. R-5602B would extend approximately 8 nautical miles (NM) east beyond the R-5601A and R-5601F eastern boundaries and would extend from 40,000 to 60,000 feet MSL.
Figure 2.4-1. Altitudes of Existing Restricted Areas and the Proposed R-5602A and R-5602B
Collectively, the R-5602A and R-5602B proposed boundaries and existing R-5601 RAs would fully contain the planned hazardous activities within RA airspace from the surface up to and including 60,000 feet MSL. The proposed time of designation for R-5602A is by Notice to Airmen (NOTAM), with an expected usage of approximately 8 hours per day and up to 200 days per calendar year. The proposed time of designation for R-5602B is by NOTAM, with an expected usage of approximately 8 hours per day and up to 25 days per calendar year. The activation period for both R-5602A and R-5602B is planned for 8:30 A.M. to 4:30 P.M. Monday through Friday, other times by NOTAM. However, a notice and graphic depiction would be published in the Notices to Airmen Publication (NTAP). The NTAP is available online at [http://www.faa.gov/air_traffic/publications/notifications](http://www.faa.gov/air_traffic/publications/notifications).

The proposed RAs were configured to avoid sensitive areas and minimize conflicts to private and commercial aviation while establishing expanded RA necessary to use new, advanced weapon systems to conduct high-angle and above-the-horizon shots. Commercial aviation, private aviation, and non-participating military aircraft would be excluded from transiting the active RA (Figure 2.4-2).

Fort Sill conducts approximately 8 to 30 sorties per average day in the current R-5601 airspace. A number of factors (e.g., weather) determine the amount of daily sorties that occur at Fort Sill. The creation and use of the proposed RAs would not change the daily number of sorties flown at Fort Sill.

F-16 aircraft flown by the Introduction to Fighter Fundamentals (IFF) students and the 301st Fighter Wing (FW) from Naval Air Station Fort Worth Joint Reserve Base are the primary aircraft that use the R-5601 RA complex. Pilots would continue to use the R-5601 RA complex in a similar manner, but would not use R-5602A or R-5602B. In addition to F-16, F-18, and AT-38 aircraft, the existing R-5601 RA complex is currently used to operate UAS. Fort Sill currently completes approximately 300 UAS sorties per year in the existing R-5601 RA complex.

2.4.1 No Action Alternative

Implementation of the No Action Alternative would not change any airspace or create any additional RA at Fort Sill. Analysis of the No Action Alternative provides a basis for comparing the environmental consequences of the proposed action to the existing (baseline) conditions, over time. Under the No Action Alternative, lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. Implementation of the No Action Alternative would not allow ADA or FA Soldiers to use new, advanced weapon systems to engage targets above the horizon or at high angle at Fort Sill.
Figure 2.4-2. Existing Restricted Areas and the Proposed R-5602A and R-5602B
### 2.5 **Summary Comparison of Environmental Consequences**

Table 2.5-1 summarizes the potential environmental consequences from Chapter 3 where the project description from Chapter 2 is overlaid on the baseline conditions from Chapter 3. The consequences are presented for each VEC and are described for the proposed action and No Action Alternative. The range of private and commercial aviation consequences described in the airspace resources section of this table are related to the private and commercial aviation flights occurring in the areas surrounding Fort Sill.

<table>
<thead>
<tr>
<th>VEC</th>
<th>Environmental Consequences</th>
<th>Proposed Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airspace Resources</td>
<td>No significant impacts. Non-participating aircraft would be required to contact Fort Sill ARAC for transition and radar monitoring when desiring to transit the airspace. Some aircraft could experience delays or be vectored around active RA.</td>
<td>No changes to airspace resources would occur and the existing RA would remain in place.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>No significant impacts. In the Electric Fires EA, impacts to air quality were determined to be less than 1 percent of the Region of Influence’s (ROI’s) overall annual air emissions on a pollutant-by-pollutant basis for all pollutants except for nitrogen oxide (NO\textsubscript{x}). NO\textsubscript{x} emissions were estimated to be 2.57 percent of the annual NO\textsubscript{x} emissions for Comanche County. No significant impacts to local or regional air quality were anticipated to result from implementation of the Electric Fires at Fort Sill. Creation and utilization of the proposed RAs would not result in additional air emissions.</td>
<td>No impacts to air quality would result from implementation of the No Action Alternative.</td>
</tr>
<tr>
<td>Biological Resources</td>
<td>No significant impacts. No biological resources (i.e., vegetation, wildlife, threatened and endangered species) are known to occur in the ROI.</td>
<td>No impacts to biological resources would result from implementation of the No Action Alternative.</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>No significant impacts. Fort Sill has determined, and the Oklahoma State Historic Preservation Office (SHPO) has concurred, that no historic properties would be affected by the undertaking.</td>
<td>No impacts to cultural resources would result from implementation of the No Action Alternative.</td>
</tr>
<tr>
<td>Hazardous Materials and Waste</td>
<td>No significant impacts. The use of hazardous materials, the production of hazardous wastes, and the potential impacts of a spill associated with the use of new, advanced weapon systems below the horizon at Fort Sill were analyzed in the Electric Fires EA. It was determined in the Electric Fires EA that no significant impacts related to hazardous materials or hazardous wastes would result from the use of these weapon systems below the horizon at Fort Sill. Creation and use of proposed RAs would not create new hazardous wastes or use new hazardous materials.</td>
<td>No impacts to hazardous materials and waste would result from implementation of the No Action Alternative.</td>
</tr>
<tr>
<td>Noise</td>
<td>No significant impacts. Implementation of the proposed action would have no effect on the current extents of Noise Zones II and III. Although aircraft re-routing could cause minor increases in noise levels, no significant noise impacts would result from the creation and use of the proposed RAs.</td>
<td>No additional noise would be created from implementation of the No Action Alternative.</td>
</tr>
</tbody>
</table>
Table 2.5-1. Summary Comparison of Environmental Consequences by Valued Environmental Component (Continued)

<table>
<thead>
<tr>
<th>VEC</th>
<th>Environmental Consequences</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>No significant impacts. All safety actions that are in place for existing training ranges would remain in place for the proposed operations. Creation and use of the proposed RAs would allow for the safe segregation of non-participating aircraft from the hazardous activities proposed for this airspace. Strict control of the RAs, restricted access to range areas, and use of established safety procedures would minimize the potential for safety risks and ensure the separation of range operations from non-participating aircraft.</td>
<td>No impacts to safety would result from implementation of the No Action Alternative.</td>
</tr>
<tr>
<td>Cumulative Impacts</td>
<td>Fort Sill is an active military installation with continuing missions. No cumulative impacts from implementation of the proposed action would be expected in conjunction with any past, present, or reasonably foreseeable future actions. Airspace use associated with the proposed action has been determined to have no significant impacts to any of the VECs. Therefore, no cumulative impacts are anticipated. Airspace users could be expected to experience occasional rerouting when an RA is activated.</td>
<td>No cumulative impacts would result from implementation of the No Action Alternative.</td>
</tr>
</tbody>
</table>
3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 AIRSPACE RESOURCES

3.1.1 Affected Environment

3.1.1.1 Definition of Resource

Airspace management and ATC consist of the direction, control, and coordination of flight operations in the “navigable airspace” that overlies the geopolitical borders of the United States and its territories. Navigable airspace consists of airspace above the minimum altitudes of flight prescribed by United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC § 40102). The U.S. government has exclusive sovereignty over all U.S. airspace extending from the ground surface to above 60,000 feet MSL (49 USC 40103(a)(1)). For airspace resources, the Region of Influence (ROI) is the proposed Fort Sill RAs, R-5602A and R-5602B, and any airports under and on the periphery of the proposed RAs, as well as more distant aviation facilities that could be affected by changes in flight patterns resulting from the proposed RAs.

Congress has assigned the FAA the responsibility to develop plans and policy for use of navigable airspace and to assign, by regulation or order, the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103(b)). SUA identified by the FAA for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order 7400.2 and other applicable regulations and orders. Airspace charts for the altitudes described in this SEA (40,000 to 60,000 feet MSL) are published by the FAA as the Instrument Flight Rules (IFR) Enroute High Altitude Charts every 56 days.

Airspace management considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple, and sometimes competing, demands for aviation airspace relative to airport operations, federal airways, jet routes, military flight training activities, and other special needs to determine how the NAS can best be structured to address all user requirements.

The Fort Sill DPTMS is responsible for managing airspace above and around Fort Sill. Fort Sill is the using agency for R-5601A through R-5601H, and the ZFW is the controlling agency. In accordance with 14 CFR 73.13-17, by letter dated March 29, 2007, the FAA and Fort Sill established procedures for joint use of the R-5601 complex by Fort Sill and the ZFW.

Fort Sill Range Operations is the scheduling agency for the R-5601 complex, and would be the scheduling agency for the proposed R-5602A and R-5602B. Fort Sill ARAC is the approving agency, in coordination with Range Operations, for participating aircraft entry into the range complex and is the designated airspace usage liaison with ZFW. The Fort Sill ARAC provides area status information and traffic advisories to non-participating pilots using Airport Surveillance Radar, Model 8, and Automated Radar Tracking System radar. Fort Sill ARAC frequency is depicted on aeronautical charts instructing non-participating aircraft to call for information on airspace status.
Fort Sill ARAC is the Army’s second busiest ATC facility, providing radar approach control service to HPAAF, Lawton-Fort Sill Regional Airport, Duncan/Halliburton Field Airport, and many smaller airports in the area.

### 3.1.1.2 Existing Conditions

The proposed action, as described in Section 2.4, is the creation and use of new RAs. The following sections explain the existing NAS structure and the management of that structure.

#### 3.1.1.2.1 Airspace Categories

The FAA defines two categories of airspace: regulatory and non-regulatory. Within these two categories are four types of airspace: Controlled, Special Use, Other, and Uncontrolled. Controlled airspace is airspace of defined dimensions within which ATC service is provided to Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) flights in accordance with the airspace classification (FAA 2017).

Controlled airspace is categorized into five separate classes: Classes A through E. The airspace classes are graphically shown on Figure 3.1-1. Classes A through E identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place to place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace.

![Figure 3.1-1. Controlled/Uncontrolled Airspace Schematic](Image)

Class A airspace generally extends from 18,000 feet MSL up to and including Flight Level (FL) 600. FL 600 is equal to approximately 60,000 feet MSL. FLs are MSL altitudes based on the use of a directed barometric altimeter setting, and are expressed in hundreds of feet. Activities conducted in the proposed RAs would occur at the same altitude as Class A airspace.

Class B airspace generally extends from the surface to 10,000 feet MSL around the nation’s busiest airports. The actual configuration of Class B airspace is individually tailored and consists
of a surface area and two or more layers. Class B airspace is designed to contain all published instrument procedures (FAA 2017). No Class B airspace is located in the ROI.

Class C airspace generally extends from the surface up to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a 5-NM radius, and an outer circle with a 10-NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation (FAA 2017).

Class D airspace generally extends from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored, and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be designated as Class D or E airspace (FAA 2017).

Class E airspace is controlled airspace that is not Class A, B, C, or D. Areas in which Class E airspace begins at either the surface or 700 feet above ground level (AGL) are used to transition to/from the terminal or en route environment (around non-towered airports). These areas are designated by VFR sectional charts. In most areas of the United States, Class E airspace extends from 1,200 feet AGL up to but not including 18,000 feet MSL, the lower limit of Class A airspace. No ATC clearance or radio communication is required for VFR flight in Class E airspace. VFR visibility requirements below 10,000 feet MSL are 3 statute miles visibility and cloud clearance of 500 feet below, 1,000 feet above, and 2,000 feet laterally. VFR visibility requirements above 10,000 feet MSL are 5 statute miles visibility and cloud clearance of 1,000 feet below, 1,000 feet above, and 1 mile laterally (FAA 2003).

Class G airspace is the portion of airspace that has not been designated as Class A, B, C, D, or E and extends from the surface to the base of the overlying Class E airspace. Although ATC has no authority or responsibility to control air traffic, pilots should remember there are VFR minimums that apply to Class G airspace.

### 3.1.1.2.2 Special Activity Airspace

Special Activity Airspace (SAA), a term that includes SUA and others (e.g., Temporary Flight Restrictions [TFRs]), is any airspace with defined dimensions within the NAS wherein limitations may be imposed upon aircraft operations. This airspace could include Prohibited Areas, Military Operations Areas (MOAs), Military Training Routes (MTRs) (Instrument Routes [IRs]/Visual Routes [VRs]), aerial refueling track/anchors, slow routes, low-altitude tactical navigation areas, Air Traffic Control Assigned Airspace (ATCAA), and any other FAA-designated airspace areas.

SUA is defined airspace wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. The types of SUA are Prohibited Areas, RAs, MOAs, Warning Areas, Alert Areas, Controlled Firing Areas, and National Security Areas.
MTRs, MOAs, RAs, IRs, and VRs are all in the ROI. Establishment of new RAs is the only airspace change required to support the new, advanced weapon systems.

MOAs are established to separate or segregate certain non-hazardous military activities from IFR aircraft traffic and to identify to VFR aircraft traffic where these military activities are conducted (see Figure 3.1-2). MOAs are SUA of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain non-hazardous military activities from IFR traffic and to identify to VFR traffic where these activities are conducted (FAA 2017). MOAs are considered “joint use” airspace. Non-participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible ATC. If a pilot operating by IFR is approved to transit a MOA, that part of the MOA is effectively deactivated for military training during the IFR aircraft transit.

Within an active MOA, flight by both participating and VFR non-participating aircraft is conducted under the “see-and-avoid” concept, which stipulates that “when weather conditions permit, pilots operating VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in Code of Federal Regulations (14 CFR) Part 91” (FAA 2017). The responsible ATC provides separation service for aircraft operating under IFR and for air traffic in MOAs. The see-and-avoid procedures mean that if a MOA were active during weather with restricted visibility, the general aviation pilot flying VFR could not safely access the MOA airspace and a pilot requesting IFR clearance would not be permitted to access the active MOA. An aircraft flying VFR that encountered weather or other conditions requiring IFR flight would need to declare an in-flight emergency and communicate with the ATC, which would communicate with Fort Sill to establish a temporary floor in the MOA. Fort Sill would then instruct military pilots not to fly below the temporary floor. Fort Sill would also instruct the VFR pilot not to fly above the temporary floor.

The MOAs in the vicinity of Fort Sill (Table 3.1-1) are used by aircraft as staging areas for test or training activities before entering an RA on approach to ground targets. Fort Sill ARAC regularly provides radar separation for inactive portions of an active MOA to permit pilots operating by IFR to transit the airspace.

<table>
<thead>
<tr>
<th>MOA</th>
<th>Altitudes</th>
<th>Time of Use</th>
<th>Controlling Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hollis</td>
<td>11,000’ to 18,000’ MSL</td>
<td>1 hour before sunrise – 1 hour after sunset, Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>Sheppard 1</td>
<td>8,000’ to 18,000’ MSL</td>
<td>1 hour before sunrise – 1 hour after sunset, Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>Sheppard 2</td>
<td>8,000’ to 18,000’ MSL</td>
<td>1 hour before sunrise – 1 hour after sunset, Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>Washita</td>
<td>8,000’ to 18,000’ MSL</td>
<td>1 hour before sunrise – 1 hour after sunset, Monday through Friday</td>
<td>ZFW</td>
</tr>
</tbody>
</table>

RAIs are another type of SUA. They are regulated under 14 CFR 73 as designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft. RAs are three-dimensional areas of airspace that are used to separate and segregate hazardous activities and military flight and training operations, including air-to-ground and ground-to-ground ordnance training. RAs are only used by participating military aircraft during scheduled hours.
**Figure 3.1-2. Airspace Types**

- **Restricted Areas (RAs).** Airspace designated under 14 CFR Part 73, within which the flight of non-participating aircraft, while not wholly prohibited, is subject to restriction. Most RAs are designated joint-use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. RAs are depicted on en route charts. Where joint-use is authorized, the name of the ATC controlling facility is also shown. Restricted airspace overlies air-to-ground ranges.

- **Military Operations Areas (MOAs).** Airspace established to separate or segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted outside of Class A airspace area. Military aircraft training could include rapid acceleration, maneuvering, and/or changes in altitude.
All commercial aviation, general aviation, and non-participating military aircraft are prohibited from entering an active RA. Most RAs are designated “joint-use,” and IFR/VFR operations in the area may be authorized by the applicable Air Route Traffic Control Center (ARTCC) when the RA is not being utilized by the using agency. Fort Sill has developed procedures that allow for IFR general aviation and other non-participating aircraft to coordinate with Fort Sill ARAC and thereby transit the RA using radar separation. Effectively, the portion of the RA used for IFR transit is inactivated for the duration of the transit. VFR aircraft are not permitted to enter an active RA. Eight contiguous RAs comprise the R-5601 complex, as identified on Figure 2.4-1 and in Table 3.1-2.

### Table 3.1-2. Existing RAs Near Fort Sill, Oklahoma

<table>
<thead>
<tr>
<th>RA</th>
<th>Altitudes</th>
<th>Time of Use</th>
<th>Controlling Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-5601A</td>
<td>Surface to 40,000’ MSL</td>
<td>Continuous</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601B</td>
<td>Surface to 40,000’ MSL</td>
<td>Continuous</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601C</td>
<td>Surface to 40,000’ MSL</td>
<td>Continuous</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601D</td>
<td>500’ AGL to 40,000’ MSL</td>
<td>Sunrise to 10:00 P.M., Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601E</td>
<td>500’ AGL to 6,000’ MSL</td>
<td>Sunrise to 10:00 P.M., Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601F</td>
<td>500’ AGL to 40,000’ MSL</td>
<td>Sunrise to 10:00 P.M., Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601G</td>
<td>500’ AGL to 8,000’ MSL</td>
<td>Sunrise to 10:00 P.M., Monday through Friday</td>
<td>ZFW</td>
</tr>
<tr>
<td>R-5601H</td>
<td>Surface to 40,000’ MSL</td>
<td>By NOTAM</td>
<td>ZFW</td>
</tr>
</tbody>
</table>

* Other times by NOTAM

### 3.1.1.2.3 Civil Airspace Use

Civilian aviation consists primarily of commercial and private aviation. Civilian aircraft operations can occur anywhere within the airspace described in Section 3.1.1.2 if and when permitted. Commercial and private pilots often operate by VFR using topographic or highway features and/or using Global Positioning System (GPS) for direct routing. Specified routes and areas have also been identified to facilitate air transportation and airspace management. This section describes these routes and areas.

**Victor Airways**, sometimes referred to as Victor Routes, are “highways in the sky” and are used by aircraft to transit between navigational aids (NAVAIDs). Victor Airways are designated on aeronautical charts with the letter “V” (hence Victor). Victor Airways are Class E airspace extending typically from 1,200 feet AGL to FL 180 or 18,000 feet MSL. The width of the victor corridor depends on the distance from the navigational aids (e.g., Very High Frequency Omni-Directional Ranges [VORs]). When VORs are less than 102 NM from each other, the Victor Airway extends 4 NM on either side of the centerline (8 NM total width). When VORs are more than 102 NM from each other, the width of the airway increases. The width of the airway beyond 51 NM from a NAVAID is 4.5 degrees on either side of the centerline between the two NAVAIDs (at 51 NM from a NAVAID, 4.5 degrees from the centerline of a radial is equivalent to 4 NM). The maximum width of the airway is at the middle point between the two NAVAIDs. Victor Airways and Jet Routes in the vicinity of Fort Sill are displayed on Figure 2.4-2.

**Jet Routes** are designated highways in Class A airspace for high altitude air traffic above FL 180. These routes are used by commercial aviation operators that fly under IFR control by the various FAA ARTCCs throughout the United States. While the minimum en route altitude for
many of these commercial routes is FL 180, the majority of flight activity on these routes is at altitudes above FL 260 and up to FL 450.

Eighteen (18) municipal and DoD airfields, along with 39 private airfields, are located within a 50-NM radius of Fort Sill. Airport use within the immediate area surrounding Fort Sill is influenced by the proximity of the Lawton-Fort Sill Regional Airport south of Fort Sill. Class D airspace with a 3,700-foot MSL ceiling is charted above the HPAAF at Fort Sill and the Lawton-Fort Sill Regional Airport.

Approach control service in the airspace around Fort Sill, including the existing R-5601 complex and the Washita MOA, allows Fort Sill to safely control aircraft in the area and allows commercial and private pilots to transit the RAs using radar separation. Under these procedures, Fort Sill will release the R-5601 complex, or subareas R-5601A, R-5601B, R-5601C, R-5601D, R-5601E, R-5601F, R-5601G, and R-5601H, to ZFW when the areas are not in use, during severe weather, and for emergency traffic situations. ZFW will return use of the R-5601 complex to Fort Sill upon request (FAA 2007).

3.1.2 Environmental Consequences

3.1.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. Airspace in the vicinity of Fort Sill would continue to be managed with no changes to airspace use.

3.1.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R-5602B

Implementation of the proposed action is not anticipated to result in significant impacts to airspace use and management in the vicinity of Fort Sill. The proposed RAs would allow the demonstration, and eventual training, of new, advanced weapon systems. As described in Section 2.4, implementation of the proposed action would create two new RAs (R-5602A and R-5602B) with proposed lateral boundaries that would overlie and extend upward over the ceilings of R-5601A, R-5601B, and a portion of R-5601F and extend approximately 8 NM east beyond the R-5601A and R-5601F eastern boundaries. Collectively, the R-5602A and R-5602B proposed boundaries and existing R-5601 RAs would fully contain the planned hazardous activities within RA airspace, from the surface to 60,000 feet MSL.

The proposed time of designation for R-5602A is by NOTAM, with an expected usage of approximately 8 hours per day and up to 200 days per calendar year. The proposed time of designation for R-5602B is by NOTAM, with an expected usage of approximately 8 hours per day and up to 25 days per calendar year. The activation period for both R-5602A and R-5602B is planned for 8:30 A.M. to 4:30 P.M. Monday through Friday, other times by NOTAM. However, a notice and graphic depiction would be published in the NTAP. The NTAP is available online at [http://www.faa.gov/air_traffic/publications/notices/](http://www.faa.gov/air_traffic/publications/notices/).

No Victor or Jet Routes would be directly affected. Victor Route 77 is located under the southeast corner of the proposed R-5602B; however, because the ceiling for Victor Route 77 is 18,000 feet MSL (22,000 feet below the floor of the proposed R-5602B), this route would not be impacted. Jet
Route 52, located northeast of the proposed RAs, would be available for routing air traffic around the area. Aircraft activity between 40,000 and 60,000 feet MSL is not extensive. Airports situated within the ROI either are currently underlying existing MOAs or are within airspace subject to existing civilian and military ATC. Stony Field, a private airport in Elgin, Oklahoma, is located below the proposed R-5602B; however, with a floor of 40,000 feet MSL, the proposed R-5602B would have no direct effect on airport operations.

The airspace above and surrounding Fort Sill is controlled and regulated by various ATC authorities and is divided into three sectors. These sectors have specific roles in managing air traffic in the region. One sector (Oklahoma City High and Cruiser Ultra High [OKC/CZR]) primarily provides overflight traffic management for turbojet arrivals/departures to and from the Oklahoma City and Tulsa airports. Turbojet arrivals/departures to and from Vance Air Force Base (AFB), north of Fort Sill, are also managed by the OKC sector. The Wichita Falls High/Archer Ultra High (SPS/ARC) sectors primarily work western arrivals to Dallas-Fort Worth airport and the ADM High/Choctaw Ultra High (ADM/CHO) works air traffic in all directions. According to FAA data from December 2016, these three sectors reach their Monitor Alert Parameter (MAP) up to four times per day. The MAP is a predetermined acceptable aircraft count that ATC uses as a gage to limit air traffic flow or increase controller staffing.

Radar and radio communications would continue to be utilized to monitor Fort Sill airspace. ZFW and Fort Sill ARAC have radar coverage for aircraft training in the Washita MOA and the R-5601 complex. Fort Sill ARAC would continue to monitor and control participating VFR aircraft and participating IFR aircraft that ingress and egress the existing RAs. Fort Sill ARAC has very high frequency/ultra-high frequency radio and landline capabilities to communicate with participating and non-participating pilots, Falcon Tower, Fort Sill Range Control, ZFW, Oklahoma City Terminal Radar Approach Control Facilities, Sheppard Radar Approach Control, and Altus Radar Approach Control.

Pilots would continue to be required to contact Fort Sill ARAC for transition and radar monitoring when desiring to transit the Fort Sill airspace. Pilots could experience delays or be vectored around active RA during periods of high traffic. However, these delays should be infrequent, and proactive flight planning and deconfliction among airspace users and the ARTCC would minimize ground holds or flight vectoring. Fort Sill ARAC would continue to vector most IFR traffic through the RA by limiting the training aircraft altitude for the period of IFR transit. Instances of ground hold or flight vectoring are not expected to be significant.

### 3.2 AIR QUALITY

#### 3.2.1 Affected Environment

#### 3.2.1.1 Definition of Resource

Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The levels of pollutants are generally expressed on a concentration basis in units of parts per million or micrograms per cubic meter.

Region 6 of the U.S. Environmental Protection Agency (USEPA) and the Oklahoma Department of Environmental Quality (ODEQ) regulate air quality in Oklahoma. The Clean Air Act (CAA),
42 USC 7401–7671q, as amended, requires the USEPA to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) to protect and promote the health and welfare of humans and the environment. These standards represent the maximum allowable atmospheric concentration of seven common criteria air pollutants (carbon monoxide [CO], nitrogen dioxide [NO₂], sulfur dioxide [SO₂], particulate matter less than or equal to 10 micrometers in diameter [PM₁₀], particulate matter less than or equal to 2.5 micrometers in diameter [PM₂.₅], ozone (O₃), and lead [Pb]) that could occur while still protecting public health and welfare.

Each state is responsible for achieving and maintaining the NAAQS. To accomplish this, states use the USEPA-required State Implementation Plan (SIP). A SIP identifies goals, strategies, schedules, and enforcement actions designed to reduce the level of pollutants in the air and bring the state into compliance with the NAAQS.

3.2.1.2 Existing Conditions

3.2.1.2.1 Climate

Fort Sill is located in Comanche County, Oklahoma, which constitutes the ROI for air quality. The climate in Comanche County is characterized as being humid subtropical. The average monthly temperature at Fort Sill is 62.1 degrees Fahrenheit (°F) (16.7 degrees Celsius [°C]). The Electric Fires EA (Appendix A) further describes the existing conditions relative to existing climate conditions.

3.2.1.2.2 Air Quality

According to the USEPA, Comanche County is in attainment for all criteria pollutants (USEPA 2017), and a conformity determination was not required as a result of implementing the proposed action in the Electric Fires EA. In the Electric Fires EA, air emissions generated under the proposed action and the No Action Alternative were compared with Comanche County emissions obtained from USEPA’s 2011 National Emissions Inventory (NEI).

3.2.1.2.3 Greenhouse Gas Emissions

The Electric Fires EA also evaluated greenhouse gases (GHGs). The six primary GHGs, defined in Section 19(i) of EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance, and internationally recognized and regulated under the Kyoto Protocol, are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from Earth’s surface. The GWP allows GHGs to be compared with each other by converting the GHG quantity into the common unit “carbon dioxide equivalent.” Baseline GHG emissions for Comanche County were obtained from the USEPA’s 2011 NEI.

3.2.2 Environmental Consequences

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not
be used to shoot projectiles above 40,000 feet MSL. Implementation of the No Action alternative would result in no impacts to air quality.

### 3.2.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R-5602B

In the Electric Fires EA (Appendix A), impacts to air quality were estimated to be less than 1 percent of the ROI’s overall annual air emissions on a pollutant-by-pollutant basis for all pollutants except for nitrogen oxide (NO\(_x\)). NO\(_x\) emissions were estimated to be 2.57 percent of the annual NO\(_x\) emissions for Comanche County. No significant impacts to local or regional air quality were anticipated to result from implementation of the Electric Fires at Fort Sill. Creation and utilization of the proposed RAs would not result in additional air emissions.

The proposed RAs would extend from 40,000 to 60,000 feet MSL. According to the Aviation Emissions and Air Quality Handbook, Version 3, Update 1, emissions above 3,000 feet are not included in any air quality analysis (FAA 2015). Per the September 12, 2016, guidance on using the Aviation Environmental Design Tool (AEDT) to conduct environmental modeling for FAA actions subject to the NEPA, above this height, pollutants that are released generally do not mix with ground-level emissions and do not have an effect on ground-level concentrations in the local area (FAA 2016). Therefore, significant impacts to air quality would not result from creation and use of the proposed RAs. On December 11, 2017, the Army notified the ODEQ of the proposed creation and utilization of R-5602A and R-5602B. On January 5, 2018, the ODEQ responded that they completed an environmental review of air, land, and water records and there are no environmental concerns under ODEQ jurisdiction (Appendix E).

### 3.3 BIOLOGICAL RESOURCES

#### 3.3.1 Affected Environment

**3.3.1.1 Definition of Resource**

For purposes of this SEA, sensitive and protected biological resources include plant and animal species that are federally listed for protection by the U.S. Fish and Wildlife Service (USFWS) or state listed by the Oklahoma Department of Wildlife Conservation (ODWC). Identifying which species occur in an area affected by an action can be accomplished through literature reviews and coordination with appropriate federal and state regulatory agency representatives, resource managers, and other knowledgeable experts.

For biological resources, the ROI for the proposed action and the No Action Alternative includes the airspace within the proposed R-5602A and R-5602B between 40,000 and 60,000 feet MSL above and near Fort Sill. Impacts resulting from new, advanced FA and ADA platforms were analyzed in the Electric Fires EA (Appendix A).

**3.3.1.2 Existing Conditions**

**3.3.1.2.1 Vegetation**

Descriptions of vegetation communities at Fort Sill are provided in the *Fort Sill Integrated Natural Resources Management Plan* (INRMP) (USAFA CFS 2014). Fort Sill is located within an ecological transition area in which tall-grass prairie merges with short-grass prairie and soil...
variation has created diverse plant communities. More than 70 percent of the installation is comprised of grassland communities, while a mix of dense woodland, riparian areas, oak savannah, and agricultural leased lands constitute the remaining areas.

3.3.1.2.2 Wildlife

Information on wildlife occurring at Fort Sill is provided in the INRMP (USAFACFS 2014). Fort Sill supports a variety of fauna, including mammals, birds, fish, reptiles, and amphibians. However, no wildlife species are known to occur at elevations between 40,000 and 60,000 feet MSL. Most birds fly below 500 feet, except during migration. Generally, long-distance migrants begin migrating at elevations of approximately 5,000 feet and then progressively climb to approximately 20,000 feet. The highest known flight of a North American migratory bird species is that of the mallard duck (*Anas platyrhynchos*), which has been observed to fly as high as 21,000 feet (World Atlas 2016). Vultures (*Aegypius monachus*) sometimes rise to elevations higher than 10,000 feet in order to scan larger areas for food and to watch the behavior of distant vultures for clues to the location of food sources (Stanford University 1988).

3.3.1.2.3 Special Status Species

Special status species are subject to regulations under the authority of federal and state agencies. The Endangered Species Act (ESA) (16 USC 1532 et seq.) of 1973, as amended, was enacted to protect and recover imperiled species and the ecosystems upon which they depend. The USFWS maintains a list of special status species considered endangered, threatened, or candidate.

“Endangered” means a species is in danger of extinction throughout all or a significant portion of its range. “Threatened”, means a species is likely to become endangered within the foreseeable future. Candidate species include plants and animals that have been studied and proposed for addition by the USFWS to the federal endangered and threatened species list. All federal agencies are required to implement protection programs for endangered and threatened species and to use their authority to further the purposes of the ESA. The Migratory Bird Treaty Act (MBTA) prohibits actions resulting in the pursuit, capture, killing, and/or possession of any protected migratory bird, nest, egg, or parts thereof.

USFWS and ODWC special status species lists, by county, were obtained to identify species with the potential to occur within Comanche County, Oklahoma. Table 3.1-1 presents the federally listed species identified under the USFWS Information for Planning and Consultation (IPaC) system (Appendix F) (USFWS 2017a). According to the ODWC County List of Endangered and Threatened Species, no state-listed species are known to occur in Comanche County (ODWC 2016a). Additionally, the USFWS Critical Habitat Portal was accessed to determine if designated critical habitat is present on or near Fort Sill. No critical habitat for USFWS special status species is present in Comanche County (USFWS 2017b). Of the five federally listed bird species with potential to occur in Comanche County, only the black-capped vireo is known to nest at Fort Sill (USAFACFS 2014; Wampler 2017). Refer to the Electric Fires EA (Appendix A) for a description of the existing conditions of black-capped vireo nesting habitat at Fort Sill.
Table 3.1-1. Federally Listed Species with Potential to Occur in Comanche County, Oklahoma

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Protection Status</th>
<th>Potential for Occurrence within the ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Knot</td>
<td><em>Calidris canutus rufa</em></td>
<td>Threatened</td>
<td>None</td>
</tr>
<tr>
<td>Piping Plover</td>
<td><em>Charadrius melodus</em></td>
<td>Threatened</td>
<td>None</td>
</tr>
<tr>
<td>Whooping Crane</td>
<td><em>Grus americana</em></td>
<td>Endangered</td>
<td>None</td>
</tr>
<tr>
<td>Least Tern</td>
<td><em>Sterna antillarum</em></td>
<td>Endangered</td>
<td>None</td>
</tr>
<tr>
<td>Black-capped Vireo</td>
<td><em>Vireo atricapillus</em></td>
<td>Endangered</td>
<td>None</td>
</tr>
</tbody>
</table>

* Federal.
Source: USFWS 2017a; ODWC 2011a –d, 2016a, b.

3.3.1.2.4 Natural Resource Area of Concern

The WMWR is an ecosystem management partner of Fort Sill, collaborating on black-capped vireo management, wildfire protection, fish stocking, and trespass issues (USAFACFS 2014). The 59,020-acre WMWR is located directly northwest of the installation. The refuge is located along the eastern edge of the southern Great Plains region and encompasses approximately 20,000 acres of open, mixed-grass prairie and approximately 39,020 acres of forest and rock outcroppings. The WMWR provides habitat for more than 50 mammal species, 240 bird species, 64 reptile and amphibian species, 36 fish species, and 806 plant species (USFWS 2017c).

3.3.2 Environmental Consequences

3.3.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. Implementation of the No Action alternative would result in no impacts to biological resources.

3.3.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R5602B

3.3.2.2.1 Vegetation

Vegetation would not be impacted by the proposed creation and use of R-5602A and R-5602B. No vegetation occurs between 40,000 and 60,000 feet MSL; therefore, implementation of the proposed action would not impact vegetation.

3.3.2.2.2 Wildlife

Wildlife would not be impacted by the proposed creation and use of R-5602A and R-5602B. As stated in Section 3.1.1.2.2, no wildlife species are known to occur between 40,000 and 60,000 feet MSL; therefore, implementation of the proposed action would not impact any wildlife species.

3.3.2.2.3 Special Status Species

The proposed creation and use of R-5602A and R-5602B would not result in any impacts to special status species because no special status species are known to occur between 40,000 and 60,000 feet MSL. In addition, no construction is associated with the proposed action.
None of the five federally listed bird species with potential to occur in Comanche County are known to occur at elevations between 40,000 and 60,000 feet MSL. As described in Section 3.3.1.2.2, the migration elevations of most birds do not exceed 20,000 feet MSL. The proposed RAs would be established between 40,000 and 60,000 feet MSL and would not impact federally listed species or habitats at Fort Sill. No impacts to special status species are anticipated. The Army has completed consultation with the USFWS on the creation and use of R-5602A and R-5602B. The USFWS Consultation Code for this project is 02EKOK00-2018-SLI-0320.

3.3.2.2.4 Natural Resource Area of Concern

Implementation of the proposed action would not impact habitats or species utilizing the WMWR; therefore, implementation of the proposed action would not impact natural resource areas of concern.

3.4 CULTURAL RESOURCES

3.4.1 Affected Environment

3.4.1.1 Definition of Resource

The National Historic Preservation Act (NHPA) was passed into law in 1966 to acknowledge the importance of protecting our nation’s heritage and historic properties from federal development. The NHPA includes provisions for the Department of Interior (DoI) to maintain the National Register of Historic Places (NRHP). The NRHP is comprised of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. The DoI is responsible for designating the “Keeper of the Register” (Keeper). Per 36 CFR 60.3(f), the Keeper is the individual who has been delegated the authority by the DoI to list properties and determine their eligibility for the NRHP. The current Keeper is the National Park Service, National Register Chief.

As defined by Fort Sill in the 2014 Integrated Cultural Resources Management Plan (ICRMP) (Fort Sill 2014), cultural resources consist of and include the following:

- Historic properties as defined in 36 CFR 800.16(l) pursuant to the NHPA (54 USC 300308) and including artifacts, records, and material remains related to such resources;
- Archeological resources as defined in the Archaeological Resources Protection Act (ARPA) (54 USC 302107) and the Archeological and Historic Preservation Act (AHPA) (54 USC 469);
- Archeological artifact collections and associated records as defined in 36 CFR 79;
- Sacred sites under EO 13007, Indian Sacred Sites, and the American Indian Religious Freedom Act (AIRFA) (42 USC 1996 and 1996a); and,
- Native American remains, objects of cultural patrimony, and cultural items as detailed in the Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq.).
The management of cultural resources is guided by Chapter 6 of AR 200-1, *Environmental Protection and Enhancement*. As outlined in AR 200-1, the cultural resources management program at Fort Sill is responsible for compliance with Sections 106 and 110 of the NHPA, as well as the ARPA, AHPA, NAGPRA, AIRFA, EO 13007, and EO 13175, *Consultation and Coordination with Indian Tribal Governments*. Responsibilities of the Fort Sill cultural resources management program are outlined in the ICRMP, which covers a wide diversity of cultural resources on the installation in compliance with Army regulations, federal legislation, and applicable guidelines.

### 3.4.1.2 Existing Conditions

The Electric Fires EA (Appendix A) describes the existing conditions relative to known cultural resources on Fort Sill. Ten (10) properties on Fort Sill are currently listed in the NRHP, and the installation contains more than 420 NRHP-eligible properties, sites, and resources (65 archaeological sites; 17 individual architectural/historic buildings, structures, and sites; and 11 historic districts containing approximately 350 standing resources). The Area of Potential Effect (APE) includes a project’s actions and an area necessary to identify direct, indirect, and cumulative effects on cultural and historic resources as a result of those actions.

As part of the Section 106 consultation process for this SEA, Fort Sill has consulted with the Oklahoma State Historic Preservation Office (SHPO) for their concurrence of “no historic properties affected by the undertaking.”

EO 13007 identifies Native American sacred sites as special floral, faunal, and mineral areas that contain resources used in religious ceremonies, among other natural and cultural resources. Confidentiality and access to these sites is mandated by EO 13007 and the AIRFA. For these reasons, no maps or descriptions are publicly available.

Fort Sill is consulting with nine Native American tribes to provide access to sacred sites (including plants, animals, and landscapes considered sacred) located on Fort Sill; however, in accordance with AR 200-1, the Garrison Commander could impose reasonable restrictions and conditions on access to sacred sites on Fort Sill for the protection of health and safety or for reasons of national security (RCG&A 2013).

### 3.4.2 Environmental Consequences

#### 3.4.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. Implementation of the No Action alternative would result in no impacts to cultural resources.

#### 3.4.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R-5602B

Implementation of the proposed action would not result in any direct or indirect impacts to cultural resources. No construction is associated with the proposed creation and use of R-5602A or R-5602B and the proposed operations would occur in airspace located 40,000 to 60,000 feet MSL above Fort Sill and the surrounding area. No tribal lands are located beneath the proposed RAs.
In compliance with Section 106 of the NHPA, Fort Sill has consulted with the SHPO for concurrence on a finding of no effect to cultural resources as a result of implementing the proposed action. On January 3, 2018, the SHPO responded to the interagency letter and indicated that they concur with the APE and found no historic properties affected by the undertaking (Appendix E).

In compliance with the NEPA, Fort Sill is also consulting with nine Native American tribes. On January 2, 2018, the Bureau of Indian Affairs responded to the interagency letter and indicated that they are unaware of any environmental/land use constraints or other issues outside of those identified in the DOPAA that would need to be addressed in the EA and they look forward to reviewing the Draft EA. On January 4, 2018, the Cheyenne & Arapaho Tribes responded to the interagency letter and indicated the project has been categorized as “No Properties” have been identified. However, they did provide direction to the Army in the event of inadvertent discoveries as described below. On January 8, 2018, the Comanche Nation responded to the interagency letter and also indicated that “No Properties” have been identified in accordance with 36 CFR 800.4(d)(1). On January 23, 2018, the Delaware Nation responded and indicated concurrence with the proposed plan. See Appendix E for copies of the aforementioned letters.

Although the potential for undiscovered resources is low, inadvertent discoveries would be protected and maintained in accordance with the NHPA, ARPA, and NAGPRA. Should cultural resources be discovered during military training or other activities, all work with the potential to impact the discovery would immediately stop, reasonable effort would be taken to protect cultural resources from further impact, and the Fort Sill Cultural Resources Officer (CRO) would be contacted immediately. Should the CRO determine the presence of cultural items as defined by the NAGPRA, the CRO would follow the NAGPRA compliance procedures documented as Standard Operating Procedure (SOP) 6 in the ICRMP (RCG&A 2013). If cultural items as defined by the NAGPRA are not present, the CRO would determine if the discovery is an isolated find or an archeological site. The discovery would then be documented according to the CRO’s determination of type discovery. Per ICRMP SOP 5, the appropriate parties would then be informed and/or consulted concerning a determination of NRHP eligibility and the proposed actions to avoid, minimize, or mitigate adverse effects to cultural resources. The CRO would permanently maintain all documentation related to the discovery in his/her files (RCG&A 2013).

### 3.5 **HAZARDOUS MATERIALS AND WASTE**

#### 3.5.1 **Affected Environment**

##### 3.5.1.1 Definition of Resource

The terms “hazardous materials” and “hazardous waste” refer to substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristic, could present substantial danger to public health or the environment when released into the environment. Products containing hazardous materials that could result in the generation of hazardous waste include fuel, adhesives, sealants, corrosion prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, and cleaners.

The key federal regulatory requirements related to hazardous materials and waste include:

- Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901 et seq.);
• Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 (42 USC 11001-11050);
• Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 (42 USC 9601-9675);
• Community Environmental Response Facilitation Act of 1992 (42 USC 9620);
• Asbestos Hazard Emergency Response Act (15 USC 2651);
• Spill Prevention, Control and Countermeasure Rule (40 CFR 112);
• USEPA Regulation on Identification and Listing of Hazardous Waste (40 CFR 261);
• USEPA Regulation on Standards for the Management of Used Oil (40 CFR 279);
• USEPA Regulation on Designation, Reportable Quantities, and Notification (40 CFR 302);
• EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance;
• Toxic Substances Control Act (TSCA) of 1976 (40 CFR 700–766); and
• CAA of 1970, including the 1990 CAA Amendments (40 CFR 61).

The Army policy for hazardous material and waste management is contained in AR 200-1. For the purposes of this analysis, the ROI for the proposed action and No Action Alternative includes Fort Sill where these substances are used, stored, transported, or disposed.

The qualitative assessment of impacts from hazardous materials and waste management focuses on how (context) and to what degree (intensity) each alternative could affect hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal. Potential impacts related to hazardous materials and wastes were analyzed for the following five effects:

1. Generation of hazardous material/waste types or quantities could not be accommodated by the current management system;
2. Increased likelihood of an uncontrolled release of hazardous materials that could contaminate the soil, surface water, groundwater, or air;
3. Non-compliance with applicable federal and state regulations as a result of the proposed action;
4. Disturbance or creation of contaminated sites, resulting in adverse effects on human health and/or the environment; and
5. Established management policies, procedures, and handling capacities could not accommodate the proposed action.

3.5.1.2 Existing Conditions

Fort Sill is a Large Quantity Generator, as defined by the USEPA, with USEPA identification number of OK4213720846. Hazardous materials and wastes on Fort Sill are managed according
to the Fort Sill *Hazardous Material and Waste Management Plan* (Fort Sill 2016). This plan describes the responsibilities, policies, and procedures for managing hazardous materials and wastes on the installation and ensures compliance with applicable federal, state, and local laws and regulations. The *Hazardous Material and Waste Management Plan* applies to all organizations and activities located on or occurring at Fort Sill (Fort Sill 2016).

Fort Sill manages hazardous substance spills and releases through the implementation of its Installation Spill Contingency Plan (ISCP) (Fort Sill 2011a). The ISCP is a complement to the installation’s Spill Prevention, Control, and Countermeasure (SPCC) Plan (Fort Sill 2011b) and serves to minimize the impacts to human health and the environment, including water resources and wildlife, caused by spills of hazardous materials and wastes at Fort Sill. The SPCC Plan and ISCP establish the responsibilities, duties, procedures, and resources to be used to contain, mitigate, and clean up oil products and hazardous material or waste spills on the installation (Fort Sill 2011a and b).

### 3.5.2 Environmental Consequences

#### 3.5.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. Fort Sill would continue to use, manage, and dispose of hazardous materials and waste as described in Section 3.5.1.2. No impacts to management, use, or generation of hazardous materials and waste would occur.

#### 3.5.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R-5602B

Implementation of the proposed action does not include any construction; therefore, no asbestos-containing materials, polychlorinated biphenyls, lead-based paint, site contamination, or unexploded ordnance is anticipated to be generated or encountered.

Under the proposed action, RAs R-5602A and R-5602B would be created to safely segregate commercial and private aircraft pilots from above-the-horizon hazardous activities associated with the use of advanced laser weapon systems and new, advanced FA and ADA platforms and munitions. As described in the Electric Fires EA (Appendix A), these weapon systems could require the use of hazardous materials and could potentially produce hazardous waste. Should hazardous materials be needed or hazardous waste generated during these operations, the material or waste would require Fort Sill Environmental Quality Division (EQD) approval, and be tracked and managed according to the Fort Sill *Hazardous Material and Waste Management Plan* (Fort Sill 2016).

Examples of hazardous materials or wastes that could be used or generated during the use of advanced laser weapon systems and new, advanced FA and ADA platforms are listed and analyzed in the Electric Fires EA (Appendix A). Any hazardous material used or waste generated would be the responsibility of the operating unit or entity and disposed of in accordance with applicable federal, state, and local laws and regulations.

In the event of an accidental hazardous material or waste release during the use of these new and advanced weapon systems, the proper notifications and actions would be taken in accordance
with the Fort Sill ISCP and SPCC Plan (Fort Sill 2011a, 2011b). Spill kits would be available and accessible during portable generator refueling.

The use of hazardous materials, the production of hazardous wastes, and the potential impacts of a spill associated with the use of new, advanced weapon systems below the horizon at Fort Sill were analyzed in the Electric Fires EA (Appendix A). It was determined in the Electric Fires EA that no significant impacts related to hazardous materials or hazardous wastes would result from the use of these weapon systems below the horizon at Fort Sill. The proposed creation and use of RAs R-5602A and R-5602B would not generate any new hazardous wastes or use new hazardous material and would not affect the generator status or negatively affect the hazardous materials and waste program. Therefore, no significant impacts to hazardous materials and waste management would result from the creation and use of R-5602A and R-5602B.

3.6 NOISE

3.6.1 Affected Environment

3.6.1.1 Definition of Resource

Noise-related concepts and terminology are discussed in the Electric Fires EA (Appendix A) and are only briefly summarized in this SEA. Noise can be defined as any sound that interferes with normal activities or otherwise diminishes the quality of the environment. The decibel (dB) is the unit of measure most often used to describe the intensity of sound. As points of reference, the sound level of normal conversation ranges from 63 to 65 dB, and kitchen appliances (e.g., blender) generate 83 to 88 dB at a distance of 3 feet.

The Army has published land use recommendations in AR 200-1 for areas affected by high levels of noise from aircraft, large arms/explosives, and small arms. AR 200-1 defines several “noise zones” that are delineated by threshold noise levels. Noise-sensitive land uses (e.g., housing, schools, and medical facilities) are considered acceptable within the “Land Use Planning Zone” (LUPZ) and “Noise Zone I,” are normally not recommended in “Noise Zone II,” and are never recommended in “Noise Zone III.”

The noise ROI for the proposed action includes areas in which the advanced laser weapon systems and new, advanced FA and ADA platform firing events would be audible. This affected area would be limited to areas within the Fort Sill ranges. Noise impacts would be considered significant if additional noise-sensitive areas were to be included within Noise Zone III.

3.6.1.2 Existing Conditions

The existing noise environment is described in detail in the U.S. Army Fort Sill Installation Compatible Use Zone Study (Army 2015b). The ranges at Fort Sill are exposed to intense military training noise on a regular basis, with principle noise sources being munitions firing and aircraft operations.

Munitions training includes firing of small, medium, and large arms by ground units as well as munitions delivery from aircraft. Although aircraft bombing events are the loudest single operation that occurs, artillery firing occurs at a much higher frequency. Ground-based firing includes a wide variety of small arms, mortars, howitzers, rockets, and explosives charges. Small arms Noise
Zone II affects 32,223 acres, 2,157 acres of which are outside the installation boundaries. The small-arms Noise Zone III affects 6,818 acres on the installation and does not extend beyond the installation boundaries. The large arms LUPZ affects 183,964 acres (174,707 acres outside the installation boundaries), Noise Zone II affects 91,086 acres (45,935 acres outside the installation boundaries), and Noise Zone III affects 31,989 acres (56 acres outside the installation boundaries).

Approximately 8 to 30 sorties are conducted per average day in the existing R-5601 airspace. Aircraft operations include jet (e.g., B-1, T-38, and F-16) and propeller-driven (e.g., T-6, C-130, C-12) aircraft as well as rotorcraft (e.g., CH-47, AH-64) and UAS. Jet aircraft are by far the loudest aircraft type operating at Fort Sill. As representative examples, an F-16 generates a maximum noise level of 106 dB during overflight; a C-130 generates 85 dB; and a CH-47 generates 78 dB at a distance of 1,000 feet and in typical range flight configuration (Army 2015b). Noise levels generated by UAS are considerably lower than those generated by manned aircraft (Army 2015b).

During times when military training activities are not occurring, average ambient noise levels in rural, unpopulated areas such as the Fort Sill ranges are typically approximately 45 dB (USEPA 1974). No locations that would be considered ‘noise-sensitive’ are located on the ranges.

### 3.6.2 Environmental Consequences

#### 3.6.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. The noise environment at Fort Sill would not change, and no additional noise impacts would occur.

#### 3.6.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R-5602B

Implementation of the proposed action would not affect ongoing military training activities or the noise generated by those activities. The proposed RAs (R-5602A and R-5602B) are primarily intended to segregate private and commercial aircraft from above-the-horizon hazardous activities associated with the use of advanced laser weapon systems and new, advanced FA and ADA platforms and munitions. Military aircraft training within the existing R-5601 complex would continue to follow current airspace utilization patterns.

Commercial and private pilots intending to fly through the proposed RAs would be routed elsewhere while the RAs are active. Noise levels generated by aircraft operating at the altitudes designated for the proposed RAs (40,000 to 60,000 feet MSL) are very low at ground level. For example, a Boeing 747 cruising at 40,000 feet MSL generates a maximum noise level of 43 dB during overflight, as calculated using the program SELCALC. This noise level is below typical ambient noise levels and would not be audible under normal circumstances. In conclusion, commercial and private pilots would be re-routed during activation of the proposed RAs and aircraft re-routing would result in minor noise level increases.

Noise associated with the use of the new, advanced weapon systems below the horizon at Fort Sill was analyzed in the Electric Fires EA (Appendix A). It was determined in the Electric Fires EA that no significant noise impacts would result from the use of these weapon systems below the horizon at Fort Sill. The proposed creation and use of R-5602A and R-5602B would
not create any new sources of noise. No significant noise impacts would result from the creation and use of R-5602A and R-5602B.

3.7 SAFETY

3.7.1 Affected Environment

3.7.1.1 Definition of Resource

This section addresses ground and flight safety for activities and operations on the ground, in the air, and in space that have the potential to affect members of the public, Fort Sill personnel, and space optical assets above 60,000 feet MSL. Protection of human health and the environment has and continues to be an integral part of the Army’s mission at Fort Sill. Activities on Fort Sill comply with all applicable federal and state, DoD-, Army-, and installation-level occupational health, safety, and environmental requirements to ensure that activities are conducted with no or minimal risk to persons or the environment, both on and off of Fort Sill.

The Fort Sill Installation Safety Office mission is: “To fully support the command’s mission while providing the best possible accident and injury prevention programs for all of Team Sill personnel.” This mission is fully supported by the Army Installation Management Command safety mission.

All ranges on Fort Sill are managed in accordance with Fort Sill Regulation 385-1, Post Range Regulation. Fort Sill Regulation 385-1 covers activities on the ground and in Fort Sill airspace up to an altitude of 40,000 feet MSL and applies to Army, Air Force, Navy, and Marine personnel and civilians utilizing the installation range complex outside the cantonment area. Further, this regulation establishes risk management as the Army’s principal risk reduction methodology and ensures regulatory and statutory compliance. It provides for public safety relative to Army operations and activities. Fort Sill Regulation 200-1, Recreational Use, Management, Harvest, and Protection of Natural Resources, governs the recreational use of range training areas on Fort Sill.

The ROI for safety is Fort Sill and surrounding areas, including the associated airspace. Range Operations is responsible for the safe management and operation of ranges on Fort Sill. Range management involves the development and implementation of those processes and procedures required to ensure that Army ranges are planned, operated, and managed safely. The focus of range management is on ensuring the safe, effective, and efficient operation of ranges and safe and efficient use of RAs. The overall purpose of range management is to balance the military need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on human health, the environment, and surrounding communities.

3.7.1.2 Existing Conditions

3.7.1.2.1 Army Health and Safety Regulations

The Army’s policies, responsibilities, and procedures to protect Army personnel and property are contained in AR 385-10, Army Safety Program. AR 385-10 provides for operational safety and safe and healthy work places, and assures compliance with applicable laws and regulations. Department of the Army Pamphlet (DA PAM) 385-24, The Army Radiation Safety Program,
establishes Army radiation safety guidance and direction to implement the requirements of AR 385-10. Regulations and guidance pertaining to the safe use of ranges on Army installations is contained in AR 385-63, Range Safety. AR 385-63 covers range use, from live firing of small arms to rockets, guided missiles, and lasers, and provides guidance for minimizing the risk of using these weapons.

3.7.1.2.2 Fort Sill Health and Safety Regulations

Fort Sill also has its own health and safety regulations, contained in Fort Sill Regulation 385-1 and Fort Sill Regulation 385-10, Safety Regulation. These regulations implement requirements of the Occupational Safety and Health Act of 1970 as implemented in EO 12196, Occupational Safety and Health Programs for Federal Employees, Department of Defense Instruction (DoDI) 6055 Series, and AR 385-10. Fort Sill Regulation 385-1 establishes responsibilities, procedures, and rules for all personnel utilizing the installation range complex. Fort Sill Range Operations is responsible for range safety, controls weapons firing and the use of training facilities, and is responsible for the management of aerial operations within the range complex at Fort Sill. Fort Sill Range Operations also provides clearance for aircraft overflights of the RA.

Wide varieties of different weapon systems are currently used at Fort Sill on a daily basis. These systems range from small arms (e.g., 12-gauge shotgun, M-16, M203, 50-caliber) to anti-tank guns (e.g., the AT4) to larger FA/ADA systems (e.g., the 155 mm Howitzer, the Avenger missile system, and the High Mobility Artillery Rocket System [HIMARS]). Fort Sill Range Operations is responsible for the management and operation of all the ranges to prevent conflicting uses and provide a safe training environment for Soldiers and the public.

Ground Safety. Range Operations requires that the surface area encompassing the weapon safety footprints be protected by purchase, lease, or other restriction to ensure the safety of personnel, structures, and the public from expended rockets, missiles, or target debris and hazardous operations. The lands associated with the Fort Sill training ranges meet these requirements.

Range Operations continually assesses the risks associated with weapons use and establishes mission parameters that minimize the potential safety hazards. Specific weapon safety footprints must be assessed against each intended target to ensure that they can be safely used. Range Operations develops range management plans for the training ranges used and transient aircraft. In addition, Range Operations assigns responsibilities and provides direction regarding range scheduling, maintenance, explosive ordnance disposal, range decontamination, and debris disposal.

Surface Danger Zones (SDZs) are a key aspect of providing safe ranges. SDZs are designed to minimize the probability of hazardous fragment or round escapement from installation boundaries and to minimize the danger to the public, installation personnel, facilities/equipment, and property. SDZs and associated exclusion areas are off-limits to non-participating personnel during active range use (DA PAM 385-63, Range Safety).

Wildfires are a growing natural hazard in most regions of Oklahoma and the Southwest, posing a threat to life and property, particularly where native ecosystems meet developed areas. Fort Sill maintains a Fire Mitigation Plan and actively maintains firebreaks to help prevent and manage wildfires at the installation. Range Operations personnel monitor weather and fire conditions.
from resources available for fire intelligence information, including the National Fire Danger Rating System website, and then provide recommendations to operations personnel. These recommendations address the need to alter flight or ground operations and if the risk is excessive as determined on a situational basis.

Lasers, with appropriate backstops, are currently used on Fort Sill as pointers, markers, target designators, and for other purposes. All four classes of lasers are used. While Class 1 and 2 lasers can be used anywhere, Class 3 and 4 lasers can only be used in designated areas.

The Army Public Health Command Nonionizing Radiation Program provides laser range-specific technical expertise on laser hazards to personnel operating lasers. Fort Sill Regulation 385-1, Chapter 8, provides guidance for the safe use of tactical lasers, pointers, and markers on Fort Sill, excluding Falcon Range. Per Fort Sill Regulation 385-1, Fort Sill Range Operations develops procedures for laser use on a case-by-case basis.

The Laser Range Safety Officer (LRSO) is responsible for the safe conduct of laser operations at lasing points. Army laser range safety guidance is described in DA PAM 385-63. The specific guidelines to ensure the proper control of hazardous laser energy are outlined in Military Handbook (MIL-HDBK)-828C, Chapter 8. Chapter 7 of DA PAM 385-24 identifies the training requirements for laser safety officers. As part of the Fort Sill laser range safety protocols, all personnel participating in laser operations are required to wear protective eyewear. In addition, restrictive signage, establishment of safety zones, and evacuation of non-mission essential personnel prior to lasing activities are all part of the Fort Sill Safety Program.

Hypervelocity projectile weapon systems with appropriate backstops (e.g., the railgun) are currently used on Fort Sill.

As described in the Electric Fires EA (Appendix A), safety issues related to electro-dynamic kinetic energy systems are primarily related to range safety. Other safety issues include the safety of personnel during the firing of these systems. Some electro-dynamic kinetic energy systems could generate strong electric and magnetic fields, while other systems use potentially harmful materials. The DoD and Army safety programs provide policies, responsibilities, and procedures to protect Army personnel. In addition to the regulations mentioned above, DoDI 6055 provides permissible exposure limits for Army personnel that have occupational exposures to electric and magnetic fields.

**Flight Safety.** As indicated in Section 3.1.1, Fort Sill ARAC is the approving agency for participating aircraft entry into the R-5601 complex and Fort Sill ARAC is designated as the airspace usage liaison with ZFW for the R-5601 complex. Fort Sill ARAC provides area status information and traffic advisories to non-participating pilots.

### 3.7.2 Environmental Consequences

#### 3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed RAs (R-5602A and R-5602B) would not be created. Lasers would not be used above the horizon and artillery and kinetic weapons would not be used to shoot projectiles above 40,000 feet MSL. All of the safety policies and procedures would remain in place, resulting in no changes to safety.
3.7.2.2 Proposed Action – Creation and Use of Restricted Areas R-5602A and R-5602B

The creation and use of the proposed R-5602A and R-5602B would not result in significant impacts to safety. The use of new, advanced weapon systems below the horizon at Fort Sill was addressed in the Electric Fires EA (Appendix A). The creation and use of R-5602A and R-5602B would enhance safety because commercial and private pilots would be safely segregated from hazardous activities above the horizon.

Laser weapons are one of the new, advanced weapon systems proposed to be fired above the horizon and through R-5602A and R-5602B. The most common laser hazard occurs when beams directly enter the eye, which could result in eye damage ranging from temporary flash blindness to permanent eye damage. To address this hazard, the Army strictly adheres to Occupational Safety and Health Administration (OSHA), Army, and American National Standards Institute (ANSI) laser safety standards and imposes strict safety protocols for all laser operations. As part of laser demonstrations or training, the Army would implement a multi-tiered safety system to address the inadvertent lasing of space optical assets and personnel on the ground and in aircraft. The safety program would require human outdoor safety spotters, close monitoring of FAA and Army radar feeds, and use of a space asset Predictive Avoidance (PA) system during all laser activities.

The Army would coordinate all above-the-horizon approvals with the Laser Clearinghouse within the JSpOC in JFCC Space at Vandenberg AFB. Recent communication with JFCC Space (Baker 2017) indicated that the Laser Clearinghouse did not require any specific language or input into the SEA process but recommended to note in the SEA that the Army coordinated the Maneuver and Fires Integration Experiment (MFIX) 2018 event with the Laser Clearinghouse for deconfliction (Baker 2017).

The JSpOC uses the SPIRAL-3 program to track the orbits of satellites. As part of the coordination process, the JSpOC would calculate and provide laser “shutter times.” Prior to any laser demonstration or training, these shutter times would be programmed into the laser weapon system. This would prevent the laser from firing during periods when space optical assets are passing through the laser beam trajectory. Furthermore, the JSpOC requires on-site validation rehearsals prior to approval of any laser firing above the horizon.

In the unlikely event that preventive measures fail and the laser would fire in the vicinity of a passing satellite, most laser operators agree that the odds of a laser damaging a satellite's instruments are small. Satellites in low-Earth orbit travel at average speeds of approximately 17,000 miles per hour and would cross a beam for only a few milliseconds. If the two were to cross, the satellite would likely need to have its optical scanner aimed directly at the beam to cause any damage (APS News 2017).

During any laser demonstrations or training, all mission-essential personnel would wear certified laser safety eye protection, and laser operators would be in constant communication with the human ground spotters and ATC staff monitoring radar feeds. Should an aircraft be identified near the proposed RAs during the above-the-horizon laser activities, all laser operations would be immediately aborted.
New, advanced FA and ADA weapon systems proposed to be fired at high angle include surface-to-surface kinetic weapons (e.g., railguns, hypervelocity projectile weapon systems, etc.). These weapon systems would not be used to shoot projectiles into the proposed R-5602B (laser only). These weapon systems would be operated in accordance with the same regulations and procedures applicable to existing projectile systems at Fort Sill, and would use existing firing points and impact areas. These high-trajectory, surface-to-surface kinetic weapons are anticipated to have firing point and downrange health and safety concerns typical of any major large artillery gun. These systems would utilize R-5602A, and effects would be contained on the installation in established impact areas. The additional airspace is required due to the high altitude of munition trajectory. Additional safety information regarding these weapon systems is included in the Electric Fires EA (Appendix A). No significant impacts to human health and safety are anticipated when demonstrations and training are conducted in accordance with all applicable safety regulations.

**Ground Safety.** All safety actions that are in place for existing training ranges would continue to be in place for the proposed operations. Fort Sill maintains detailed emergency and mishap response plans to react to an accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off the range. Prior to any new, advanced weapon system activities, the area would be cleared of all non-mission essential personnel, roads would be closed, and restrictive signs would be put in place. The range safety personnel and all other range personnel would continually watch for hazardous conditions such as trespassers, fires, bird activity conditions, etc. Range users would be immediately notified of any hazardous conditions on the range. If safety is in question, the range safety officer or other appropriate authority would immediately stop range operations until the situation is remedied.

**Flight Safety.** The creation and use of the proposed RAs would segregate all air traffic from the hazardous new, advanced weapons system activities. As mentioned, the Army would implement a multi-tiered safety program to maintain flight safety during these activities and training.

The proposed RAs (R-5602A and R-5602B) would be activated by NOTAM, with an expected usage of approximately 8 hours per day from 8:30 A.M. to 4:30 P.M., Monday through Friday, and other times by NOTAM. R-5602A would be activated by NOTAM, with an expected usage of up to 200 days per calendar year. R-5602B would also be activated by NOTAM, with an expected usage of up to 25 days per calendar year. Fort Sill would notify ZFW prior to laser activation and high-trajectory, surface-to-surface kinetic weapons use. Additional notification requirements would exist prior to and following lasing operations. Strict control of RA, restricted access to range areas, and use of established safety procedures would minimize the potential for safety risks and ensure the separation of range operations from non-participants. Significant impacts to aviation safety would not result from the creation and use of the proposed RAs, R-5602A and R-5602B.
4. CUMULATIVE EFFECTS

The CEQ guidelines stipulate that the cumulative effects analysis in an EA should consider the potential environmental consequences resulting from “the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7).

Actions that have a potential to interact with the proposed action at Fort Sill are included in this cumulative effects analysis. This approach enables decision makers to have the most current information available so that they can evaluate the range of environmental consequences that would result from implementation of the proposed action at Fort Sill.

In this chapter, the Army has identified past and present actions in the region of Fort Sill. In addition, this analysis also evaluated reasonably foreseeable future actions that are in the planning phase in this region.

The assessment of cumulative effects begins with defining the scope of other project actions and the potential interrelationship with the proposed action (CEQ 1997). The scope of the analysis must consider other projects that coincide with the location and timetable of implementation of the proposed action at Fort Sill. Cumulative effects can arise from single or multiple actions and through additive or interactive processes acting individually or in combination with each other. Actions that are not part of the proposal, but that could be considered as actions connected in time or space (40 CFR 1508.25) (CEQ 1997), could include projects that affect areas on or near Fort Sill. This analysis addresses three questions to identify cumulative effects:

1. Does a relationship exist such that elements of the proposed action might interact with elements of past, present, or reasonably foreseeable actions?
2. If the proposed action and another action could be expected to interact, would the proposed action be affected by impacts of the other action?
3. If such a relationship exists, does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

For the proposed action under consideration to have cumulative significant impacts on a VEC, two conditions must be met. First, the combined impacts of all identified past, present, and reasonably foreseeable projects, activities, and processes on the particular VEC, including the impacts of the proposed action, must be significant. Second, the proposed action must make a substantial contribution to that significant cumulative impact. Proposed actions of limited scope do not typically require as comprehensive an assessment of cumulative impacts as proposed actions that have significant environmental impacts over a large area (CEQ 2005).

In the following sections, the cumulative significance is based on the context, intensity, and timing of the proposed action relative to the past, present, and reasonably foreseeable actions. A summary of the cumulative effects is provided, followed by a discussion of the resource areas that have potentially significant cumulative effects based on the above evaluation criteria.
4.1 **PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS**

This section provides decision makers with the cumulative effects of the proposed action, as well as the incremental contribution of past, present, and reasonably foreseeable actions.

As part of the Electric Fires EA, the Army completed a comprehensive evaluation of past, present, and reasonably foreseeable actions at Fort Sill and around the Lawton, Oklahoma, area. The cumulative effects analysis identified 15 different past, present, and reasonably foreseeable projects that could have interacted with implementation of either of the two alternatives associated with the Electric Fires mission at Fort Sill (Appendix A). The cumulative effects analysis in the Electric Fires EA did not identify significant impacts to any of the VECs resulting from either of the electric fires alternatives when combined with any or all of the 15 projects.

As part of the analysis associated with this SEA, past, present, and reasonably foreseeable actions were evaluated to determine if any recent interactions would have the potential to interact with the proposed creation and utilization of R-5602A and R-5602B.

Table 4.1-1 summarizes past, present, and reasonably foreseeable actions within the region. This table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources, if any, could potentially interact with creation and utilization of RA R-5602A and R-5602B at Fort Sill. No other actions were identified during the recent data gathering process for this SEA at Fort Sill. The only recent activity that could have resulted in a cumulative effect to airspace users was the temporary creation and use of the RA R-5602 for the successful MFIX 2018 demonstration conducted in December of 2017. This demonstration was considered successful because there were no intrusions into the temporary RA and the demonstration was completed with no impacts to commercial/private pilots or space assets. Because this was only a temporary action, no significant cumulative impacts to airspace use would result.

Past activities are those actions that occurred within the geographic scope of cumulative effects that have shaped the current environmental conditions of the project area. For most VECs, the impacts of past actions are now part of the existing environment and are incorporated in the description of the affected environment in Chapter 3.
<table>
<thead>
<tr>
<th>Action</th>
<th>Proponent/Location</th>
<th>Timeframe</th>
<th>Description</th>
<th>Resource Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Fires Demonstrations</td>
<td>Fort Sill</td>
<td>Present, future</td>
<td>Demonstrations of various Electric Fires and Loitering Aerial Munition Systems (LAMS) at Fort Sill, Oklahoma. Electric Fires is a term that represents systems that use EM energy to destroy, degrade, and deny enemy threats. The LAMS are explosive guided munitions used to counter aerial and ground threats.</td>
<td>Airspace, Safety</td>
</tr>
<tr>
<td>Grow the Army Initiative</td>
<td>Fort Sill</td>
<td>Present, future</td>
<td>The Army has mandated an Active Duty Army force increase of 17,000 Soldiers. A similar mandate is in place for the National Guard and Army Reserve. Because of this mandate, Fort Sill is experiencing a large increase in the number of troops undergoing Advanced Instructor Training (AIT) and basic training.</td>
<td>Noise, Air Quality, Safety, Biological Resources, Cultural Resources</td>
</tr>
<tr>
<td>Out Year Plan, 2018 and Beyond</td>
<td>Fort Sill</td>
<td>Present, future</td>
<td>Military Construction (MILCON) - Training Support Facility, Reception Barracks Complex PH2, Advanced Individual Training Barracks Complex PH2, etc.</td>
<td>Noise, Air Quality, Safety, Biological Resources, Cultural Resources</td>
</tr>
<tr>
<td>Water Crossings Improvements</td>
<td>Fort Sill</td>
<td>Present, future</td>
<td>Non-MILCON - Replace low-water crossings with box culverts throughout installation. Improve storm water flow and reduce flash flooding.</td>
<td>Safety, Biological, Cultural Resources</td>
</tr>
<tr>
<td>Fence line Improvements</td>
<td>Fort Sill</td>
<td>Present, future</td>
<td>Correction of the Boundary Fence.</td>
<td>Safety, Biological Resources, Cultural Resources</td>
</tr>
<tr>
<td>Creation of R-5601G and R-5601H</td>
<td>Fort Sill</td>
<td>Past</td>
<td>In 2016, two new areas of RA were created above Fort Sill. These include R-5601G created to the north of the installation and R-5601H created over the HPAAF.</td>
<td>Air Quality, Biological Resources, Cultural Resources, Hazardous Materials and Waste, Noise, Safety</td>
</tr>
<tr>
<td>Creation of temporary RA R-5602</td>
<td>Fort Sill</td>
<td>Past</td>
<td>Temporary RA was recently created at Fort Sill to support the MFIX 2018 demonstration conducted in December 2017.</td>
<td>Airspace Resources</td>
</tr>
<tr>
<td>Re-route East Cache Creek</td>
<td>Fort Sill</td>
<td>Present, future</td>
<td>Re-route of a portion of East Cache Creek.</td>
<td>Air Quality, Biological Resources, Cultural Resources</td>
</tr>
</tbody>
</table>
### Table 4.1-1. Past, Present, and Reasonably Foreseeable Actions at Fort Sill and Associated Region (Continued)

<table>
<thead>
<tr>
<th>Action</th>
<th>Proponent/ Location</th>
<th>Timeframe</th>
<th>Description</th>
<th>Resource Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State and Local Actions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highway and Road Improvements</td>
<td>Oklahoma Department of Transportation/ Comanche County</td>
<td>Present, future</td>
<td>Based on review of the Oklahoma Department of Transportation Project 8 Year Construction Work Plan Report, 21 road and bridge projects are scheduled for construction in Comanche County between 2017 and 2024. Projects range from a fencing project to an interchange at US-62 and I-44.</td>
<td>Noise, Air Quality, Safety, Biological Resources,</td>
</tr>
<tr>
<td>Apache Casino Hotel Event Center</td>
<td>Fort Sill Apache Tribe</td>
<td>Past, present</td>
<td>Construction of a 53,000 square-foot event center that can seat up to 1,200 people for special events and entertainment. Expected to be completed in the spring of 2017.</td>
<td>Cultural Resources and Noise</td>
</tr>
<tr>
<td>Public Safety Facility</td>
<td>City of Lawton/ Lawton Industrial Development Authority (LIDA)</td>
<td>Present, future</td>
<td>Construction of a new public safety facility that will be the new home of the Lawton Police Department and city jail, the Central Fire Station, and the Municipal Court. The estimated 97,400 square-foot facility will be located on 5.2 acres on Railroad Street immediately south of East Gore Boulevard.</td>
<td>Noise and Safety</td>
</tr>
<tr>
<td>Fire Station No. 8</td>
<td>City of Lawton</td>
<td>Present, future</td>
<td>Construction of a new 16,000 square-foot fire station (Station No. 8) at Southwest Bishop Road between 52nd Street and 67th Street.</td>
<td>Noise and Safety</td>
</tr>
<tr>
<td>East Lake, Oak Pointe, Oak Ridge, etc.</td>
<td>Private developers/ City of Lawton</td>
<td>Past, present, future</td>
<td>Development of various single-family home subdivisions in and around the City of Lawton.</td>
<td>Noise, Air Quality, Biological Resources</td>
</tr>
<tr>
<td>F-35 Use of Falcon Range</td>
<td>Air Force Reserve Command (AFRC)</td>
<td>Future</td>
<td>The preferred alternative for the AFRC beddown of F-35A aircraft is Naval Air Station Fort Worth Joint Reserve Base. Should the aircraft be based at this location, F-35A pilots would potentially use Falcon Range for training purposes.</td>
<td>Noise, Safety and Airspace</td>
</tr>
</tbody>
</table>
4.2 **Cumulative Impact Analysis**

This section evaluates the cumulative effects from the past, present, and reasonably foreseeable future actions (see Table 4.1-1) relative to the creation and utilization of the proposed R-5602A and R-5602B. Table 4.2-1 provides a summary of the cumulative effects. As shown in Table 4.2-1, only Airspace Resources are anticipated to contribute to cumulative effects. Cumulative effects are discussed for airspace resources below.

![Table 4.2-1. Summary of Cumulative Effects for Fort Sill](image)

<table>
<thead>
<tr>
<th>Resource Area</th>
<th>Creation and Utilization of R-5602A and R-5602B</th>
<th>Past, Present, and Reasonably Foreseeable Actions</th>
<th>Cumulative Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airspace Resources</td>
<td>☘</td>
<td>☘</td>
<td>☘</td>
</tr>
<tr>
<td>Air Quality</td>
<td>○</td>
<td>☘</td>
<td>○</td>
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<tr>
<td>Biological Resources</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Cultural Resources</td>
<td>○</td>
<td>☘</td>
<td>○</td>
</tr>
<tr>
<td>Hazardous Materials and Waste</td>
<td>○</td>
<td>☘</td>
<td>○</td>
</tr>
<tr>
<td>Noise</td>
<td>○</td>
<td>☘</td>
<td>○</td>
</tr>
<tr>
<td>Safety</td>
<td>☘</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

*Key: ○ – not affected or beneficial impacts, ☘ – affected but not significant, short to medium term, impacts that range from low to high intensity*

### 4.2.1 Airspace Resources

The creation and utilization of the proposed RAs (R5602A and R-5602B) removes airspace from use for civilian aviation while it is active. As described in this SEA, the airspace proposed for RA is at an altitude not typically used by commercial or private pilots. These two new RAs would be labeled as R-5602A and R-5602B and would extend from 40,000 to 60,000 feet MSL. The proposed R-5602A would be located over R-5601A, R-5601B, and parts of R-5601F. R-5602B would extend approximately 8 nautical miles (NM) east beyond the R-5601A and R-5601F eastern boundaries and would also extend from 40,000 to 60,000 feet MSL. The creation and use of RAs R-5602A and R-5602B, combined with the recent creation of R-5601G, R-5601H, and temporary R-5602, is not anticipated to result in significant cumulative impacts to commercial and private pilots.

### 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 use of these resources would have on future generations. Irreversible impacts primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). Irretrievable resource commitments also involve the loss in value of an affected resource that cannot be restored as a result of the action.

No irreversible or irretrievable environmental changes are anticipated to result from the creation and utilization of the proposed R-5602A and R-5602B at Fort Sill. Most impacts would be short-term and temporary. Those limited resources that could involve a possible irreversible or irretrievable commitment would be used in a beneficial manner.
As described in the Electric Fires EA, electric fires activities would continue to involve the consumption of nonrenewable resources (e.g., gasoline used in vehicles and equipment). None of these activities would significantly decrease the availability of minerals or petroleum resources. Although the amount of these materials used was anticipated to increase slightly, this additional use was not expected to significantly affect the availability of the resources in the southwestern Oklahoma region or the nation.
5. REFERENCES


Baker 2017. Email communication from Captain Austin C. Baker (JFCC Space) to Tom Daues regarding Laser Clearinghouse coordination with the Army for MFIX 2018. 5 April 2017.


FAA 2016. Guidance on Using the Aviation Environmental Design Tool to Conduct Environmental Modeling for FAA Actions Subject to NEPA


Supplemental Environmental Assessment for the Creation and Use of Restricted Areas R-5602A and R-5602B at Fort Sill, Oklahoma


Appendix A

Final Electric Fires Environmental Assessment and Finding of No Significant Impact
FINAL ENVIRONMENTAL ASSESSMENT FOR DEMONSTRATIONS OF VARIOUS ELECTRIC FIRES AND LOITERING AERIAL MUNITION SYSTEMS AT FORT SILL, OKLAHOMA
FINDING OF NO SIGNIFICANT IMPACT

Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma

The Environmental Assessment (EA) has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations issued by the President’s Council on Environmental Quality (CEQ) and the Army (40 Code of Federal Regulations [CFR] §§ 1500-1508, and 32 CFR 651, Environmental Analysis of Army Actions). There are no cooperating agencies associated with this Environmental Assessment (EA). This Finding of No Significant Impact (FNSI) herein references the attached Final EA and has been developed as the final decision document for the EA.

The EA has been prepared to present and evaluate the Proposed Action and alternatives, including the No Action Alternative. Resources addressed in the EA include land use, health and safety, air quality, noise, biological, cultural, hazardous materials and waste, and cumulative impacts.

PROJECT LOCATION: The proposed location is Fort Sill, located near Lawton, Oklahoma.

PURPOSE AND NEED: The purpose of the proposed action is to demonstrate concepts and capabilities that have the potential to change the way the Army conducts operations in the future. These demonstrations are proposed to examine or develop solutions and determine which solutions, if implemented, would result in the highest level of capability, effectiveness, and efficiency to the force (TRADOC Regulation 71-20). The need for the proposed action is a direct result of the requirement for the Capabilities Development and Integration Directorate (CDID) to develop and integrate new technologies to defend the Nation and its interests. Electric Fires and Loitering Aerial Munition Systems (LAMS) are both new technologies that promise advances in the ability of the warfighter to communicate, defend against enemy weapons, and destroy enemy threats with levels of speed, accuracy, and safety not possible with current conventional weapons.

ALTERNATIVES: Three alternatives were considered: the No Action Alternative; Alternative 1, Demonstrations on the West Range area; and Alternative 2, Demonstrations on the East Range area. Descriptions of these alternatives follow.

No Action Alternative. No demonstrations of Electric Fires or LAMS would occur with implementation of the No Action Alternative. Analysis of the No Action Alternative provides a basis for comparing the environmental consequences of the Proposed Action to the existing (baseline) conditions over time. While the No Action Alternative does not satisfy the stated purpose and need, its inclusion in this EA is required by NEPA regulations (40 CFR 1502.14[c]).

Preferred Alternative: Alternative 1: Demonstrations on the West Range Area. The West Range area at Fort Sill includes both the West Range and the training areas east of Highway 115 and west of I-44 on the installation (see Figure 2.6-1 in the EA). Implementation of this alternative would mean that the demonstrations described in the EA (Section 2.3 and Table 2.3-1) would be conducted in the portion of the West Range area at Fort Sill, west of Tower Two Road. No demonstrations would occur east of Tower Two Road as part of this alternative. Alternative 1 was selected as the Preferred Alternative for a number of reasons including ease of access to the training area, fewer potential conflicts with existing range uses (e.g. fewer agricultural fields and less interference with the basic and small arms training activities), and greater topographic relief increasing the potential number of areas with suitable backstops for demonstrations.

Alternative 2: Demonstrations on East Range Area. The East Range area at Fort Sill includes both the East Range and the training areas east of I-44 to the east boundary of the installation (see
Figure 2.6-1 in the EA). Potential impacts resulting from implementation of this alternative would be similar to those described for Alternative 1, with the exception of the improvements described for Firing Point 240E. No improvements would be required at any location in the East Range area and the LAMS would only be demonstrated at the sub-ranges identified on Figure 3.2.7. Although not significant, implementation of this alternative would result in slightly more minor impacts associated with deconflicting range usage due to the additional agricultural leases and the high use of the East Range area by other units.

ENVIRONMENTAL CONSEQUENCES OF IMPLEMENTING ALTERNATIVE 1:
Implementation of Alternative 1 has the potential for minor impacts to land use, air quality, noise, and biological resources. These impacts would not be significant. No impacts to human health and safety, cultural resources, or hazardous materials and waste are anticipated to result from implementation of Alternative 1. Compliance with the Installation Biological Opinion will ensure no significant impacts to the black-capped vireo.

PUBLIC OUTREACH: On December 21, 2014, the Army published a public notice in the Lawton Sunday Constitution notifying the public that the Draft EA and FNSI were available at the Lawton Public library in Lawton, Oklahoma, the Nye Library on Fort Sill and via a website during the public review and comment period. On January 25, 2015, the Army published a second public notice in the Lawton Sunday Constitution notifying the public of an extension of the formal comment period to February 8, 2015. This extension was due to a delay in the receipt of the Draft EA and FNSI by a public agency. The Final EA and Draft FNSI were released for a second 30-day public review (March 8, 2015 through April 8, 2015). No comments were received during this second 30-day public review period.

One comment letter from a member of the public was received during the Draft EA public review period. The commenter expressed concern about the long-term health and environmental effects associated with the repeated use of the systems described in the Draft EA. The Army and Fort Sill are committed to providing a safe environment for both military personnel and civilians wherever they operate. Safety and protection of the environment are integrated into every activity that occurs at Fort Sill on a daily basis. As described in Section 3.2.2 of the EA, a detailed (up to 12 months) review and approval process would be required prior to the demonstration of any system at Fort Sill. This review and approval process would include a variety of different internal and external organizations and agencies.

Upon approval, each demonstration would be conducted in compliance with all required health and safety procedures and any site or demonstration-specific procedures required by Range Operations (the same requirement for any other weapon system used at Fort Sill). The systems described in this EA were analyzed as demonstrations only, not as part of long-term training at Fort Sill. If any of these systems were to be acquired by the Army and adopted as part of regular training, additional health, safety, and environmental analysis would be completed as part of the NEPA documentation.

FINDING: Based upon the results of the Final EA, it has been concluded that implementation of the Preferred Alternative, Alternative 1 will not result in any significant impacts to human health or the environment. Therefore, no further environmental impact analysis is warranted at this time.

Glenn A. Waters
Colonel, U.S. Army
Garrison Commander
Fort Sill, Oklahoma

12 May 2015
Date
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ACRONYMS AND ABBREVIATIONS

°C degrees Celsius
°F degrees Fahrenheit
ACUB Army Compatible Use Buffer
ADS Active Denial System
AEC U.S. Army Evaluation Center
AFI Air Force Instruction
AFMO Army Frequency Management Office
AGM Absorbed Glass Mat
AHPA Archeological and Historic Preservation Act
AIRFA American Indian Religious Freedom Act
Al₂O₃ aluminum oxide
AR Army Regulation
ARAC Army Radar Approach Control
ARPA Archaeological Resources Protection Act
AUZ adaptable use zone
CAA Clean Air Act
CDD Concepts Development Directorate
CDID Capabilities Development and Integration Directorate
CEQ Council on Environmental Quality
CFR Code of Federal Regulations
CHAMPS Counter-Electronics High Power Microwave Advanced Missile Project
cm centimeter(s)
CO carbon monoxide
CRO Cultural Resources Officer
DA PAM Department of Army Pamphlet
DARPA Defense Advanced Research Projects Agency
dB decibel
dBP peak level decibels
DoD U.S. Department of Defense
DoDI Department of Defense Instruction
DoI U.S. Department of Interior
DSW Demonstration Support Worksheet
EA Environmental Assessment
EIS Environmental Impact Statement
EM electromagnetic
EO Executive Order
EOD explosive ordnance disposal
EQD Environmental Quality Division
ESA Endangered Species Act
ESMP Endangered Species Management Plan
FAA Federal Aviation Administration
FBL Fires Battle Lab
FCC Federal Communications Commission
FCoE U.S. Army Fires Center of Excellence
**ACRONYMS AND ABBREVIATIONS (Continued)**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>FM</td>
<td>Frequency Manager</td>
</tr>
<tr>
<td>FNSI</td>
<td>Finding of No Significant Impact</td>
</tr>
<tr>
<td>FRF</td>
<td>Frequency Request Form</td>
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<tr>
<td>GHG</td>
<td>greenhouse gas</td>
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<tr>
<td>GPS</td>
<td>global positioning system</td>
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<tr>
<td>GWP</td>
<td>global warming potential</td>
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<tr>
<td>HAP</td>
<td>hazardous air pollutant</td>
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<tr>
<td>HERF</td>
<td>high-energy radio frequency</td>
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<tr>
<td>HIMARS</td>
<td>High Mobility Artillery Rocket System</td>
</tr>
<tr>
<td>I-44</td>
<td>Interstate 44</td>
</tr>
<tr>
<td>ICRMP</td>
<td>Integrated Cultural Resources Management Plan</td>
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<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronic Engineers</td>
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<tr>
<td>IICEP</td>
<td>Interagency and Intergovernmental Coordination for Environmental Planning</td>
</tr>
<tr>
<td>IMCOM</td>
<td>Installation Management Command</td>
</tr>
<tr>
<td>INRMP</td>
<td>Integrated Natural Resource Management Plan</td>
</tr>
<tr>
<td>IPaC</td>
<td>Information, Planning, and Conservation</td>
</tr>
<tr>
<td>ISCP</td>
<td>Installation Spill Contingency Plan</td>
</tr>
<tr>
<td>ITAM</td>
<td>Integrated Training Area Management</td>
</tr>
<tr>
<td>Keeper</td>
<td>Keeper of the Register</td>
</tr>
<tr>
<td>kV/m</td>
<td>kilovolts per meter</td>
</tr>
<tr>
<td>kW</td>
<td>kilowatt</td>
</tr>
<tr>
<td>kW/cm²</td>
<td>kilowatts per square centimeter</td>
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<tr>
<td>LAMS</td>
<td>loitering aerial munition systems</td>
</tr>
<tr>
<td>LGAC</td>
<td>laser-generated air contaminant</td>
</tr>
<tr>
<td>LOS</td>
<td>line-of-sight</td>
</tr>
<tr>
<td>LRAD</td>
<td>Long Range Acoustic Device</td>
</tr>
<tr>
<td>LRSO</td>
<td>Laser Range Safety Officer</td>
</tr>
<tr>
<td>LUPZ</td>
<td>Land Use Planning Zone</td>
</tr>
<tr>
<td>MBTA</td>
<td>Migratory Bird Treaty Act</td>
</tr>
<tr>
<td>MIL-HDBK</td>
<td>Military Handbook</td>
</tr>
<tr>
<td>MJ</td>
<td>megajoule</td>
</tr>
<tr>
<td>MLRS</td>
<td>Multiple Launch Rocket System</td>
</tr>
<tr>
<td>mm</td>
<td>millimeter(s)</td>
</tr>
<tr>
<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
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<tr>
<td>NAGPRA</td>
<td>Native American Graves Protection and Repatriation Act</td>
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<tr>
<td>NEC</td>
<td>Network Enterprise Center</td>
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<tr>
<td>NEI</td>
<td>National Emissions Inventory</td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
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<tr>
<td>NO₂</td>
<td>nitrogen dioxide</td>
</tr>
<tr>
<td>NOA</td>
<td>Notice of Availability</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>NS</td>
<td>nanosecond(s)</td>
</tr>
<tr>
<td>OKDWC</td>
<td>Oklahoma Department of Wildlife Conservation</td>
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</table>
ACRONYMS AND ABBREVIATIONS (Continued)

O$_3$ ozone
Pb lead
PM$_{2.5}$ particulate matter equal to or less than 2.5 microns
PM$_{10}$ particulate matter equal to or less than 10 microns
PPE personal protective equipment
QRBA Quanah Range Buffer Area
RA Restricted Area
RDX cyclotrimethylenetramine
RM risk management
ROI Region of Influence
RTLP Range and Training Land Program
SAR specific absorption rate
SDZ Surface Danger Zone
SIP State Implementation Plan
SO$_2$ sulfur dioxide
SO$_X$ sulfur oxide
SPCC Spill Prevention, Control, and Countermeasure
SRP Sustainable Range Program
TCM TRADOC Capability Manager
TCP Traditional Cultural Property
TRADOC Training and Doctrine Command
UAS unmanned aircraft system
USEPA U.S. Environmental Protection Agency
USFWS U.S. Fish and Wildlife Service
UXO unexploded ordnance
VOC volatile organic compound
W/cm$^2$ watts per square centimeter
W/kg watts per kilogram
WMWR Wichita Mountains National Wildlife Refuge
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1. PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Assessment (EA) analyzes and documents the potential environmental consequences resulting from proposed demonstrations of various Electric Fires and loitering aerial munition systems (LAMS) at Fort Sill, Oklahoma. Electric Fires is a conceptual term used by the Army to identify systems that use electromagnetic (EM) energy to destroy, degrade, and deny enemy threats. The LAMS are explosive guided munitions used to counter aerial and ground threats.

The proposed demonstrations could occur on range areas included in this EA with proper coordination and approval from numerous organizations on and off the Installation, including Range Operations. Completion of these demonstrations would help establish the foundation for future acquisitions and training of Electric Fires and LAMS at Fort Sill. These systems are revolutionary technologies that show promise to reduce costs and hazards, and achieve enormous gains in flexibility and mobility versus present day gun powder-based systems. LAMS are guided munitions, while Electric Fires technologies are grouped into two categories: electro-dynamic kinetic energy and directed energy. Examples of these technologies are: (1) electro-dynamic kinetic energy systems: EM launch (railgun), combustion light gas gun, electrothermal-chemical; and (2) directed energy: acoustic, high power microwave, radio frequency, laser, particle beam, and laser-induced plasma channel. Electro-dynamic kinetic energy and directed energy systems are not linked to any specific platform (tank, aircraft, truck, etc.).

1.2 BACKGROUND

Fort Sill is located approximately 90 miles southwest of Oklahoma City and approximately 50 miles north of Wichita Falls, Texas, on Interstate 44 (I-44) (Figure 1.2-1). The City of Lawton, Oklahoma, borders Fort Sill to the south. The Installation encompasses approximately 94,000 acres. Military restricted airspace over Fort Sill is currently divided into six segments, with a maximum altitude of 40,000 feet. The Federal Aviation Administration (FAA) is currently in the process of creating two new areas of restricted airspace in the vicinity of Fort Sill.

The Installation is the home of the U.S. Army Fires Center of Excellence (FCoE), an organization combining the U.S. Army Field Artillery Center and School; the U.S. Army Air Defense Artillery Center and School; the U.S. Army Electronic Warfare School; and the Training and Doctrine Command (TRADOC) Capabilities Development and Integration Directorate (CDID). TRADOC is the capability developer and operational architect of the Army. TRADOC designs, develops, and integrates warfighting requirements; fosters innovation; and leads change for the Army. TRADOC Regulation 71-20 describes the role of TRADOC relative to concept and capability development and integration.
Figure 1.2-1. Regional Map of Fort Sill
Principal operational units at Fort Sill include the 75th Fires Brigade, the 428th and 434th Field Artillery Brigades, and the 30th and 31st Air Defense Artillery Brigades. Fort Sill is also one of the five locations for Army Basic Combat Training. As the home of the FCoE, the Installation’s mission is to train soldiers and develop Field Artillery, Air Defense Artillery, and Electronic Warfare leaders; design and develop fire support for the force; support unit training and readiness; mobilize and deploy operating forces; and maintain Installation infrastructure and services.

As part of the design and development mission, the FCoE CDID is responsible for developing FCoE-related concepts, requirements, and experimentation to accompany the lessons trainees are receiving in the classroom. These integrated capabilities complement existing resources and allow industrial developers to better serve the Field Artillery and Air Defense Artillery Soldier. Within CDID, the Fires Battle Lab (FBL) and TRADOC Capability Managers (TCMs) conduct demonstrations in order to refine ideas, concepts, solutions, prototypes, and evolving technologies. TCMs currently support limited testing and fielding of selected technologies. The CDID currently uses computer modeling and simulation to test potential capabilities and concepts. Both organizations require the ability to expand the types of live fire demonstrations available to them in order to demonstrate how these technologies and concepts may operate on future battlefields.

1.3 **PURPOSE OF THE PROPOSED ACTION**

The purpose of the proposed action is to demonstrate concepts and capabilities that have the potential to change the way the Army conducts operations in the future. These demonstrations are proposed to examine or develop solutions and determine which solutions, if implemented, would result in the highest level of capability, effectiveness, and efficiency to the force (TRADOC Regulation 71-20). Fort Sill would provide a venue for FCoE combat developers, training developers, operational unit leaders, and FCoE leadership assigned to Fort Sill to investigate and assess emerging technologies and concepts that may fill military deficiencies. Fort Sill would also provide a venue to military, civilian, and government officials external to Fort Sill.

1.4 **NEED FOR THE PROPOSED ACTION**

The need for the proposed action is a direct result of the requirement for the CDID to develop and integrate new technology to defend the Nation and its interests. Electric Fires and LAMS are both new technologies that promise advances in the ability of the warfighter to communicate, defend against enemy weapons, and destroy enemy threats with levels of speed, accuracy, and safety not possible with current conventional weapons.

Army Regulations (ARs) 5-22 and 73-1, and TRADOC Regulation 71-20, direct the FCoE and CDID to: serve as the force modernization advocate for Field Artillery and Air Defense Artillery branches; provide the link between science and technology and the Army acquisition community; and to conduct demonstrations to put capabilities in the hands of Soldiers earlier. This coordination between military and civilian entities would allow the Army to maintain its technological advantage on the modern battlefield and would facilitate a quicker transition from concepts to reality.
To better utilize subject matter experts and conduct/coordinate Electric Fires efforts across the Army, the Electric Fires Office was authorized in November 2012 as a subordinate office within the CDID’s FBL and transferred to the CDID Requirements Development Division in July 2014. The FCoE Commander determined that having the capabilities to demonstrate Electric Fires systems at Fort Sill is needed to meet their near-term focus on Army vulnerabilities; to gain insights into currently available technologies; and to develop new tactics, techniques, and procedures.

1.5 SCOPE OF THE ENVIRONMENTAL ANALYSIS

This EA has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations issued by the President’s Council on Environmental Quality (CEQ) and the Army (40 Code of Federal Regulations [CFR] §§ 1500-1508 and 32 CFR 651, et seq.). The purpose of this EA is to inform decision makers of the likely potential consequences of implementation of the proposed action and alternatives. This EA identifies, documents, and evaluates the human and natural environmental effects of the demonstrations at Fort Sill, Oklahoma. An interdisciplinary team of health physicists, environmental scientists, biologists, planners, economists, engineers, archaeologists, and military technicians analyzed the proposed action and alternatives relative to existing conditions and identified relevant beneficial and adverse effects associated with implementation of the proposed action. The proposed action and alternatives are described in Chapter 2. Conditions existing as of 2014, considered to be the “baseline” conditions, are described in Chapter 3, Affected Environment and Environmental Consequences. The expected effects of the proposed action, also described in Chapter 3, are presented immediately following the description of baseline conditions for each environmental resource addressed in the EA. Chapter 3 also addresses the potential for cumulative effects and identifies mitigation measures where appropriate.

1.6 PUBLIC INVOLVEMENT AND AGENCY AND TRIBAL COORDINATION

Executive Order (EO) 12372, Intergovernmental Review of Federal Programs, requires intergovernmental notifications prior to making any detailed statement of environmental consequences. Through the process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), the proponent must notify concerned federal, state, and local agencies and allow them sufficient time to evaluate potential environmental consequences of a Proposed Action. Comments from these agencies are subsequently incorporated into the environmental analysis. Consultation with Native American Tribes will be conducted in accordance with 36 CFR 800 once the detailed range designs have been developed. Public participation opportunities with respect to this EA and decision making on the proposed action have been guided by 32 CFR 651.

The Army encouraged and invited public/agency, tribal, and other participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public with a potential interest in the proposed action, including minority, low-income, disadvantaged, and Native American groups, were encouraged to participate in the decision-making process during the public review periods described as follows.
On December 21, 2014, the Army published a public notice in the Lawton Sunday Constitution notifying initiation of the 30-day Draft EA comment period. The public notice included a brief summary of the Draft EA, addresses of two local libraries where the document was located, and a website link where the document could be downloaded. On January 13, 2015, the Lawton Constitution published a front page newspaper article titled, “Comment sought on new types of Fort Sill munition”. This article provided a summary of the Draft EA, described the 30-day public review process, and included contact information for comments or questions about the Draft EA.

On January 25, 2015, the Army published a second public notice in the Lawton Sunday Constitution notifying the public of an extension of the formal comment period to February 8, 2015. This extension was due to a delay in the receipt of the Draft EA by a public agency. Copies of the public notices and the newspaper article are contained in Appendix A.

One comment letter from a member of the public was received during the Draft EA public review period (see Appendix A). The commenter expressed concern about the long-term health and environmental effects associated with the repeated use of the systems described in the Draft EA. The Army and Fort Sill are committed to providing a safe environment for both military personnel and civilians wherever they operate. Safety and protection of the environment are integrated into every activity that occurs at Fort Sill on a daily basis. As described in this EA, a detailed (up to 12 months) review and approval process would be required prior to the demonstration of any system at Fort Sill. This review and approval process would include a variety of different internal and external organizations and agencies. Upon approval, the demonstration would be conducted in compliance with all required health and safety procedures and any site or demonstration specific procedures required by Range Operations, the same that is required for any other weapon system to be used at Fort Sill. In addition, the systems described in this EA were analyzed as demonstrations only and not part of the long-term training at Fort Sill. If any of these systems were to eventually be acquired by the Army and adopted as part of regular training, additional health, safety and environmental analysis would be completed as part of the NEPA documentation.

As part of the public/agency and tribal review process, the Final EA, along with the Draft Finding of No Significant Impact (FNSI), was made available to the public for a second 30-day review period. On March 8, 2015, the Army published a second public notice in the Lawton Sunday Constitution notifying initiation of the 30-day Final EA and Draft FNSI comment period. The public notice included a brief summary of the Final EA and Draft FNSI, addresses of two local libraries where the documents were located, and a website link where the documents could be downloaded. This 30-day review period ended on April 8, 2015, and no comments were received.

1.7 DECISIONS TO BE MADE

Because significant environmental consequences were not identified through this process, the Army has determined that this EA will result in a FNSI. The FNSI documents the decision to implement Alternative 1, which includes demonstrations of various Electric Fires and LAMS on the West Range Area at Fort Sill, as described in this Final EA.
1.8 **ENVIRONMENTAL RESOURCES NOT CARRIED FORWARD FOR DETAILED ANALYSIS**

The determination of environmental resources to be analyzed versus those not carried forward for detailed analysis is part of the EA scoping process. CEQ and Army regulations (40 CFR 1501.7(a)(3) and 32 CFR 651.5(d)(5)) encourage project proponents to identify and eliminate resource areas from detailed study that are not important or have no potential to be impacted through implementation of their respective proposed actions. One alternative of the proposed action would require minimal construction, including the construction of one building, construction of a cement pad with four grounding rods, and creation of a gravel parking area. This alternative would also include burying a portion of a power line. Additional details on construction are included in Chapter 2.

**Airspace** – No new airspace would be required for implementation of the proposed action. Some technologies (e.g., lasers shooting over the horizon) have safety implications for aircraft and satellites, and these safety implications will be evaluated in the Safety resource area of the EA. Therefore, further analysis of airspace was determined unnecessary.

**Soil and Water Resources** – Minimal construction would be required to implement one alternative of the proposed action. The construction of a concrete pad (100 x 100 feet), burial of 1,500 feet of utility line, construction of one building (a 20 x 30 foot building with an observation deck), earth work to remove and flatten existing man-made berms (less than 0.2 acres), and construction of a gravel parking area (100 x 100 feet) is not anticipated to result in significant impacts to soil or water resources at Fort Sill. Appropriate management practices would be incorporated into this construction to minimize soil erosion and sedimentation. The proposed construction site is located in an area that is currently in use as an improved firing point with no unique soil or water resources. Therefore, further analysis of soils and water resources was determined unnecessary.

**Aesthetics and Visual Resources** – No changes to the aesthetics and visual resources of Fort Sill or surrounding areas would occur with implementation of the proposed action; thus, further analysis of aesthetics and visual resources was determined unnecessary.

**Surface Transportation** – The pattern of traffic flow would not be expected to significantly change, as the proposed action does not include any permanent increases to personnel. Some roads would require closure during demonstration periods. However, this is common during existing training at Fort Sill. Further analysis of transportation systems was determined unnecessary.

**Utilities** – For one alternative of the proposed action, approximately 1,500 feet of existing overhead power line would be buried three feet below the ground surface. Conversion of the power line from aboveground to below ground is to protect the power line from radio frequency interference and is not related to an increase in demand for electrical power. Any power required for demonstrations of technologies would be supplied by portable generators. Therefore, further analysis of utilities was determined unnecessary.
Socioeconomics, Environmental Justice, and Protection of Children – The proposed action would result in only minimal economic benefits from short-term construction activities and from the short-term, minimal increase in personnel during demonstrations; therefore, further analysis of socioeconomics was determined unnecessary. As there is no potential for significant adverse impacts to areas outside the boundary of Fort Sill, no communities would be adversely impacted and there is no potential for disproportionate impacts to minorities or children.
Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma

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2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter presents the No Action Alternative (in accordance with CEQ regulations (40 CFR 1502.14[d])); a description of the proposed action and alternatives; the narrowing criteria used to identify and develop the proposed action and alternatives; and a description of the alternatives not carried forward for analysis.

2.2 NO ACTION ALTERNATIVE

Implementation of the No Action Alternative would fail to meet the purpose and need for the FCoE to provide advanced technology demonstrations at Fort Sill. FCoE leadership would not have the benefit of actual capability demonstrations to help forge new concepts for future warfighting capabilities and identify/validate capability gaps. No construction activities would occur under the No Action Alternative, and no demonstrations would occur at Fort Sill.

2.3 DESCRIPTION OF THE PROPOSED ACTION

2.3.1 Electric Fires and Loitering Aerial Munition Systems

The proposed action is to demonstrate the technologies listed in Table 2.3-1. The technologies evaluated in this EA are at various stages in the development process and specific parameters of a system such as maximum power output or frequency might not be known or available at this time. The power levels shown in the power output column in Table 2.3-1 represent the maximum amount of power expected to be used by each technology during demonstrations on Fort Sill in the next 20 years, but not necessarily the maximum power of the technology. Furthermore, the category names are based on the general technology type; some future technologies might have a different name but still fall within these broad categories.

<table>
<thead>
<tr>
<th>Table 2.3-1. Proposed Electric Fires Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
</tr>
<tr>
<td>Electro-Dynamic Kinetic Energy Systems</td>
</tr>
<tr>
<td>EM Launch</td>
</tr>
<tr>
<td>Combustion Light Gas Gun</td>
</tr>
<tr>
<td>Electrothermal-Chemical</td>
</tr>
<tr>
<td>Directed Energy</td>
</tr>
<tr>
<td>Acoustic</td>
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<tr>
<td>High Power Microwave</td>
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<tr>
<td>Radio Frequency</td>
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<tr>
<td>Laser</td>
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<tr>
<td>Particle Beam</td>
</tr>
<tr>
<td>Laser Induced Plasma Channel</td>
</tr>
<tr>
<td>Loitering Aerial Munition Systems</td>
</tr>
</tbody>
</table>
2.3.1.1 Electro-Dynamic Kinetic Energy Systems

For the purposes of this EA, electro-dynamic kinetic energy systems are advanced technology systems that have the potential to propel a projectile further and faster than conventional weapon systems. Three types of electro-dynamic kinetic energy systems are evaluated in this EA. These include EM launch, combustion light gas gun, and electrothermal-chemical.

**Electromagnetic Launch** – EM launch systems use electricity conveyed through coils (coilgun) or along electric conductive rails (railgun) to propel projectiles. While various EM launch technologies or railguns could be demonstrated at Fort Sill, there are two major technology paths currently under development in the U.S. Department of Defense (DoD). One system being developed by the Navy uses the magnetic field created by high electrical currents to accelerate a sliding metal arm between two rails to launch projectiles. Another alternate technology uses a high electrical current conducted along the rails to drive the projectile with plasma (ionized gas).

The high velocity of these projectiles and the large kinetic energy (energy relating to the motion of an object) allow the projectile to cause significant damage down-range without the need for high explosives. The high velocities also extend the range of these projectiles beyond the range possible with conventional propellants. Research and development of these technologies has occurred since the 1920s. The Office of Naval Research is in Phase II of its railgun development, which began in 2005. Demonstrations of the technology have occurred at Dugway Proving Grounds in 2009-2010 and are ongoing at the Naval Surface Warfare Center Dahlgren, Virginia. The ship variant of the Naval railgun is anticipated to deploy within two years.

**Combustion Light Gas Gun** – These systems are based on the replacement of the traditional solid propellant by low molecular weight, combustible gas mixes (e.g. hydrogen, oxygen). The gas mix is pumped into a chamber and then ignited using a small electrical ignition source. Research on the combustion light gas gun has been ongoing for more than 10 years and has shown that the technology provides a minimum of 30 percent more muzzle energy than advanced solid propellant guns. Other benefits of combustion light gas guns are the ability to manufacture propellant in the field and the ability to automatically adjust the propellant charge as needed. The combustion light gas gun is a scalable technology, with current working prototypes in 16, 45, and 155-millimeter (mm) bore sizes.

**Electrothermal-Chemical Gun** – These systems are a solid propellant-based artillery weapon in which the conventional ignition system has been replaced with a plasma cartridge to ignite and control the ammunition’s propellant. Electrical energy is used as a catalyst to start the ignition process. The use of plasma as an ignition source has the benefits of reduced ignition delay time, highly repeatable ignition time, and enhanced burning and combustion of the solid propellant.
2.3.1.2 Directed Energy Systems

Six types of directed energy systems are evaluated in this EA. These include acoustic, high power microwave, radio frequency, laser, particle beam, and laser-induced plasma channel.

**Acoustic** – The acoustic systems are based on audible warnings and deterrence. These systems use directed sound waves rather than directed energy. These directed sound systems allow military units to: issue highly intelligible, authoritative voice commands, with the option of broadcasting powerful deterrent tones to enhance response capabilities, as well as communicate in multi-lingual formats. The Long Range Acoustic Device (LRAD) has seen service in Iraq since 2010 with Military Police units.

**High Power Microwave** – High power microwave systems produce short bursts of microwave energy which can be lethal to electronics with no effects on personnel operating the equipment. The low collateral damage aspect of the technology makes high power microwave systems useful in a wide variety of missions in which avoiding civilian casualties is a major concern. The wide array of systems that fall into this category can focus on counter-electronics missions delivered via a high powered microwave dish. Such a system was demonstrated at Fort Sill in 2013 to exhibit the use of high-powered microwaves to degrade the electronic systems of an unmanned aircraft system (UAS). These systems could also be delivered via missile. A high powered microwave missile (Counter-Electronics High Power Microwave Advanced Missile Project [CHAMPS]) was tested at Dugway Proving Grounds in October 2012 to provide focused, high-powered microwave effects in specific environments (such as buildings), and the Air Force continues development of this missile for both air-to-air and air-to-ground roles.

The high powered microwave could also be used in crowd control situations. The Solid State Active Denial Technology is a system that has been deployed in Afghanistan since 2010. This system heats the top layer of human skin without penetrating further into the tissue, creating a burning sensation that ceases as soon as the person is outside the beam path or the microwave is turned off.

**Radio Frequency** – Similar to high powered microwaves, these systems use frequency outside the microwave bands of the EM spectrum. A high-energy radio frequency (HERF) is a directed-energy system used to disrupt digital equipment, such as computers. HERF works by blasting high-intensity radio waves at electronics, disrupting their operation.
**Laser** – Laser systems generate brief, high-energy pulses to degrade or destroy threats. Systems under development include the High Energy Laser Mobile Demonstrator, the High Energy Laser Liquid Area Defense System, and phased array laser weapon systems. The High Energy Laser Mobile Demonstrator completed a successful demonstration of a 10 kilowatt (kW) laser at White Sands Missile Range in December 2013. The High Energy Laser Liquid Area Defense System is scheduled to conduct demonstrations and tests at White Sands Missile Range in 2014 with a planned 150 kW laser. The coherent optical phased array lasers are currently under development by the Defense Advanced Research Projects Agency’s (DARPA’s) Excalibur program and anticipate the ability to demonstrate this technology in the fall of 2014. These lasers could potentially be used to defend against rocket, artillery, mortar, and UAS threats, as well as in a direct fire mode in ground combat vehicles.

**Particle Beam** – These systems use a high-energy beam of atomic or subatomic particles to damage the threat by disrupting its structure. A particle-beam directs energy in a particular and focused direction using particles with negligible mass. Significant research and development occurred with this technology in the 1980s as part of the Strategic Defense Initiative program, and was recently revitalized by the Air Force at Kirtland Air Force Base in 2010.

**Laser Induced Plasma Channels** – These systems are based on the creation of a path through the atmosphere using a laser beam that is electrically conductive; this path then facilitates the delivery of a powerful electric current against the threat. In June 2012, engineers at Picatinny Arsenal demonstrated the potential weapon capability of a laser induced plasma channel system.

### 2.3.1.3 Loitering Aerial Munition Systems

The LAMS are guided munitions to counter both aerial and ground threats. These systems allow small infantry units the capability to engage threats beyond the range of current line-of-sight (LOS) weapons. LAMS have the capability to be launched, loiter over the battlefield, and then target objectives as needed. In 2013 the Army purchased the Switchblade, which is a small, self-contained, self-launched LAMS capable of being carried in a backpack and operated by a single user. Numerous other similar systems, such as Single Multi-Mission Attack Munition (SMAM), are being evaluated by the Army and other DoD branches. For the purposes of the analysis, all LAMS proposed to be demonstrated at Fort Sill would be electrically powered.

### 2.3.2 Demonstration Process at Fort Sill

Prior to the initiation of any demonstrations, detailed coordination and approval from numerous internal and external organizations would be completed to ensure compliance, safety, and protection of human health and the environment. Organizations involved in the coordination and
approval process include: U.S. Army Public Health Command, TCM-Ranges, Army Spectrum Management, the Federal Communications Commission (FCC), the FAA, and the Laser Clearing House. Agencies on the installation include: the Network Enterprise Center, Range Operations, Safety, Staff Judge Advocate, Environmental Quality Division (EQD), and other tenant units.

Planning to execute demonstrations would start months prior to the event with the initial identification of potential technologies relevant to the Fires community. Agreement documents between government, academia, and industrial partners would outline the roles and responsibilities of each party, information required to meet Range Operations procedures, and documentation of coordination with agencies outside of Fort Sill to gain approval as required. Each demonstration would typically last from four to six weeks. A representative timeline for demonstrations could include one and a half weeks to set-up at the range, one and a half weeks for demonstration, and one and a half weeks to remove all equipment from Fort Sill. However, each technological system would have unique timelines and requirements. The proposed demonstrations would occur approximately, but not limited to, six times per calendar year at Fort Sill.

In order to minimize the impact on current training requirements for existing units at Fort Sill, the proposed action would follow normal range scheduling and utilization protocols. The demonstrations would be conducted in accordance with all current Fort Sill safety and coordination requirements, as well as additional risk mitigation measures, as necessary.

Fort Sill Range Operations is responsible for the review and approval of the Army-approved safety zones associated with each system. The safety zones would be established to provide a graphical depiction of the potential hazard areas of each system proposed to be fired on the Fort Sill ranges. Consequently, each time a demonstration is conducted at Fort Sill, the Army must approve that specific system prior to the event as part of the required coordination.

2.4 **ALTERNATIVE IDENTIFICATION**

The alternative identification process for demonstrations of various Electric Fires and LAMS started with the development of criteria based on the FCoE Commander’s guidance and the advanced technology mission of the FCoE. These criteria were then applied to a number of potential alternatives to narrow the alternatives to a reasonable range that could support the criteria.

This section establishes and describes the criteria used to evaluate the alternative against the purpose and need of the proposed action. Alternatives considered but not carried forward are explained in Section 2.5. A list of alternatives carried forward for analysis is described in Section 2.6.

2.4.1 **Alternative Development**

The Army determined that a reasonable alternative should meet the criteria listed as follows:

- **Increase the Training Capacity and Capability of Fort Sill.** The demonstrations conducted at Fort Sill would prepare the foundation for eventual training once these systems are acquired and determined to be a program of record. As Army systems of the future enter the force, and consistent with its training mission, Fort Sill would be better prepared to transition smoothly from demonstration into training for the Field Artillery, Air Defense Artillery, and Electronic Warfare Soldiers using these systems.
Facilitate Timely FCoE Awareness and Integration of Revolutionary Technology with Future Fires. The FCoE mission includes a responsibility for timely identification of new concepts, technologies, and vulnerability identification as part of the continual Concepts Development Directorate (CDD), FBL, and FCoE Commander’s synergistic force modernization process.

Minimize Cost. Minimize facility cost through the enhancement of existing Fort Sill facilities, and minimize the process costs through the execution of demonstrations at Fort Sill, where the CDID is located. The ability to demonstrate these technologies at Fort Sill would minimize costs to the government. Additionally, with feedback from CDID as a demonstration participant, it is foreseeable that these technologies would be better postured to transition more efficiently into the Army acquisition process.

Avoid Proximity to Public Use Areas. In order to ensure safety and security, the demonstrations need to occur in a location that minimizes potential exposure to non-participating personnel and members of the general public. This would include public use sites on or near Fort Sill, such as the main cantonment area, cemeteries, agricultural leases, and the Wichita Mountains National Wildlife Refuge (WMWR).

Provide Adequate Geographic Mitigation Measures. The demonstration location needs to offer sufficient terrain, such as large hills, to serve as backstops to minimize system effects and avoid impacting existing electronic range systems.

2.5 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

During the early planning stages for the proposed action, the CDID considered the possibility of conducting demonstrations at locations other than Fort Sill. It was determined that the use of external locations for the demonstrations would not meet the requirements outlined in TRADOC Regulation 71-20 and would not enhance the training capability at Fort Sill. In addition, demonstrations at locations off Fort Sill would be more costly, less efficient, and less effective than demonstrations at Fort Sill. External locations would require additional financial and other resources to move Soldiers between classroom and field training sites. Coordinating calendars for the FCoE leadership to meet at an external location at a specific time is more difficult when travel factors would also have to be considered. Furthermore, the use of an external location prevents participation and support from the operational brigade and battalion commanders on Fort Sill. Historically, coordination of efforts between test facilities and doctrine centers has challenged the Army. Testing information and data transmitted electronically cannot provide the same impact on the concepts and requirements developers as personal observance of system capabilities. The physical separation of event location and CDID personnel would foster disconnects. Fort Sill would incur significant travel and billeting costs even if the calendars and timing were able to align. For these reasons, this alternative was considered but not carried forward for environmental analysis.

Alternate geographic locations on Fort Sill were also considered during the early planning stages of the proposed action. Locations at the East Range area and at the Quanah Range area were discussed with Range Operations as potential alternatives to the West Range area. The Quanah Range contains the Falcon Bombing Range, an Air Force Reserve facility used by all
military services. The Quanah Range was eliminated from further consideration due to incompatibility with the existing uses of that particular range area on Fort Sill.

2.6 **ALTERNATIVES**

Based on the alternative narrowing criteria, two action alternatives are carried forward for further analysis. These alternatives are listed below. The No Action Alternative is described in Section 2.2.

1) Conducting demonstrations in the West Range area at Fort Sill;
2) Conducting demonstrations in the East Range area at Fort Sill; and
3) No Action Alternative.

2.6.1 **Alternative 1 – Demonstrations on West Range Area at Fort Sill**

The West Range area at Fort Sill includes both the West Range and the training areas east of Highway 115 and west of I-44 on the installation (Figure 2.6-1). However, no demonstrations would occur east of Tower Two Road. Implementation of this alternative would mean that the demonstrations described in Section 2.3 and Table 2.3-1 would be carried out in the West Range area at Fort Sill.

Upon approval by Range Operations, demonstrations could occur on Firing Point 240E or ranges located in the West Range area. Representative locations that could potentially be used for demonstrations are shown on Figure 2.6-1. Demonstrations of a specific system or technology at a specific location would be dependent on range conditions, range scheduling, limitations of the location (e.g. lack of a suitable backstop, potential interference with electronic target systems, environmental constraints, etc.), and final approval of Range Operations. For example, the safe
use of electro-dynamic kinetic energy systems is dependent in part upon a suitable impact area that meets the safety zone requirements for that system. The demonstration location would require an appropriate firing location that fits the requirements of the pre-determined and approved safety zone. As described in Section 2.3, approval of system-specific safety zones would be part of the process required to demonstrate a specific technology at Fort Sill. In other cases, directed energy systems such as high powered microwave would not require an impact zone for safe firing but would not be able to fire in a direction that could potentially disrupt existing electronic systems in the West Range area.

The variables listed above are examples of the potential considerations that would be part of the process required to demonstrate a technology at Fort Sill. The final determination of whether a particular technology could be demonstrated, where the demonstrations could occur, and what additional procedures are required for an effective and safe demonstration would be finalized by CDID and Range Operations.

Implementation of Alternative 1 also includes improvements to Firing Point 240E in the West Range area. Firing Point 240E (Figure 2.6-2) is an existing improved artillery firing point with a gravel access road, gravel and concrete firing pads, and earth berms. Improvements at this location would include construction of a concrete pad (100 x 100 feet), conversion of 1,500 feet of utility line from aboveground to below ground, construction of one building (a 20 x 30 foot building with an observation deck), earth work to remove and flatten existing man-made berms (less than 0.2 acres), and construction of a gravel parking area (100 x 100 feet).

2.6.2 Alternative 2 – Demonstrations on East Range Area at Fort Sill

The East Range area at Fort Sill includes both the East Range and the training areas east of I-44 to the east boundary of the installation (Figure 2.6-1). The East Range area is comprised of the North Arbuckle Range and the South Arbuckle Range. The North Arbuckle Range is approximately 8,562 acres while the South Arbuckle Range is approximately 6,913 acres. Unlike Alternative 1, these ranges are geographically separated and not contiguous. Implementation of this alternative would be the same as that described for Alternative 1, with the exception of the improvements described for Firing Point 240E. No improvements would be required at any location in the East Range area.

2.7 Summary Comparison of Environmental Consequences

Table 2.7-1 summarizes the potential environmental consequences anticipated to result from implementation of each of the three alternatives. The consequences associated with implementing the proposed demonstrations at Fort Sill are presented for each environmental resource area, except those described in Section 1.8.
Figure 2.6-2. Firing Point 240E

Not to Scale, drawing is for conceptual purposes only as project requirements and specific locations may change during final site layout and design.
### Table 2.7-1. Summary Comparison of Environmental Consequence by Resource and Alternative

<table>
<thead>
<tr>
<th>Environmental Resource</th>
<th>No Action</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land Use</strong></td>
<td>Implementing the No Action Alternative would result in no changes or consequences at Fort Sill. The No Action Alternative would not provide areas to allow the demonstration of advanced technologies at the installation. In addition, implementation of the No Action Alternative would prevent the FCOE CDID from accomplishing their mission to bring concepts to Programs of Record.</td>
<td>Minor impacts associated with deconflicting range use. No significant impacts to land use at the installation. No impacts to land uses outside of the Fort Sill boundaries are anticipated.</td>
<td>Additional agricultural leases and high use of the East Range area by other units would result in slightly more minor impacts associated with deconflicting range usage. These impacts would not be significant. No impacts to land uses outside of the Fort Sill boundaries are anticipated.</td>
</tr>
<tr>
<td><strong>Health and Safety</strong></td>
<td>No Impacts</td>
<td>Strict adherence to the existing Fort Sill health and safety regulations and approval demonstrations by Fort Sill Range Operations would minimize the health and safety risks associated with demonstrations of all technologies. Demonstrations are anticipated to have no significant impacts on health and safety at Fort Sill.</td>
<td>Strict adherence to the existing Fort Sill health and safety regulations and approval demonstrations by Fort Sill Range Operations would minimize the health and safety risks associated with demonstrations of all technologies. Demonstrations are anticipated to have no significant impacts on health and safety at Fort Sill.</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>No Impacts</td>
<td>Increased emissions from construction and range improvements would result in only a short-term, temporary increase in emissions. Demonstration impacts would amount to less than one percent of the ROI’s overall annual air emissions on a pollutant-by-pollutant basis for all pollutants except for sulfur oxide (SO₃). SO₃ emissions would total 2.57 percent of the annual SO₃ emissions for Comanche County. There would be no significant impact to local or regional air quality from implementation of Alternative 1.</td>
<td>No increased emissions from construction and range improvements would occur as implementation of Alternative 2. Demonstration impacts would amount to less than one percent of the ROI’s overall annual air emissions on a pollutant-by-pollutant basis for all pollutants except for SO₃. SO₃ emissions would total 2.57 percent of the annual SO₃ emissions for Comanche County. There would be no significant impact to local or regional air quality from implementation of Alternative 2.</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>No Impacts</td>
<td>Noise levels associated with the demonstrations are comparable to noise levels generated by systems currently in use at Fort Sill. No significant impact to the noise environment is anticipated as a result of implementing Alternative 1.</td>
<td>Noise levels associated with the demonstrations are comparable to noise levels generated by systems currently in use at Fort Sill. No significant impact to the noise environment is anticipated as a result of implementing Alternative 2.</td>
</tr>
</tbody>
</table>
Table 2.7-1. Summary Comparison of Environmental Consequence by Resource and Alternative (Continued)

<table>
<thead>
<tr>
<th>Environmental Resource</th>
<th>No Action</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biological</strong></td>
<td>No impacts</td>
<td>Short-term, minor, adverse impacts to vegetation and wildlife would occur as a result of implementing Alternative 1. These impacts would not be significant. No impacts to the federally endangered black-capped vireo are anticipated to result from implementation of Alternative 1, as demonstrations would avoid nesting habitat for the vireo during the nesting season.</td>
<td>Short-term, minor, adverse impacts to vegetation and wildlife would occur as a result of implementing Alternative 2. These impacts would not be significant. No impacts to the federally endangered black-capped vireo are anticipated to result from implementation of Alternative 2, as nesting habitat for the vireo does not occur in the East Range area.</td>
</tr>
<tr>
<td><strong>Cultural</strong></td>
<td>No Impacts</td>
<td>No adverse impacts to cultural resources are anticipated to result from implementing Alternative 1.</td>
<td>No adverse impacts to cultural resources are anticipated to result from implementing Alternative 2.</td>
</tr>
<tr>
<td><strong>Hazardous Materials and Waste</strong></td>
<td>No Impacts</td>
<td>No significant impacts to hazardous materials use and management, hazardous waste generation and management, and hazardous waste disposal are anticipated to result from implementing Alternative 1.</td>
<td>No significant impacts to hazardous materials use and management, hazardous waste generation and management, and hazardous waste disposal are anticipated to result from implementing Alternative 2.</td>
</tr>
<tr>
<td><strong>Cumulative Effects</strong></td>
<td>No impacts</td>
<td>No significant cumulative impacts are anticipated to result from the implementation of Alternative 1.</td>
<td>No significant cumulative impacts are anticipated to result from the implementation of Alternative 2.</td>
</tr>
</tbody>
</table>
Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 LAND USE

3.1.1 Affected Environment

3.1.1.1 Definition of the Resource

Land use describes the way the natural landscape has been modified or managed to provide for human needs. In developed and urbanized areas, land uses typically include residential, commercial, industrial, utilities and transportation, recreation, open space, and mixes of these basic types. Other uses such as mining, extractive activities, agriculture, forestry, and specially protected areas (such as larger monuments, parks, and preserves) are usually found on the fringes of or outside of urbanized areas. Plans and policies guide how land resources are allocated and managed to best serve multiple needs and interests. Federal, state, and local statutes, regulations, plans, programs, and ordinances define specific limitations on uses.

For the purposes of this land use analysis, the Region of Influence (ROI) for Alternatives 1, 2, and the No Action Alternative includes the land within and immediately surrounding Fort Sill.

Potential impacts on land use can result from actions that (1) change the suitability of a location for its current or planned use (e.g., noise exposure in residential areas); (2) cause conditions that are unsafe for range and training area usage and the public welfare; (3) conflict with the current and planned use of the area based on current zoning, amendments, agreements, regulatory restrictions, management, and land use plans; or (4) displace a current use with a use that does not meet the goals, objectives, and desired use for an area. The degree of land use effects (negligible, minor, moderate, or significant) is based on the level of land use sensitivity in areas affected by a proposed action, the magnitude of change, and the compatibility of a proposed action with existing or planned land uses.

3.1.1.2 Existing Conditions

3.1.1.2.1 Installation

Land use at Fort Sill is primarily for military training and operational purposes. The installation is divided into the cantonment area, maneuver training areas, live fire training ranges, artillery firing points, ordinance impact areas, and areas unsuitable for training. The cantonment area contains the administrative areas, medical facilities, the Henry Post Army Airfield, a cemetery, family housing, barracks, and other Soldier housing. The cantonment area and areas unsuitable for training (landfill, recreation area, cultural sites, ammunition supply point, etc.) comprise 8,312 acres. The maneuver training areas comprise 45,266 acres (heavy, 38,735 acres; light, 6,531 acres) and provide land for outdoor dismounted maneuver training and mounted heavy and light vehicle maneuver training. The remaining 39,991 acres consist of the four live fire training range impact areas (dunned and non-dunned) and other non-maneuver related training areas.

The three ranges at Fort Sill are the Quanah, West, and East Ranges. The ranges on Fort Sill are shown on Figure 1.2-1. The East Range is used primarily for small arms weapons training. The West Range is used for both artillery and live aircraft bombing training. The Quanah Range is
used primarily by the Air Force for air-to-surface munitions training and maneuvers (inert and training bombs, rockets, strafe, and laser) (Fort Sill 2005). As discussed in Section 2.5, the Quanah Range was eliminated as an alternative for demonstrations. All Fort Sill ranges are managed under the Army’s Sustainable Range Program (SRP) core programs, the Range and Training Land Program (RTLP) and the Integrated Training Area Management (ITAM) Program. The RTLP provides central management, programming, and policy for the modernization of the Fort Sill Ranges and their day-to-day operations. The ITAM provides Fort Sill range officers with the capability to manage and maintain training and testing land by integrating mission requirements with environmental requirements and sound land management practices (AR 350-19). The regulations, policies, and procedures for scheduling, maintenance, and safe operations on Fort Sill’s ranges and training areas are described in Fort Sill Regulation 385-1 (Fort Sill 2012). Department of Army Pamphlet (DA PAM) 385-63, Range Safety, provides additional applicable information on Fort Sill range safety and the standards and procedures for the safe firing of ammunition, demolitions, lasers, guided missiles, and rockets; and the delivery of bombs for training and target practice. Fort Sill is currently developing a Range Master Plan along with a Real Property Master Plan.

Endangered and threatened species habitats and management is also a land use at Fort Sill and within the West Range area. Portions of the installation and the West Range area are designated as nesting habitat for the black-capped vireo, a Federally listed endangered species (Figure 3.1-1). These black-capped vireo nesting areas are restricted to foot traffic during the nesting season (Fort Sill 2005). Additional information on the endangered and threatened species management at Fort Sill is located in Section 3.5.

Recreation areas (e.g. hunting and fishing) are also land uses at Fort Sill and within the West and East Range areas. With regard to hunting, the installation has been divided into hunter use compartments and areas. These divisions are based on habitat type and are available for use depending on the proximity to impact and training areas and their status of use. The hunting compartments and all West and East Range area ponds are only open to hunters and fisherman who have taken the Fort Sill Sportsman Safety Class (USAFACFS 2003). The responsibilities, procedures, and rules for hunters and fisherman utilizing Fort Sill’s training areas are provided in Fort Sill Regulation 200-1 (Fort Sill 2009).

Additional land use within Fort Sill and the West and East range areas includes agricultural leases. These leases include cultivated fields, wildlife food plots, and mowed and hayed fields. These leased lands are within the maneuver areas and the non-dudded impact buffer zone, but are considered safe for agricultural purposes. These areas have been cleared, and the chance of a dud-related accident is remote (USAFACFS 2003). Agricultural use areas within the West and East ranges are considered off limits as training areas (Fort Sill 2012).

The black-capped vireo nesting habitat and the agricultural lease areas pose training and operational constraints in the West and East range areas. These constraints are shown on Figure 3.1-1. When active firing training and operations are occurring, the relevant surface danger zones (SDZs) also pose a constraint at Fort Sill and in the West and East range areas.

3.1.1.2.2 Surrounding Areas

Land use surrounding Fort Sill consists of sparsely populated residential areas and agricultural areas, except to the north and west where the WMWR is located (Fort Sill 2006). The WMWR
Figure 3.1-1. Fort Sill Land Use and Potential Constraints
comprises 59,020 acres and contains rare remnant mixed-grass prairie and a herd of Texas Longhorn cattle. This refuge was established to protect and restore wildlife species and provide habitat for large, native, grazing animals. WMWR offers wildlife watching, hunting, fishing, and other related activities (USFWS 2014a). Additionally, the Fort Sill cantonment area is located north of and adjacent to the City of Lawton, which is the only major metropolitan area near the installation (Figure 1.2-1). There are also several smaller communities near Fort Sill. These include Cache, Elgin, Indiahoma, and Medicine Park.

In 2004, Fort Sill obtained approval to purchase six Army Compatible Use Buffer (ACUB) zones, totaling 19,415 acres, along the northeastern, eastern, southern, and western boundaries of the installation (Figure 3.1-1). The purchase of these conservation easements is being completed in cooperation with Land Legacy Inc., an Oklahoma nonprofit corporation. These ACUB zones prevent encroachment on Fort Sill’s ranges and training activities from non-compatible community development on land adjacent to the installation. ACUB zones do not increase the available training areas and ranges, but do help ensure that Fort Sill can use the full extent of its available training lands (Fort Sill 2004, Fort Sill 2006).

3.1.2 Environmental Consequences

3.1.2.1 No Action Alternative

Under the No Action Alternative, Alternative 1 or 2 would not be implemented and no construction or demonstrations of Electric Fires and LAMS would occur. Implementation of the No Action Alternative would have no effects on land use at Fort Sill.

3.1.2.2 Alternative 1 – Demonstrations on West Range Area

3.1.2.2.1 Installation

Implementation of Alternative 1 would result in minor construction at Firing Point 240E (Figure 2.6-2). The construction of a concrete pad, a building with an observation deck, gravel parking lot, as well as burying 1,500 feet of utility line and the modification of man-made berms would have negligible effects on land use at the West Range area of Fort Sill. Firing Point 240E would continue to be used for artillery and other training as well as the proposed demonstrations.

Implementation of Alternative 1 would include the demonstration of Electric Fires and LAMS in the West Range area of Fort Sill. These demonstrations would utilize the West Range area under the same or similar procedures as the current weapons systems (artillery, laser, Multiple Launch Rocket System [MLRS], small arms, etc.) used at Fort Sill. The majority of Electric Fires demonstrations would be conducted from an established firing point into a designated impact area and within an Army-approved safety zone. Systems such as high power microwave, radio frequency, and acoustic could fire outside the impact area. As with the current weapons systems utilizing the West Range area, Fort Sill Range Operations would review the parameters and safety zones for the system(s) to be demonstrated and approve a set of operating parameters through the Demonstration Support Worksheet (DSW) approval process explained in Section 3.2.2. CDID is currently working with Directorate of Public Works Master Planning and TRADOC to ensure firing locations are properly designated for each weapon system. Therefore, conducting these demonstrations would result in negligible to minor effects on land use.
Endangered and threatened species management in the West Range area at Fort Sill would not change or be affected by implementation of Alternative 1. Black-capped vireo nesting areas would continue to be restricted to foot traffic during the nesting season, and those areas would continue to be managed as described in Section 3.5. No directed energy systems with the potential to exceed human health exposure limits would be demonstrated over vireo habitat if the portion of the safety zone that exceeds human health requirements would intersect with that habitat. Recreational use (hunting and fishing) in the West Range area and at Fort Sill would continue in accordance with AR 200-1. Recreational activities such as hunting would be prohibited in the area during live demonstrations, resulting in minor impacts to the availability of the West Range area for recreational activities.

Implementation of Alternative 1 would also result in no change to the use and management of the leased agricultural fields located in the West Range area. These fields would remain off limits to training activities (Fort Sill 2012) and the proposed demonstrations.

### 3.1.2.2 Surrounding Area

Implementation of Alternative 1 would be consistent and compatible with the existing land uses at Fort Sill. Range Operations would allow demonstrations only in areas where there is no potential for off-installation impacts. Demonstrations of Electric Fires and LAMS on the West Range area is not anticipated to have any effects on land use, and is not anticipated to create land use incompatibilities with ACUBs or the region surrounding the installation.

### 3.1.2.3 Alternative 2 – Demonstrations on East Range Area

#### 3.1.2.3.1 Installation

Implementation of Alternative 2 would mean that Electric Fires and LAMS would be demonstrated in the East Range area of Fort Sill. Conducting these demonstrations would result in minor effects on land use. Like the consequences associated with the implementation of Alternative 1 (see Section 3.1.2.2.1), actions associated with the proposed demonstrations would be consistent and compatible with the East Range and the sub-ranges within the East Range area. Although no construction would be required as part of this alternative, additional coordination with Range Operations would be required due to the volume of basic and small arms training activities that currently occur within the East Range area. Range Operations would schedule the demonstrations in accordance with current Fort Sill range use policies to prevent any competing uses. Additional coordination would also be required to avoid demonstration in areas with high public visibility. Demonstrations could also be limited in the East Range area due to the additional acres of agricultural leased lands and the proximity of the proposed LAMS demonstration areas relative to the existing small arms ranges (see Section 3.2.2.3).

#### 3.1.2.3.2 Surrounding Area

Implementation of Alternative 2 would be consistent and compatible with the existing land uses at Fort Sill. Range Operations would allow demonstrations only in areas where there is no potential for off-installation impacts. Demonstrations of Electric Fires and LAMS on the East Range area is not anticipated to have any effects on land use, and is not anticipated to create land use incompatibilities with ACUBs or the region surrounding the installation.
3.2 HEALTH AND SAFETY

3.2.1 Affected Environment

3.2.1.1 Definition of the Resource

This section addresses health and safety for activities and operations on the ground and in the air that have the potential to affect members of the public and Fort Sill personnel. Protection of human health and the environment has and continues to be an integral part of the Army’s mission at Fort Sill. Activities on Fort Sill comply with all applicable federal and state, DoD-, Army-, and installation-level occupational health, safety and environmental requirements to ensure that activities are conducted with no or minimal risk to persons or the environment, both on and off of Fort Sill.

The Fort Sill Installation Safety Office mission is as follows: “To fully support the command’s mission while providing the best possible accident and injury prevention programs for all of Team Sill personnel”. This mission is fully supported by the Army’s Installation Management Command’s (IMCOM) safety mission.

All ranges on Fort Sill are managed in accordance with Fort Sill Regulation 385-1. This safety regulation covers activities on the ground and in Fort Sill airspace up to an altitude of 40,000 feet and applies to Army, Air Force, Navy and Marine personnel and civilians utilizing the installation range complex outside the cantonment area. Further, this regulation establishes risk management (RM) as the Army’s principal risk reduction methodology and ensures regulatory and statutory compliance. It provides for public safety relative to Army operations and activities. Fort Sill Regulation 200-1 governs the recreations use of range training areas on Fort Sill.

The ROI for health and safety is Fort Sill and surrounding areas including the associated airspace. Range Operations is responsible for the safe management and operation of ranges on Fort Sill. Range management involves the development and implementation of those processes and procedures required to ensure that Army ranges are planned, operated, and managed safely. The focus of range management is on ensuring the safe, effective, and efficient operation of ranges and safe and efficient use of Restricted Areas (RAs). The overall purpose of range management is to balance the military need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on human health, the environment, and surrounding communities.

3.2.1.2 Existing Conditions

3.2.1.2.1 Army Health and Safety Regulations

The Army’s policies, responsibilities, and procedures to protect Army personnel and property are contained in AR 385-10, Army Safety Program. The regulation provides for operational safety and safe and healthy work places, and assurs compliance with applicable laws and regulations. DA PAM 385-24 establishes Army radiation safety guidance and direction. It provides guidance and direction to implement the requirements of AR 385-10. Regulations and guidance pertaining to the safe use of ranges on Army installations is contained in AR 385-63, Range Safety. This regulation covers range usage from live firing of small arms to rockets, guided missiles, and lasers, and provides guidance for minimizing the risk of using these weapons.
3.2.1.2.2 Fort Sill Health and Safety Regulations

Fort Sill also has its own health and safety regulations, contained in Fort Sill Regulation 385-1, *Post Range Regulation*, and Fort Sill Regulation 358-10, *Safety Regulation*. These regulations implement requirements of the Occupational Safety and Health Act (OSHA) of 1970 as implemented in EO 12196, Department of Defense Instruction (DoDI) 6055 Series, and AR 385-10. Fort Sill Regulation 385-1 establishes responsibilities, procedures, and rules for all personnel utilizing the Installation range complex by personnel assigned, attached, or transient to Fort Sill. Fort Sill Range Operations is responsible for range safety, controls weapons firing and the use of training facilities, and is responsible for the management of aerial operations within the range complex at Fort Sill. Fort Sill Range Operations also provides clearance for aircraft overflights of the RA.

Wide varieties of different weapon systems are currently used at Fort Sill on a daily basis. These systems range from small arms (12 gauge shotgun, M-16, M203, 50 caliber) to anti-tank guns such as the AT4 to larger field artillery such as the 155 mm Howitzer, the Avenger missile system and the High Mobility Artillery Rocket System (HIMARS). Fort Sill Range Operations is responsible for the management and operation of all the ranges to prevent conflicting uses and provide a safe training environment for Soldiers and the public.

Range operations require that the surface area encompassing the weapon safety footprints be protected by purchase, lease, or other restriction to ensure the safety of personnel, structures, and the public from expended rockets, missiles, or target debris and hazardous operations. The lands associated with the Fort Sill training ranges meet these requirements.

Public health and safety concerns associated with the Fort Sill airspace operations are largely associated with aviation and weapons safety. Range Operations continually assesses the risks associated with weapons employment and establishes mission parameters that minimize the potential safety hazards. Specific weapon safety footprints must be assessed against each intended target to ensure that they can be safely used. Range operations develops range management plans for the training ranges used and transient aircraft. In addition, Range Operations assigns responsibilities and provides direction regarding range scheduling, maintenance, explosive ordnance disposal (EOD), range decontamination, and debris disposal.

SDZs are a key aspect of providing safe ranges. SDZs are designed to make the probability of hazardous fragment or round escapement from installation boundaries unlikely and to minimize the danger to the public, installation personnel, facilities/equipment, and property. SDZs and associated exclusion areas are off-limits to non-participating personnel during active range use (DA PAM 385-63).

Wildfires are a growing natural hazard in most regions of Oklahoma and the Southwest, posing a threat to life and property, particularly where native ecosystems meet developed areas. Fort Sill maintains a Fire Mitigation Plan to help prevent and manage wildfires at the installation. Range Operations personnel monitor weather and fire conditions from resources available for fire intelligence information including the National Fire Danger Rating System website, and then provide recommendations to operations personnel. These recommendations address the need to alter flight or ground operations and, if the risk is excessive as determined on a situational basis,
impose restrictions on range operations. These restrictions could include limiting the type of ordnance used, or the complete curtailment of ordnance use or other range operations.

3.2.1.2.3 Electro-Dynamic Kinetic Energy Health and Safety

Safety issues related to electro-dynamic kinetic energy systems are primarily related to range safety. Other safety issues include the safety to personnel during the firing of these systems. Some electro-dynamic kinetic energy systems could generate strong electric and magnetic fields while other systems use potentially harmful materials. The DoD and Army’s safety program provides policies, responsibilities, and procedures to protect Army personnel. In addition to the regulations mentioned above, DoDI 6055 provides permissible exposure limits for Army personnel that have occupational exposures to electric and magnetic fields.

3.2.1.2.4 Directed Energy Health and Safety

Effects of EM energy on people or other biological organisms have been well studied for more than 50 years. These effects are dependent upon a number of factors, including frequency, power settings, size and shape of a person, and a person’s ability to dissipate the excess heat caused by energy being absorbed through normal biological functions. Higher frequencies (e.g., microwaves, radio) have less penetration depth due to the shorter wavelengths, which are susceptible to reflection and refraction based on the energy level, material composition (i.e., moisture content) and absorption rate.

In 2005, the Institute of Electrical and Electronic Engineers (IEEE) completely revised the Standard C95.1 Safety Levels with Respect to Human Exposure to Radio Frequency and Electromagnetic Fields. More than 1,000 documents were used in the revision of the standard. The standard uses the specific absorption rate (SAR), which was developed to measure the rate at which EM energy is absorbed in the human body. SAR is expressed in units of watts per kilogram (W/kg), and is used to determine the potential harmful effects to humans. Research, based in part on animal trials, has shown that a rate of 4 W/kg over a six minute time period has not revealed any harmful effects to humans (IEEE 2005). To further ensure the safety of personnel, the IEEE C95.1 Standard added a safety factor of 10 and determined the permissible occupational exposure limit to personnel at 0.4 W/kg. These absorption rates are often difficult to measure directly; therefore, C95.1 expresses exposure limits in terms of the power flux densities (watts per square centimeter [W/cm²] or kilowatts per square centimeter [kW/cm²]) of EM energy required to exceed the permissible SAR limit.

The exposure limit of 0.4 W/kg is just one safety factor relating to the exposure of personnel to EM energy. Other factors such as if the environment is controlled (i.e. personnel are aware of the exposure in a work environment); uncontrolled (areas where high levels of EM energy would not be expected); if the exposure is whole body or partial; or if the EM energy is pulsed or continuous determine different permissible exposure limits. These limits are explained in detail in IEEE C95.1. The DoD incorporates the current IEEE C95.1 by reference in DoDI 6055.11.

The majority of experimental data on EM energy have concluded that the effects on organisms are primarily related to the heating effect of this energy and the ability of the body to deal with the excess heat. Unlike ionizing radiation, exposure to EM energy does not result in cumulative effects. Once the source of the radio frequency is turned off or removed, exposure stops.
In addition to safety related to personnel, EM energy has the potential to impact fuel, ordnance, or create interference with devices that generate EM energy. High levels of EM energy can potentially ignite fuel or detonate nearby ordnance. For these reasons, the Army creates safety zones for fuel, ordnance, and EM interference around systems that emit high levels of EM energy.

A wide variety of different radio frequencies are currently in use at Fort Sill, all of which are closely regulated in compliance with AR 5-12, *Army Use of the Electromagnetic Spectrum*. The Fort Sill Frequency Manager (FM), as part of the Fort Sill Network Enterprise Center (NEC), is responsible for the management of all frequencies on Fort Sill. The Army Frequency Management Office (AFMO) in San Antonio, Texas, provides the FM with a set list of frequencies available for local distribution and use on Fort Sill. If a proponent requires the use of a frequency that is not on this list, the proponent is required to complete a Frequency Request Form (FRF). The FRF requires specific information about the frequency request, including technical parameters such as output power, emission designator types, type of antennae, and whether the source will be fixed or mobile. Upon receipt of the completed FRF, the FM coordinates with AFMO to initiate the frequency deconfliction process. As part of this process, the AFMO would coordinate with the entity that owns the requested frequency and obtain permission for frequency use. The timeline associated with the deconfliction process could vary depending on existing uses of that frequency, but could range between 45 and 180 days.

**Lasers** – Lasers are currently used on Fort Sill as pointers, markers, target designators, and for other purposes. All four classes of lasers are used. While Class 1 and 2 lasers can be used anywhere, Class 3 and 4 lasers can only be used in designated areas.

The U.S. Army Public Health Command Nonionizing Radiation Program (MCHB-IP-ONR) provides laser range specific technical expertise on laser hazards to personnel operating lasers. Fort Sill Regulation 385-1, Chapter 8, provides guidance for the safe use of tactical lasers, pointers, and markers on Fort Sill, excluding Falcon Range. Per this regulation, Fort Sill Range Operations will develop procedures for laser demonstrations on a case-by-case basis.

The Laser Range Safety Officer (LRSO) is responsible for the safe conduct of laser operations at lasing points. Army laser range safety guidance is described in DA PAM 385-63. The specific guidelines to ensure the proper control of hazardous laser energy are outlined in Military Handbook (MIL-HDBK)-828B, Chapter 8. Chapter 7 of DA PAM 385-24 identifies the training requirements for laser safety officers.

The use of lasers on Falcon Range is closely regulated by the provisions contained in Air Force Instruction (AFI) 13-212, Chapter 4, and AFI 48-139. The Falcon Range has been certified by the Air Force Research Laboratory for the safe use of most DoD-fielded, fixed-wing and man-portable laser systems. The most recent Air Force Research Laboratory optical radiation safety consultative letter, Falcon Range Laser Safety Survey, is maintained at Falcon Range and at 301st Operations Group Commander, Naval Air Station Fort Worth Joint Reserve Base, Texas, 76127-6200.

### 3.2.2 Environmental Consequences

Demonstrations of a specific system or technology at a specific location would be dependent on range conditions, range scheduling, limitations of the location (e.g. lack of a suitable backstop, potential interference with electronic targets, environmental constraints, etc.), and final approval of Range Operations.
As part of the preparation process for Electric Fires demonstrations at Fort Sill, the entity proposing the demonstration would complete the DSW contained in Appendix B. The DSW includes detailed information about the specific demonstration and mission specific information including success criteria, narrative descriptions of the demonstration process, equipment characteristics, target descriptions and characteristics and anticipated safety, frequency, security, communications, and medical requirements. The DSW also includes a signature line for the requesting entity and a signature line for the approval by the CDID representative. Receipt of the DSW by the Electric Fires Office initiates the demonstration approval process. Depending on the technology to be demonstrated, a variety of different internal and external organizations and agencies would be involved with review and approval of the demonstration.

Appendix B also contains the system approval process flowcharts that would be followed during the demonstration review and approval process. These flowcharts indicate the internal (Army Public Health Command, TCM-Range, Laser Clearinghouse, Staff Judge Advocate, Army Spectrum Management Office and others) and external (FAA and/or FCC) entities and agencies requiring review and approval of the demonstration along with the appropriate DD forms that would be required. For example, as part of the Department of Defense Spectrum Management Program compliance, Form DD 1494, would be required to minimize the potential for frequency interference during the fielding and employment of spectrum dependent equipment. The Deliberate Risk Assessment Worksheet, Form DD 2977, would also be prepared as part of the preparation process. The DSW approval timeline would be dependent on the system to be demonstrated but could be as long as 12 months.

The methodology for evaluating the potential impact to health and safety focuses on the downrange impacts of each technology and the potential impacts relating to the system and power source at the firing point. Downrange impacts include the dimension of the path the projectile or beam needs to reach the target, the target area and backstop, and additional area calculated for potential ricochet. Prior to any demonstrations occurring at Fort Sill, all participating personnel would be required to don personal protective equipment (PPE) appropriate to the system being demonstrated. For example, laser demonstrations would require appropriate eye protection and acoustic demonstrations would require appropriate hearing protection. As part of normal safe range operations, range use would be publicized through the public affairs office and roads would be blocked off during demonstrations as necessary. None of the systems evaluated in this EA would be intentionally directed at military or civilian personnel.

3.2.2.1 No Action Alternative

Implementation of the No Action Alternative would not provide the opportunity for demonstrations of the advanced technologies identified in Section 2.3 at Fort Sill. Training at the existing ranges on Fort Sill would continue under the direction and management of Range Operations.

3.2.2.2 Alternative 1 – Demonstrations on the West Range Area

Implementation of this alternative would include the demonstration of electro-dynamic kinetic energy systems, directed energy systems and LAMS at the West Range area of Fort Sill. Because of the inherent differences of each system relative to health and safety, each system is described separately.
3.2.2.2.1 Electro-Dynamic Kinetic Energy Systems

Electro-dynamic kinetic energy systems considered in this analysis are EM launch (railgun), combustion light gas gun, and electrothermal-chemical technologies. Each of these technologies uses a different system to propel a projectile toward a target. Current EM launch system technologies use either electrical energy to create a magnetic field that propels the projectile or plasma to propel the projectile. The combustion light gas gun uses an ignited combustible gas mix to propel the projectile towards the target. The electrothermal-chemical gun uses electrical energy and a plasma cartridge to ignite the projectiles propellant. These systems would be demonstrated against fixed targets within the impact area of the West Range at Fort Sill.

The safe use of electro-dynamic kinetic energy systems is dependent in part upon a suitable impact area that meets the safety zone requirements for that system. A representative example of electro-dynamic kinetic energy safety zones is illustrated on Figure 3.2-1. The demonstration location would require an appropriate firing location that fits the requirements of the predetermined and approved safety zone. As described in Section 3.2.2, approval of system-specific safety zones would be part of the DSW process required to demonstrate a specific technology at Fort Sill.

Figure 3.2-1. Representative Example of Electro-Dynamic Kinetic Energy Safety Zones in the West Range Area
Electromagnetic Launch – As identified in other environmental analysis of railgun technology (Navy 2013a), magnetic and electrical fields are anticipated to result from the operation of the 32 megajoule (MJ) railgun. Studies of EM energy resulting from firing a 32 MJ railgun at Dahlgren indicated that EM levels at 80 feet from the railgun were well below IEEE C95.1 standards. The highest electric field recorded was 17 kilovolts per meter (kV/m), compared to the IEEE exposure limit of 100 kV/m. Depending on the operational power level of the railgun, the magnetic field strength generated at demonstrations could be intense enough near the launcher during firing that it could exceed IEEE C95.1 limits. All demonstrations would be evaluated and approved prior to use at Fort Sill and an exclusion or safety zone that keeps personnel at a safe distance would be based on the planned operational levels. Any demonstration personnel having an active implantable medical device, such as pacemakers and implantable cardioverter defibrillators, must coordinate their location with the on-site supervisor prior to firing of the railgun. No significant impacts to human health and safety are anticipated when demonstrations are conducted in accordance with all applicable safety regulations.

Combustion Light Gas Gun – Some demonstrations could use combinations of materials that pose some health risks if not properly handled. For example, current versions of the combustion light gas use liquid hydrogen and oxygen as propellants. Liquid hydrogen is a cryogenic liquid that poses a burn risk if it contacts the skin. Gaseous hydrogen is an asphyxiant. Hydrogen is also a fire/explosion hazard. Liquid oxygen is a cryogenic as well and leaks of oxygen in a confined environment can create high oxygen environments increasing the risk of fires. Both hydrogen and oxygen have a long history of safe usage for numerous industrial applications, and implementation of proper safety procedures would reduce the potential safety risks. Future systems that use hazardous materials would be handled in a similar manner as the combustion light gas gun, following all applicable safety regulations and procedures. No significant impacts to human health and safety are anticipated when demonstrations are conducted in accordance with all applicable safety regulations.

Electrothermal-Chemical – Current electrothermal-chemical systems are anticipated to have firing point and downrange health and safety concerns typical of any major large artillery gun. All applicable safety regulations would be followed during demonstration of this system, thus no significant impacts to health and safety are anticipated.

3.2.2.2.2 Directed Energy Systems

Directed energy systems use some form of EM energy (see Section 2.3.1.2) or acoustic energy to disrupt either mechanical systems or the target structure. These systems are demonstrated against fixed, surface mobile or aerial targets. Safety concerns would focus on the dimension of the path the energy wave requires to reach the target and the target area and backstop or the area beyond the target area.

Acoustic – Acoustic systems such as the LRAD use directed sound waves to transmit clear communications or issue deterrent warnings. When used for deterrence these systems produce loud sound levels that are intended as a deterrent without inflicting permanent harm. A legal review by the U.S. Department of the Army, Office of The Judge Advocate General found that the LRAD, “when used in the manner prescribed, would not cause permanent damage to the ear
or hearing loss” (Army 2010). No significant impacts to human health and safety are anticipated when demonstrations are conducted in accordance with all applicable safety regulations. During demonstrations of acoustic systems, all participating personnel would be required to wear hearing protection. Figure 3.2-2 illustrates a representative example of safety zones associated with acoustic system demonstrations in the West Range area.

**Figure 3.2-2. Representative Example of Acoustic System Safety Zones in the West Range Area**

**High Power Microwave/Radio Frequency** – Prolonged exposure to certain power levels and EM frequencies has the potential for harmful impacts to humans. As described in Section 3.2.1.2.4, these impacts are primarily related to tissue damage resulting from excessive heating. All demonstrations at Fort Sill would undergo the DSW review and approval process to ensure compliance with health and safety procedures and regulations relative to high powered microwaves/radio frequency systems. Safety zones would be created for each type of demonstration system. These safety zones would account for the permissible exposure limits in DoDI 6055.11 and also consider potential impacts to electronic equipment, fuel sources, ordnance, and frequency interference. A representative example of a high power microwave/radio frequency safety zone is illustrated on Figure 3.2-3. In addition, certain types of high powered microwaves/radio frequency systems have the capability to generate ionizing radiation (e.g. x-rays) in the immediate vicinity of the power source. Any systems capable of generating ionizing radiation would be demonstrated in compliance with DoDI 6055. Electric hazards relating to the power source are also present in most high powered microwaves/radio frequency systems.
Personnel using these systems would be familiar with the potential hazards and recognize the conductive surfaces on the system capable of delivering electrical shock. Any demonstration personnel having an active implantable medical device, such as pacemakers and implantable cardioverter defibrillators, must coordinate their location with the on-site supervisor prior to demonstrating the high power microwave/radio frequency device.

The Active Denial System (ADS) is an example of a high power microwave system that uses a frequency of 95 GHz and is intended to be a non-lethal deterrent. This system has been successfully demonstrated at other military facilities and has been shown to be an effective deterrent that poses no long-term effects on its targets (LeVine 2009). Previous demonstrations and testing of the system have shown that exposure is limited to the outer 1/64th inch of skin; the principal effect is thermal; prolonged exposure, while unlikely (1/10th of 1 percent), can cause thermal injury; exposure to ADS is unlikely to initiate cancer or have deleterious effect on fetal development (Navy 2013b).

Figure 3.2-3. Representative Example of a High Power Microwave/Radio Frequency Safety Zone in the West Range Area
High powered microwaves/radio frequency systems capable of generating a beam with the potential to exceed human health standards downrange would have safety zones excluding all personnel. All system demonstrations would be closely coordinated with the Fort Sill Range Operations and would comply with Fort Sill Regulation 385-1. No significant impacts to health and safety are anticipated to result from implementation of high power microwave/radio frequency systems, because all demonstrations would be completed in compliance with the above-stated processes and regulations.

**Laser** – As referenced above, lasers are currently being safely used at Fort Sill. The proposed laser demonstrations would be conducted in accordance with existing regulations; stringent DoD policies specifically developed for laser activities; and management controls, plans, and procedures to include the development of laser safety zones. These procedures would minimize exposure to laser radiation that could cause damage to skin tissue or eyes. In addition to personnel exposure to lasers, the potential impact of laser beams to pilots, non-participating aircraft, and satellites is also of concern.

The laser safety zone would illustrate the minimum land and air requirements, to include terrain mitigation, necessary to safely demonstrate a given laser. While mechanisms for biological damage from lasers are similar to effects produced from absorption of energy from conventional light sources, lasers are of special concern because of their potential to project hazardous levels of energy over great distances. Laser hazards can span from temporary and permanent blindness to physically burning tissue.

All lasing activity would be directed into the impact area of the West Range. Safety zones would be established around laser corridors and the target or backstop based on calculations of the power being emitted by the laser. A representative example of laser safety zones is illustrated on Figure 3.2-4. These zones would be identified and demarcated to keep people at a safe distance during the brief time that the laser is demonstrated. During the lasing demonstration, much of the laser beam would be absorbed by the target with an appropriate backstop. Because backscatter could occur at the target location, an eye-safety hazard zone would be calculated around the target and backstop, and personnel shelters, if necessary, would be located well beyond the area where backscatter could pose risk to personnel. Target area selection will minimize the probability of a fire started by the laser.

If lasers are anticipated to be demonstrated without the use of a backstop (i.e., over the horizon), additional procedures would be required to eliminate the potential impact to pilots, non-participating aircraft, and satellites. Prior to any over the horizon laser demonstrations, Fort Sill Army Radar Approach Control (ARAC) would be contacted to verify the absence of non-participating aircraft in the airspace above and surrounding the demonstration location. If non-participating aircraft are identified within Fort Sill airspace during the demonstration, the demonstration would be aborted until proper assurance that laser demonstrations would not impact pilots or non-participating aircraft. Additionally, clearance for all over the horizon laser demonstrations would require Laser Clearing House and other agency approvals, which includes satellite de-confliction and specific demonstration times.

By implementing strict health and safety procedures for laser use, Fort Sill personnel would be located well beyond distances that could result in injury from the lasers and distance to the general public would be even farther away from the demonstration area. In addition to direct hazards to skin
tissue and eyes, there are potential non-beam hazards such as electrocution, fire, laser-generated air contaminants (LGACs) and collateral radiation as a result of lasing activities (Navy 2013b).

Figure 3.2-4. Representative Example of Laser Safety Zones in the West Range Area

LGACs could be generated when high power laser beams interact with metals, plastics, composites, etc. (ANSI 2007). Fort Sill personnel would ensure that appropriate industrial hygiene characterizations of LGAC exposure takes place in accordance with 29 CFR 1910.1000, Air Contaminants, so that no occupational over-exposures could occur.

Potential collateral radiation produced as a result of air breakdown at the laser/target interface would not present a hazard to personnel because no personnel would be in close proximity to the target in the impact area. Once lasing activities stop, all collateral radiation (if any) ceases and no residual collateral radiation remains (Navy 2013b). Strict adherence to the existing Fort Sill health and safety regulations and approval of laser use by Fort Sill Range Operations would minimize the health and safety risks associated with laser demonstrations. Laser demonstrations are anticipated to have no significant adverse impacts on health and safety at Fort Sill.

**Particle Beam** – Particle beam demonstrations would include the use of systems designed to direct high energy beams of atomic or subatomic particles at targets to disrupt the target structure. Particle beam systems have been researched for decades and are still under development in testing laboratories.
Particle beams are still in a developmental stage as a weapon system, thus the full range of potential health impacts may not be known. The potential safety impacts associated with particle beam systems are anticipated to be very similar to those of lasers, as previously described. Should future systems testing show potential health effects that are not controlled by safety zones and relevant safety standards, additional analysis may be required prior to demonstration at Fort Sill. As with lasers, implementation of particle beam systems in the West Range area is not anticipated to result in significant impacts to human health provided that all of the safety procedures and relevant regulations are followed prior to and during the demonstration. Particle beam demonstrations would be directed into the impact area of the West Range area. Safety zones would be established as part of the demonstration approval process and would be based on appropriate backstops for targets. The safety zones for particle beam demonstrations would be similar to lasers and would be developed and approved prior to initiation of demonstrations.

**Laser Induced Plasma Channel** – Laser Induced Plasma Channel systems are based on the creation of a path through the atmosphere using a laser beam that is charged with an electrical current. Because a laser is used as the vector for the energy transfer, the potential impacts to health and safety would be similar as those described for lasers above. Laser induced plasma demonstrations would be designed for short ranges with a maximum range of no more than 200 meters. A representative example of a safety zone associated with a laser induced plasma channel demonstration on the West Range area is illustrated on Figure 3.2-5.

![Figure 3.2-5. Representative Example of a Laser Induced Plasma Channel Safety Zone in the West Range Area](image-url)
Potential health and safety concerns associated with laser induced plasma channels would also include risk of electrocution from the power source, risk of fire from implementation of the demonstration and EM interference with electronic or electric systems near the demonstration site.

Implementation of laser induced plasma channel demonstrations is not anticipated to result in significant impacts to health and safety provided that all health and safety procedures and relevant regulations are followed prior to and during the demonstration.

3.2.2.2.3 Loitering Aerial Munition Systems

LAMS are explosive guided munitions used to counter both aerial and ground threats. LAMS have the capability to be launched by a single Soldier, loiter over the battlefield and engage threats beyond the range of current LOS weapons. A variety of LAMS have been demonstrated at various locations. Most recently, during the summer of 2014, the Naval Air Warfare Center Weapons Division hosted the Black Dart 2014 counter unmanned aerial vehicle field demonstration at the Sea Test Range at San Nicolas Island in California.

The Switchblade and the Single Multi-Mission Attack Munition (SMAM) are representative of the types of LAMS that could be demonstrated at Fort Sill. SMAMs are a larger category of LAMS that have the capability of longer flight times, increased range, and increased munition payload. Representative examples of LAMS launch, flight, and target safety zones are illustrated on Figure 3.2-6.

The Switchblade, manufactured by AeroVironment, is one example of LAMS currently in use by the Army. In 2011, the Army purchased a small number of Switchblade systems and initial training occurred in early 2012. The Army is currently evaluating LAMS as a potential Program of Record. The primary safety concerns with LAMS are related to the onboard high-energy forward fragmentation munition and the fact that they are unmanned, controlled via a ground control station. The guided munition must remain in radio frequency LOS at all times during operation, but provisions account for lost link. Depending on the type of LAMS demonstrated, the contents of the munition portion of the LAMS could vary. Prior to the demonstration, the contents of the munition will be evaluated by EOD to ensure proper health and safety precautions are in place to recover or handle the munition as necessary.

In 2012, the U.S. Army Evaluation Center (AEC) at Aberdeen Proving Ground evaluated the Switchblade system and identified four hazards, one of which was listed as a serious risk and three of medium risk. The hazard listed as serious was related to incomplete software testing which caused the overall system to receive a serious hazard rating. The documentation associated with these determinations also provided safety zones for the Switchblade both during launch and flight (Army 2012). The launch, flight, and target safety zones must be clear of friendly forces and non-participating personnel.

If radio frequency LOS is lost during operation, all LAMS are programmed to transition to lost link mode. The guided munition loss of link altitudes would be unique to each LAMS. If the munition has been armed, the lost link mode safes the munition and the guided munition autonomously
begins to return to a pre-determined lost link waypoint orbit. If the radio frequency LOS is not restored, the munition is programmed to enter into an orbit, either until the radio frequency LOS is restored or the batteries are depleted. Upon battery depletion, the LAMS would descend to the ground without detonation (Army 2012). If any LAMS are deployed and the munition does not detonate, a minimum of 12 hours would be allotted for the batteries to be depleted and the LAMS would then be considered unexploded ordnance (UXO) and would only be recovered by EOD.

Implementing demonstrations of LAMS is not anticipated to result in significant impacts to health and safety provided that all health and safety procedures and relevant regulations are followed prior to and during the demonstration.
3.2.2.3 Alternative 2 – Demonstrations on the East Range Area

Implementation of Alternative 2 would mean that Electric Fires and LAMS would be demonstrated in the East Range area of Fort Sill. Because the types of demonstrations proposed to occur in the East Range area would be the same as proposed under Alternative 1, the potential impacts to health and safety resulting from implementation of each of the systems listed in Table 2.3-1 would also be the same. The primary differences between the two alternatives are the juxtaposition of agricultural leases and the boundaries of Fort Sill relative to the proposed demonstration sites.

Conducting these demonstrations is anticipated to result in negligible to minor health and safety effects. Similar to the consequences associated with the implementation of Alternative 1, actions associated with the proposed demonstrations would be consistent and compatible with the East Range and the sub-ranges within the East Range area. Although no construction would be required as part of this alternative, additional coordination with Range Operations would be required due to the volume of basic and small arms training activities that currently occur within the East Range area. Range Operations would schedule the demonstrations in accordance with current Fort Sill range use policies to prevent any competing uses.

Additional coordination would also be required to avoid demonstration in areas with high public visibility. Demonstrations could also be limited in the East Range area due to the additional acres of agricultural leased lands and the fact that the Fort Sill boundaries are closer to the proposed demonstration sites. With specific regard to demonstrations of LAMS on the East Range area at Fort Sill, three of the proposed demonstration areas shown on Figure 2.6-1 would not be suitable for demonstration of LAMS due to the proximity of existing small arms ranges. The East Range area potential LAMS demonstration areas are identified on Figure 3.2-7.

![Figure 3.2-7. Potential LAMS Demonstration Areas in the East Range Area](image-url)
Figures 3.2-8 through 3.2-12 illustrate representative examples of safety zones associated with implementation of demonstrations in the East Range area. As described in Section 2.6.2, the East Range area at Fort Sill is comprised of the North and South Arbuckle Ranges. The representative examples are shown for both the North and South Arbuckle Ranges. Representative examples of launch, flight, and target safety zones for LAMS are shown on Figure 3.2-6.
Figure 3.2-9. Representative Example of Acoustic System Safety Zones in the East Range Area
Figure 3.2-10. Representative Example of a High Power Microwave/Radio Frequency Safety Zone in the East Range Area
Figure 3.2-11. Representative Example of Laser Induced Plasma Channel Safety Zones in the East Range Area
Figure 3.2-12. Representative Example of Laser Safety Zones in the East Range Area
3.3 **AIR QUALITY**

3.3.1 **Affected Environment**

3.3.1.1 Definition of the Resource

Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The levels of pollutants are generally expressed on a concentration basis in units of parts per million or micrograms per cubic meter.

The baseline standards for pollutant concentrations are the National Ambient Air Quality Standards (NAAQS) and state air quality standards established under the Clean Air Act (CAA) of 1990. These standards represent the maximum allowable atmospheric concentration that could occur and still protect public health and welfare. The NAAQS provide both short- and long-term standards for the following criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO$_2$), sulfur dioxide (SO$_2$), particulate matter equal to or less than 10 and 2.5 microns (PM$_{10}$ and PM$_{2.5}$), ozone (O$_3$), and lead (Pb).

Under the CAA, it is the responsibility of the individual states to achieve and maintain the NAAQS. To accomplish this, states use the U.S. Environmental Protection Agency (USEPA)-required State Implementation Plan (SIP). An SIP identifies goals, strategies, schedules, and enforcement actions designed to reduce the level of pollutants in the air and bring the state into compliance with the NAAQS.

All areas of the United States are designated as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. Areas where there are insufficient air quality data for the USEPA to form a basis for attainment status are unclassifiable. Thus, such areas are treated as attainment areas until proven otherwise. “Maintenance areas” are those that were previously classified as nonattainment but where air pollution concentrations have been successfully reduced below the standard. Maintenance areas are subject to special maintenance plans to ensure compliance with the NAAQS.

Hazardous air pollutants (HAPs) are chemical pollutants and toxic chemical air pollutants for which occupational exposure limits have been established. Volatile organic compounds (VOCs), an ozone precursor, are included in this definition and include any organic compound involved in atmospheric photochemical reactions, except those designated by a USEPA administrator as having negligible photochemical reactivity. HAPs are not covered by the NAAQS but could present a threat of adverse human health or environmental effects under certain conditions.

3.3.1.2 Existing Conditions

3.3.1.2.1 Climate

Fort Sill is located within the interior climate region of southwestern Oklahoma, which is characterized as being humid subtropical. The average temperature for the year in Fort Sill is 62.1 degrees Fahrenheit (°F) (16.7 degrees Celsius [°C]). The warmest month, on average, is July with an average temperature of 83.5°F (28.6°C). The coolest month on average is January, with an average temperature of 39.4°F (4.1°C).
The average amount of precipitation for the year in Fort Sill is 30.9 inches (784.9 mm). The month with the most precipitation on average is May, with 5.0 inches (127 mm) of precipitation. The month with the least precipitation on average is January, with an average of 1.2 inches (30.5 mm). There is an average of 64 days of precipitation, with the most precipitation occurring in May and the least precipitation occurring in January. Average annual snowfall at Fort Sill is 3.9 inches (9.9 centimeters [cm]). The month with the most snow is January, with 1.4 inches (3.6 cm) of snow (Weatherbase 2014).

3.3.1.2.2 Air Quality

Fort Sill is located in Comanche County, Oklahoma, which is the ROI for the air quality analysis. According to the USEPA, Comanche County is in attainment for all criteria pollutants (USEPA 2014a), and a conformity determination would not be required.

Emissions that would be generated under Alternative 1, Alternative 2, and the No Action Alternative were compared with Comanche County emissions obtained from USEPA’s 2011 National Emissions Inventory (NEI). NEI data are the latest available; these are presented in Table 3.3-1. The county data include emissions amounts from point sources, area sources, and mobile sources. Point sources are stationary sources that can be identified by name and location. Area sources are point sources from which emissions are too low to track individually, such as a home or small office building or a diffuse stationary source, such as wildfires or agricultural tilling. Mobile sources are any kind of vehicle or equipment with gasoline or diesel engine, an airplane, or a boat. Two types of mobile sources are considered: on-road and nonroad. On-road sources consist of vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Nonroad sources are aircraft, locomotives, diesel and gasoline boats, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (USEPA 2014b).

<table>
<thead>
<tr>
<th>Criteria Pollutant (tons/year)</th>
<th>CO</th>
<th>NOₓ</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>SO₂</th>
<th>VOCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comanche County</td>
<td>45,118</td>
<td>6,718</td>
<td>29,163</td>
<td>5,989</td>
<td>385</td>
<td>23,151</td>
</tr>
</tbody>
</table>

Source: USEPA 2014a

CO = carbon monoxide; NOₓ = nitrogen oxides; PM₁₀ and PM₂.₅ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO₂ = sulfur dioxide; VOC = volatile organic compound

3.3.1.2.3 GHG Emissions/Baseline

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere; the accumulation of these gases in the atmosphere has been attributed to the regulation of Earth’s temperature. Human activity in the past century is “very likely” (90 percent chance) the cause of the observed increase in GHG concentrations (Intergovernmental Panel on Climate Change 2007). Thus, regulations have been promulgated to inventory and decrease emissions of GHGs. On October 30, 2009, the USEPA published a rule for the mandatory reporting of GHGs from sources that in general emit 25,000 metric tons or more of carbon dioxide equivalent per year in the United States. The USEPA also recently promulgated the Prevention of Significant Deterioration and Title V GHG
Tailoring Rule, which will impose GHG permitting requirements on existing major sources with major modifications and certain new major sources. At this time, a threshold of significance has not been established for the emissions of GHGs.

The six primary GHGs, defined in Section 19(i) of EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, and internationally recognized and regulated under the Kyoto Protocol, are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from Earth’s surface. The GWP allows GHGs to be compared with each other by converting the GHG quantity into the common unit “carbon dioxide equivalent.” Baseline GHG emissions for Comanche County, obtained from the USEPA’s 2011 NEI, are summarized in Table 3.3-2.

### Table 3.3-2. Baseline Greenhouse Gas Emissions Inventory for Comanche County, Oklahoma

<table>
<thead>
<tr>
<th>Greenhouse Gases (tons/year)</th>
<th>CO₂</th>
<th>N₂O</th>
<th>CH₄</th>
<th>CO₂e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comanche County</td>
<td>1,182,212</td>
<td>22</td>
<td>1,403</td>
<td>1,223,843</td>
</tr>
</tbody>
</table>

Source: USEPA 2014b

CH₄ = methane; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; N₂O = nitrous oxide

#### 3.3.2 Environmental Consequences

##### 3.3.2.1 Analysis Methodology

CAA Section 176(c), General Conformity, requires Federal agencies to demonstrate that their proposed activities would conform to the applicable state implementation plan for attainment of the NAAQS. General conformity applies only to nonattainment and maintenance areas. If the emissions from a Federal action proposed in a nonattainment area exceed annual *de minimis* thresholds identified in the rule, a formal conformity determination is required of that action. The thresholds are more restrictive as the severity of the nonattainment status of the region increases. The project region is designated as attainment for all criteria pollutants (USEPA 2014a). The criteria pollutants are compared with the emissions of Comanche County, which is in attainment for all criteria pollutants.

In order to evaluate air emissions and their impact on the overall ROI, the emissions associated with the project activities were compared with the total emissions on a pollutant-by-pollutant basis for the ROI’s 2011 NEI data. Potential impacts to air quality are evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. The CEQ defines significance in terms of context and intensity in 40 CFR 1508.27. This requires the significance of the action to be analyzed with respect to the setting of the proposed action and based relative to the severity of the impact. The CEQ NEPA regulations (40 CFR 1508.27[b]) provide 10 key factors to consider in determining an impact’s intensity. To provide a more conservative analysis, the two counties were selected as the ROI instead of the USEPA-designated Air Quality Control Region, which is a much larger area.
The air quality analysis focused on emissions associated with construction emissions from range improvements and internal combustion generators, vehicle use, and LAMS emissions associated with demonstration activities. Construction-related sources include emissions from heavy construction machinery, semitractor-trailer rigs, and vehicle exhaust from contracted employees’ personal vehicles.

For the purposes of this air quality analysis, the use of a 2-megawatt mobile diesel generator was anticipated to be required for demonstration of each of the technologies listed in Table 2.3-1. The emissions resulting from operation of the generator are summarized in Table 3.3-3.

### Table 3.3-3. Emissions Resulting from Portable Diesel Generator Compared with Comanche County Emissions

<table>
<thead>
<tr>
<th>Emissions (tons/year)</th>
<th>CO</th>
<th>NOx</th>
<th>PM&lt;sub&gt;10&lt;/sub&gt;</th>
<th>PM&lt;sub&gt;2.5&lt;/sub&gt;</th>
<th>SOx</th>
<th>VOCs</th>
<th>CO&lt;sub&gt;2e&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI Emissions</td>
<td>45,118</td>
<td>6,718</td>
<td>29,163</td>
<td>5,989</td>
<td>385</td>
<td>23,151</td>
<td>1,182,212</td>
</tr>
<tr>
<td>Generator Emissions</td>
<td>4.25</td>
<td>18.54</td>
<td>0.54</td>
<td>0.00</td>
<td>0.31</td>
<td>0.54</td>
<td>910</td>
</tr>
<tr>
<td>Percent of County Emissions</td>
<td>0.01%</td>
<td>0.28%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.08%</td>
<td>0.00%</td>
<td>0.08%</td>
</tr>
</tbody>
</table>

Source: USEPA 2014b

CO = carbon monoxide; CO<sub>2e</sub> = carbon dioxide equivalents; NOx = nitrogen oxides; PM<sub>10</sub> and PM<sub>2.5</sub> = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SOx = sulfur oxides; VOC = volatile organic compound

GHGs are included in the analysis. The primary source of carbon dioxide emissions would be from vehicles operating on-site during construction and ongoing generator and aircraft emissions from demonstration activities. Construction equipment operation, worker commuting, and aircraft emissions would contribute to GHG emissions in the area. GHG emissions would be compared with the CEQ’s minimum level of 25,000 metric tons (27,558 tons) as a level at which consideration would be required in NEPA documentation. Air quality calculations are provided in Appendix C.

#### 3.3.2.2 No Action Alternative

The No Action Alternative would not result in any additional impacts to air quality beyond the scope of normal conditions and influences within the ROI.

#### 3.3.2.3 Alternative 1 – Demonstrations on West Range Area

Under Alternative 1, short-term, temporary construction emissions would be generated by heavy equipment completing improvements to Firing Point 240E and worker trips while construction was ongoing. Operational emissions would be associated with generators providing external power to various Electric Fires systems and from military vehicles providing transportation to personnel and/or equipment during demonstrations. It is assumed that LAMS would be electric and therefore would have no associated criteria pollutant emissions. Any new activity not described in Chapter 2 or new technology that could have the potential to adversely impact air quality must be evaluated in accordance with 32 CFR 651. Likewise, demonstration activities would be required to follow the DSW Preparation Instructions (Appendix B). Individual demonstrations would then be evaluated by appropriate personnel and if the potential for adverse impacts to air quality exists, further NEPA and/or permitting would be required.
Emissions associated with Alternative 1 are calculated and summarized in Table 3.3-4. Construction emissions were calculated using DoD-developed Air Conformity Applicability Model Version 5.0 inputs. Calculations are described in Appendix C.

Impacts resulting from implementation of the demonstrations would amount to less than 1 percent of each of the criteria pollutants. Increases from construction and range improvements result in only a short-term, temporary increase in emissions. GHG emissions would be well less than 25,000 metric tons (27,558 tons).

Table 3.3-4. Construction and Vehicle Emissions Compared with Comanche County Emissions

<table>
<thead>
<tr>
<th>Emissions (tons/year)</th>
<th>CO</th>
<th>NOₓ</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>SOₓ</th>
<th>VOCs</th>
<th>CO₂ₑ</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI Emissions</td>
<td>45,118</td>
<td>6,718</td>
<td>29,163</td>
<td>5,989</td>
<td>385</td>
<td>23,151</td>
<td>1,182,212</td>
</tr>
<tr>
<td>Construction Emissions</td>
<td>3.99</td>
<td>5.84</td>
<td>2.77</td>
<td>0.28</td>
<td>0.01</td>
<td>0.80</td>
<td>1,064</td>
</tr>
<tr>
<td>Vehicle Emissions</td>
<td>0.40</td>
<td>0.07</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.05</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>4.39</td>
<td>5.91</td>
<td>2.77</td>
<td>0.28</td>
<td>0.01</td>
<td>0.85</td>
<td>1,100</td>
</tr>
<tr>
<td>Percent of County Emissions</td>
<td>0.01%</td>
<td>0.09%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.09%</td>
</tr>
</tbody>
</table>

3.3.2.3.1 Electro-Dynamic Kinetic Energy Systems

**Electromagnetic Launch** – Emissions associated with EM launch under Alternative 1 are calculated and summarized in Table 3.3-3. The emissions are associated with an external generator used to power the system. Impacts would amount to less than one percent of the ROI’s overall annual air emission on a pollutant-by-pollutant basis. The EM railgun does not require the use of a propellant. Firing of railgun projectiles generates small quantities of aluminum oxide (Al₂O₃) in the immediate vicinity of firing caused by the abrasion of aluminum components. The quantity and form of aluminum oxide that would be emitted is not considered toxic and would not require any additional safety measures.

**Combustion Light Gas Gun** – Emissions associated with the combustion light gas gun under Alternative 1 are calculated and summarized in Table 3.3-3. Emissions are associated with an external generator used to run the system. The system itself uses combustion light gases such as hydrogen or oxygen to propel projectiles. Combustion of these light gases produces no air pollutants. Impacts would amount to less than one percent of the ROI’s overall annual air emission on a pollutant by pollutant basis.

**Electrothermal-Chemical Gun** – Emissions associated with the electrothermal-chemical gun under Alternative 1 are calculated and summarized in Table 3.3-3. Emissions are associated with an external generator used to run the system. Impacts would amount to less than one percent of the ROI’s overall annual air emission on a pollutant by pollutant basis.

3.3.2.3.2 Directed Energy Systems

Emissions associated with the directed energy systems (acoustic, high power microwave, radio frequency, laser, particle beam, and laser induced plasma channel) under Alternative 1 are calculated and summarized in Table 3.3-3. Emissions are associated with an external generator.
used to run the systems. Impacts would amount to less than 1 percent of the ROI’s overall annual air emission on a pollutant-by-pollutant basis.

3.3.2.4 Summary

Emissions associated with Alternative 1 are summarized in Table 3.3-5. Emissions are associated with construction activities, vehicle operations, and external portable generators used to power the demonstrations. Impacts would amount to less than one percent of the ROI’s overall annual air emissions on a pollutant-by-pollutant basis for all pollutants except for NO\textsubscript{x}. NO\textsubscript{x} emissions would total 2.57 percent of the annual NO\textsubscript{x} emissions for Comanche County. There would be no significant impact to local or regional air quality from implementation of Alternative 1.

In accordance with Fort Sill regulations, portable generators would be those generators capable of being moved after shutdown and disconnect. Mobile refuelers or an approved refueling container (e.g., Jerry cans) would be used to refuel generators. No aboveground storage tanks or 55-gallon drums would be used for refueling. Spill kits would be available and readily accessible during portable generator refueling.

| Table 3.3-5. Alternative 1 Emissions Summary Compared with Comanche County Emissions |
|---------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                | CO       | NO\textsubscript{x} | PM\textsubscript{10} | PM\textsubscript{2.5} | SO\textsubscript{x} | VOCs | CO\textsubscript{2}e |
| ROI Emissions                  | 45,118   | 6,718           | 29,163          | 5,989           | 385         | 23,151          | 1,182,212          |
| Construction Emissions         | 3.99     | 5.84           | 2.77            | 0.28            | 0.01        | 0.80            | 1,064            |
| Vehicle Emissions              | 0.40     | 0.07           | 0.00            | 0.00            | 0.00        | 0.05            | 36               |
| Generator Emissions            | 38.24    | 166.84         | 4.87            | 0.00            | 2.81        | 4.90            | 8,190            |
| Total                          | 42.62    | 172.75         | 7.63            | 0.28            | 2.82        | 5.75            | 9,290            |
| Percent of County Emissions    | 0.09%    | 2.57%          | 0.03%           | 0.00%           | 0.73%       | 0.02%           | 0.79%            |

Source: USEPA 2014b
CO = carbon monoxide; CO\textsubscript{2}e = carbon dioxide equivalents; NO\textsubscript{x} = nitrogen oxides; PM\textsubscript{10} and PM\textsubscript{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO\textsubscript{x} = sulfur oxides; VOC = volatile organic compound

3.3.2.5 Alternative 2 – Demonstrations on East Range Area

Under Alternative 2, no construction would be necessary, so there would be no construction equipment emissions generated. As with Alternative 1, operational emissions would be associated with portable generators providing external power to various Electric Fires demonstrations and from military vehicles providing transportation to personnel and/or equipment during demonstrations. Emissions associated with vehicle operations and generator use would be the same under Alternative 2 as under Alternative 1.

Emissions associated with Alternative 2 are summarized in Table 3.3-6. Impacts would amount to less than one percent of the ROI’s overall annual air emission on a pollutant by pollutant basis for all pollutants except for NO\textsubscript{x}. NO\textsubscript{x} emissions would total 2.48 percent of the annual NO\textsubscript{x} emissions for Comanche County. There would be no significant impact to local or regional air quality from implementation of Alternative 2.
### Table 3.3-6. Alternative 2 Emissions Summary Compared with Comanche County Emissions

<table>
<thead>
<tr>
<th>Emissions (tons/year)</th>
<th>ROI Emissions</th>
<th>Vehicle Emissions</th>
<th>Generator Emissions</th>
<th>Total</th>
<th>Percent of County Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CO</td>
<td>NO$_x$</td>
<td>PM$_{10}$</td>
<td>PM$_{2.5}$</td>
<td>SO$_x$</td>
</tr>
<tr>
<td>ROI Emissions</td>
<td>45,118</td>
<td>6,718</td>
<td>29,163</td>
<td>5,989</td>
<td>385</td>
</tr>
<tr>
<td>Vehicle Emissions</td>
<td>0.40</td>
<td>0.07</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Generator Emissions</td>
<td>38.24</td>
<td>166.84</td>
<td>4.87</td>
<td>0.00</td>
<td>2.81</td>
</tr>
<tr>
<td>Total</td>
<td>38.64</td>
<td>166.91</td>
<td>4.87</td>
<td>0.00</td>
<td>2.81</td>
</tr>
<tr>
<td>Percent of County Emissions</td>
<td>0.09%</td>
<td>2.48%</td>
<td>0.02%</td>
<td>0.00%</td>
<td>0.73%</td>
</tr>
</tbody>
</table>

Source: USEPA 2014b

CO = carbon monoxide; CO$_{2e}$ = carbon dioxide equivalents; NO$_x$ = nitrogen oxides; PM$_{10}$ and PM$_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO$_x$ = sulfur oxides; VOC = volatile organic compound

### 3.4 Noise

#### 3.4.1 Affected Environment

##### 3.4.1.1 Definition of the Resource

Noise is considered unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Sound levels in this document are stated in decibels (dB), a logarithmic scale used to simplify communication of a very wide range of audible sound pressure levels. At distances of about three feet, normal human speech ranges from 63 to 65 dB, loud kitchen appliances (e.g., blender) range from about 83 to 88 dB, and rock bands can approach 110 dB.

The frequency (i.e., pitch) of a sound is also important in determining how the sound will be perceived. Unless otherwise noted, noise levels in this document have been adjusted to emphasize frequencies heard best by the human ear, a process known as “A-weighting.” Large-arms munitions firing generates sounds that are felt as well as heard. With this type of noise, energy in frequency bands not heard well by the human ear could have substantial impacts. Large-arms munitions noise levels are often C-weighted, an adjustment that de-emphasizes extremely low- and high-frequency sounds to a lesser extent than A-weighting. Peak level decibels (dBP) is often used when describing noise from small-arms ranges. Peak level is the maximum instantaneous sound level that occurs during an acoustic event. Another analysis used for assessing explosive noise is PK 15 (met) peak noise levels. Risk of complaint is considered low for a PK 15 (met) < 115 dB, moderate for levels of 115-130 dB, and high for levels >130 dB.

For noise impacts, the ROI for the proposed action and the No Action Alternative includes the West and East Range areas and the surrounding area where potential noise impacts are anticipated.

##### 3.4.1.2 Existing Conditions

The noise environment at Fort Sill consists primarily of three types of noise: transportation noise from aircraft and vehicles, noise from firing at small-arms ranges, and noise from large caliber weapons firing and military explosives operations. The existing noise contours for Fort Sill for both small-arms and large caliber weapons and explosive noise are shown on Figure 3.4-1.
Figure 3.4-1. Existing Noise Contours at Fort Sill
AR 200-1, *Environmental Protection and Enhancement*, defines recommended noise limits from Army activities for established use of land with respect to environmental noise. These include:

- **Land Use Planning Zone (LUPZ):** Zone used to better predict noise impacts associated with increased levels of operations at airfields or with large caliber weapons ranges. This zone is used to provide communities with additional information regarding land use decisions.

- **Zone 1:** Typically compatible with most noise-sensitive (housing, schools, medical facilities) land uses.

- **Zone 2:** Normally incompatible with most noise-sensitive land uses. Exposure to noise in this zone may be considered significant. Without additional mitigation, land uses are normally limited to industrial-related activities.

- **Zone 3:** Incompatible with noise-sensitive land uses. Noise levels are generally considered severe, thus noise-sensitive land uses should not be considered in this zone.

While the noise contours for large caliber weapons extend off of the installation boundary, the majority of noise associated with small-arms fire only impacts areas within the installation boundary.

### 3.4.2 Environmental Consequences

#### 3.4.2.1 No Action Alternative

Implementation of the No Action Alternative would result in no changes to the noise environment at Fort Sill. Under this alternative, there would be no demonstrations and noise levels would remain consistent with baseline conditions.

#### 3.4.2.2 Alternative 1 – Demonstrations on West Range Area

Construction activities in support of the Firing Point 240E improvements would occur in the context of an active Army post near the West Range impact area where artillery and other loud explosions are a normal part of the environment. Construction activities would generate localized increases in noise qualitatively different from noise associated with a firing range. For example, a typical backhoe, dozer, and crane generate up to approximately 78, 82, and 81 dB, respectively, at a distance of 50 feet (FHWA 2006). Construction noise would be temporary and intermittent, lasting only the duration of the project. No significant impacts to the noise environment would be anticipated to result from construction activities.

Noise levels resulting from implementation of Alternative 1 would vary depending upon the type of system being demonstrated. As shown in Table 3.4-1, noise levels resulting from the majority of the directed energy systems are negligible. Acoustic systems would produce noise levels in the 120-170 dB range, but the nature of these systems is such that the noise is highly focused and limited to the specific target area. Noise levels resulting from the electro-dynamic kinetic energy systems and the LAMS range from 166-192 dB. Noise associated with these systems is comparable to existing artillery systems in use at Fort Sill in that the noise levels are high intensity but for a short duration. The dB levels associated with these systems are also similar to existing systems at Fort Sill (Table 3.4-1). As with current range operations, hearing protection...
would be required during demonstrations as necessary. Up to six demonstrations of various technologies would occur at Fort Sill on an annual basis. This level of demonstration is not anticipated to result in significant impact on the noise environment at Fort Sill.

Table 3.4-1. Sounds Levels and Hearing Effects Resulting from Proposed Electric Fires and Loitering Aerial Munition System Demonstrations and Existing Army Weapon Systems

<table>
<thead>
<tr>
<th>System</th>
<th>Sound Level (dB)</th>
<th>Hearing Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM Launch</td>
<td>180-192</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>Combustion Light Gas Gun</td>
<td>180-192</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>Electrothermal-Chemical</td>
<td>180-192</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>Acoustic</td>
<td>120-170</td>
<td>Localized, focused target area</td>
</tr>
<tr>
<td>High Power Microwave</td>
<td>Negligible</td>
<td>Could produce slight clicking or buzzing sound at certain frequencies</td>
</tr>
<tr>
<td>Radio Frequency</td>
<td>Negligible</td>
<td>Could produce slight clicking or buzzing sound at certain frequencies</td>
</tr>
<tr>
<td>Laser</td>
<td>Not applicable – visible light only</td>
<td>None</td>
</tr>
<tr>
<td>Particle Beam</td>
<td>Negligible</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>Laser Induced Plasma Channel</td>
<td>Negligible</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>LAMS</td>
<td>166</td>
<td>High Intensity, Short Duration</td>
</tr>
</tbody>
</table>

Noise Levels for Existing Army Systems

<table>
<thead>
<tr>
<th>System</th>
<th>Sound Level (dB)</th>
<th>Hearing Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3 MAAWS Recoilless Rifle</td>
<td>190</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>M72A3 Light Antitank Weapon</td>
<td>182</td>
<td>High Intensity, Short Duration</td>
</tr>
<tr>
<td>Paladin 155 MM Self-propelled howitzer</td>
<td>166</td>
<td>Sound experienced by gunner in open firing compartment</td>
</tr>
<tr>
<td>105 MM towed howitzer</td>
<td>183</td>
<td>High Intensity, Short Duration</td>
</tr>
</tbody>
</table>

*Source/credit FBL

3.4.2.3 Alternative 2 – Demonstrations on East Range Area

No construction activities would occur as a result of implementing Alternative 2 and there would be no construction related noise impacts. Noise impacts associated with demonstrations in the East Range area would be the same as those described for Alternative 1. No significant noise impacts would be anticipated.

3.5 BIOLOGICAL

3.5.1 Affected Environment

3.5.1.1 Definition of the Resource

For purposes of this EA, sensitive and protected biological resources include plant and animal species that are federally (U.S. Fish and Wildlife Service [USFWS]) or state (Oklahoma Department of Wildlife Conservation [OKDWC]) listed for protection. Identifying which species occur in an area affected by an action might be accomplished through literature reviews and
coordination with appropriate federal and state regulatory agency representatives, resource managers, and other knowledgeable experts.

For the purposes of this biological resources analysis, the ROI for Alternative 1, Alternative 2, and the No Action Alternative includes the land within and immediately surrounding Fort Sill.

3.5.1.2 Existing Conditions

3.5.1.2.1 Vegetation

Fort Sill lies within an ecological transition area where tall-grass prairie merges with short-grass prairie, and soil variation has created diverse plant communities. Grassland communities constitute more than 70 percent of Fort Sill. Tall grasses like big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), and Indian grass (*Sorghastrum nutans*) dominate sites with deep soils. Native legumes and other forbs are also numerous in these areas. Medium and short grasses like blue grama (*Bouteloua gracilis*) and sideoats grama (*Bouteloua curtipendula*) occupy more droughty hardland and slickspot soils. Medium and short grasses like hairy and sideoats grama (*Bouteloua spp.*) and fall witchgrasses (*Leptoloma cognatum*) are abundant on very shallow rocky soils.

In addition to grassland communities, vegetation within Fort Sill includes a mix of dense woodland, riparian areas, oak savannah, and agricultural lease lands. Dense woodlands include bottomland forest and cross timbers. Principal trees in the bottomland forest are elm (*Ulmus spp.*), pecan (*Carya illinoensis*), and hackberry (*Celtis occidentalis*). Trees in the cross timbers include blackjack oak (*Quercus marilandica*), post oak (*Q. stellata*), hickories (*Carya spp.*) and elms. Riparian areas are primarily vegetated with elm, pecan, hackberry, and various species of oak. Oak savannah includes various species such as red oak (*Quercus shumardii*), blackjack oak, bur oak (*Quercus macrocarpa*), post oak (*Quercus stellata*), and white oak (*Quercus alba*). Invasive mesquite (*Prosopis glandulosa*) and eastern red cedar (*Juniperus virginiana*) are also present. Mesquite and oak thickets have encroached grassland prairie areas and compete with native short-, medium-, and tall-prairie grasses. Eastern red cedar has encroached in wooded and prairie areas where fire has been controlled.

Agricultural lease areas are located in both the West and East Range areas of Fort Sill and contain a variety of vegetation including cultivated fields, alfalfa crops, and mowed and hayed fields. Invasive grass species include Johnson grass (*Sorghum halepense*), three awn (*Aristida adscensionis*), and gumweed (*Grindelia sp.*) (USAFAFS 2003).

3.5.1.2.2 Wildlife

**Mammals** – The diversity of natural environments at Fort Sill provides suitable habitat for a wide variety of mammal species. Frequently encountered mammal species include coyote (*Canis latrans*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), cottontail rabbit (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), beaver (*Castor canadensis*), opossum (*Didelphis virginiana*), prairie vole (*Microtus ochrogaster*), deer mouse (*Peromyscus maniculatus*), and white-footed mouse (*P. leucopus*). Less frequently encountered are large herbivores such as mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*), and large carnivores such as mountain lions (*Felis concolor*). Bison (*Bison bison*) inhabit the WMWR and
have on occasion been found on Fort Sill (USAFACFS 2003). Game species include white-tailed deer (*Odocoileus virginianus*), elk, raccoons, feral pigs (*Sus scrofa*), and coyotes. Bat species potentially occurring on Fort Sill include silver-haired bat (*Lasionycteris noctivagans*), Mexican free-tailed bat (*Tadarida brasiliensis*), eastern red bat (*Lasiurus borealis*), and the hoary bat (*Lasiurus cinereus*) (USAFACFS 2003).

**Birds** – The State of Oklahoma is within the Central Flyway migration corridor. This migration corridor is utilized by over 400 avian species. Fort Sill provides suitable stopover or resident habitat for many of these species. Bird species commonly observed at Fort Sill include American crow (*Corvus brachyrhynchos*), black-capped vireo (*Vireo atricapillus*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), turkey vulture (*Cathartes aura*), bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*), pheasants (*Phasianus colchicus*), and several species of swallows (*Hirundo* spp.). Avian game species on the installation include bobwhite quail, mourning dove, pheasants, and waterfowl species such as mallard, teal, and Canada and snow geese. Several natural areas providing habitat and refuge for birds, as well as many other wildlife species, have been established on the installation.

**Fish** – Aquatic habitat within Fort Sill includes several creeks and associated tributaries and ponds. Common fish species that could inhabit these waters include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), green sunfish (*L. cyanellus*), channel catfish (*Ictalurus punctatus*), and others.

**Reptiles and Amphibians** – A herpetological survey documenting species observations for the installation was performed at Fort Sill in 1991. A total of 45 species were either collected or verified by sightings (USAFACFS 2003). Reptile species with potential to occur within Fort Sill could include a wide variety of turtles, lizards, and snakes. Amphibians could also be present, including salamanders, frogs, and toads.

3.5.1.2.3 Special Status Species

Special status plant and wildlife species are subject to regulations under the authority of federal and state agencies. The Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1532 et seq.) of 1973, as amended, was enacted to protect and recover imperiled species and the ecosystems upon which they depend. The USFWS maintains a list of special status species considered endangered, threatened, or candidate.

“Endangered” means a species is in danger of extinction throughout all or a significant portion of its range. “Threatened” means a species is likely to become endangered within the foreseeable future. Candidate species include plants and animals that have been studied and proposed for addition by the USFWS to the federal endangered and threatened species list. All federal agencies are required to implement protection programs for endangered and threatened species and to use their authority to further the purposes of the act.

The Migratory Bird Treaty Act (MBTA) prohibits actions resulting in the pursuit, capture, killing, and/or possession of any protected migratory bird, nest, egg, or parts thereof. The USFWS maintains a list of designated migratory birds occurring in various regions of the
United States. The USFWS regulations allow for the incidental take of migratory birds for military readiness activities.

USFWS and OKDWC special status species lists, by county, were obtained to identify species with the potential to occur within Comanche County (USFWS 2014b, OKDWC 2014). Five federally listed migratory bird species were identified and include: piping plover (*Charadrius melodus*); American peregrine falcon (*Falco peregrinus anatum*); whooping crane (*Grus americana*); red knot (*Calidris canutus rufa*); and the black-capped vireo (Table 3.5-1). No state-listed species were identified.

Additionally, the USFWS Critical Habitat Portal was accessed to determine if designated critical habitat was present on or near Fort Sill. No critical habitat for these species is present in Comanche County (USFWS 2014c).

**Table 3.5-1. Special Status Species with Potential to Occur in Comanche County, OK**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Protection Status</th>
<th>Habitat</th>
<th>Potential to Occur within Fort Sill</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping Plover</td>
<td><em>Charadrius melodus</em></td>
<td>Threatened</td>
<td>Found on mudflats, sandy beaches and shallow wetlands with sparse vegetation. Might be found along the margins of</td>
<td>Rare migrant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>lakes and large rivers where there is exposed (bare) sand or mud.</td>
<td></td>
</tr>
<tr>
<td>American Peregrine Falcon</td>
<td><em>Falco peregrinus anatum</em></td>
<td>Delisted due to recovery</td>
<td>Resident in sand shinnery oak communities. Nest in cliffs and tall, man-made structures surrounded by open landscapes with nearby riparian areas.</td>
<td>Rare migrant</td>
</tr>
<tr>
<td>Whooping Crane</td>
<td><em>Grus americana</em></td>
<td>Endangered</td>
<td>Pass through Oklahoma during spring and fall migration. Stopover habitat includes shallow wetlands, marshes,</td>
<td>Rare migrant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>margins of ponds and lakes, sandbars, and shorelines of shallow rivers, wet prairies and crop fields near wetlands.</td>
<td></td>
</tr>
<tr>
<td>Red Knot</td>
<td><em>Calidris canutus rufa</em></td>
<td>Threatened</td>
<td>Migrates annually between its breeding grounds in the Canadian Arctic and wintering regions, including the southeast</td>
<td>Rare migrant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>United States, the northwest Gulf of Mexico, northern Brazil and the southern tip of South America. Might pass</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>through Oklahoma during migration.</td>
<td></td>
</tr>
<tr>
<td>Black-capped Vireo</td>
<td><em>Vireo atricapillus</em></td>
<td>Endangered</td>
<td>Low brushy thickets comprised of deciduous trees such as oaks, redbuds, and plums. Documented occurrence in</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wichita Mountains of northern Comanche County.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.5-1. Special Status Species with Potential to Occur in Comanche County, OK (Continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Protection Status*</th>
<th>Habitat</th>
<th>Potential to Occur within Fort Sill</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arkansas River Shiner</td>
<td><em>Notropis</em></td>
<td>Threatened</td>
<td>Inhabits the shallow braided channels of wide sandy prairie rivers in the Arkansas River system. Nearly all remaining Oklahoma populations occur in the Canadian River. A small population might persist in the Cimarron River. Critical habitat for the Arkansas River shiner is located approximately 65 miles northeast of Fort Sill in two streams near Oklahoma City.</td>
<td>No</td>
</tr>
<tr>
<td>Leopard Darter</td>
<td><em>Percina</em></td>
<td>Threatened</td>
<td>Live within rocks and cobble on the bottom of clear, swift-flowing small rivers. In Oklahoma, three isolated populations are known to occur within the Little River watershed. Critical habitat for the leopard darter occurs in the eastern part of the state, over 175 miles away from Fort Sill.</td>
<td>No</td>
</tr>
</tbody>
</table>

* Federal.


Of the five federally listed migratory bird species with potential to occur in Comanche County, only the black-capped vireo is known to nest at Fort Sill. The piping plover and whooping crane, have been observed within Comanche County during migration periods, but have not been documented at the installation. The American peregrine falcon has been observed from Fort Sill during migration (Wampler 2014a). The red knot could potentially migrate through Comanche County; however, there are no known nesting sites or stopover habitat within Oklahoma (Stubbs 2014). The red knot has not been observed at Fort Sill (Wampler 2014b).

The Arkansas River shiner was historically widespread and abundant throughout the western portions of the Arkansas River basin in Kansas, New Mexico, Oklahoma, and Texas; however, it is now almost entirely restricted to approximately 510 miles of the Canadian River in Oklahoma, Texas, and New Mexico. The population nearest to Fort Sill is located 65 miles northeast of the installation. A small remnant population could persist in the Cimarron River (Oklahoma-Kansas). Hatchery propagation is being carried out at the Tishomingo National Fish Hatchery in Oklahoma; propagated fish are to be released into protected habitats (OKDWC 2011e).

In Oklahoma, the leopard darter currently lives in three isolated populations within the Little River watershed. The population nearest to Fort Sill is located in the Glover River approximately 175 miles east of Fort Sill. The other populations occur in the Little River above Pine Creek Reservoir and in the Mountain Fork River above Broken Bow Reservoir (OKDWC 2011f).

**Black-Capped Vireo** – Black-capped vireos nest in an early-successional, deciduous scrub community. This habitat is generated as the result of various disturbances, including wildfire or mechanical removal of woody top growth. Good nesting habitat for black-capped vireos includes a wide diversity of hardwoods in a patchy, low-growing pattern with open, grassy spaces between patches of woody vegetation. Throughout the range of the species, the black-capped
The black-capped vireo was placed on the federal list of endangered species in October 1987 (Ratzlaff 1987). The recorded occurrence of the black-capped vireo dates back to 1943 at Fort Sill and to 1929 in the adjacent Wichita Mountains (Fazio and Grzybowski 2011). A study to fully document the current status of the vireo was initiated by the Army in 1988 (Tazik and Grzybowski 1988), and monitoring efforts continue at the installation. Annual reports are completed to evaluate the distribution, abundance, dispersal, minimum survival, habitat requirements, and reproductive success of vireos on Fort Sill (Tazik and Grzybowski 1993). Through this effort, long-term monitoring of vireo success and habitat management of territories to assist in species recovery is achieved.

In accordance with Chapter 4 of AR 200-1, Fort Sill has prepared an Endangered Species Management Plan (ESMP) (Fort Sill 1999) and an Integrated Natural Resource Management Plan (INRMP) (USAFACFS 2003), which provide guidelines for maintaining and enhancing populations and habitats of the black-capped vireo on Fort Sill while maintaining mission readiness consistent with Army and federal environmental regulations. In managing the species on the installation, Fort Sill also complies with the MBTA, which prohibits harming the birds, their nests, or their eggs.

Fort Sill continues to comply with the reasonable and prudent measures and associated terms and conditions outlined in the Biological Opinion on Military Activities at Fort Sill (USFWS 1998). These measures include:

**Annual Survey**
- Annually survey and monitor for presence and territories to develop and maintain viable and secure populations while providing the appropriate protection.

**Military Training**
- Minimize training use of black-capped vireo nesting habitat areas during the nesting season (April-July).
- Areas designated as black-capped vireo territories must not contain points used as destinations by troops involved in training. From April-July these areas are limited use areas.
- Continue designation of no off-road maneuver for vireo areas.

**Cowbird Removal**
- Implement control efforts to include trapping, shooting, and cowbird egg and nestling removal. An annual report of trapping results must be submitted to the USFWS.

**3.5.1.2.4 Natural Resource Area of Concern**

The USFWS Information, Planning, and Conservation (IPaC) system was accessed to identify any National Refuge lands, Coastal Barrier Resource Units, and invasive species management
practices with potential to be affected by the alternatives. The IPaC system identified the WMWR as a Natural Resource Area of Concern (USFWS 2014e). The National Wildlife Refuge System, managed by the USFWS, is the nation’s premier system of public lands and waters set aside to conserve America’s fish, wildlife, and plants.

Wichita Mountains National Wildlife Refuge – The 59,020-acre WMWR is located directly northwest of Fort Sill (see Figure 1.2-1). The WMWR provides mixed-grass prairie habitat to more than 50 mammal species, 240 bird species, 64 reptile and amphibian species, 36 fish species, and 806 plant species (USFWS 2014a).

The endangered black-capped vireo is one of the more heavily monitored species found in the WMWR. This migratory bird, which overwinters in Mexico, comes to the WMWR in late April and early May of each year to find mates, establish nests, and raise young. It remains through August, when it returns to its wintering grounds. The bird is endangered due to loss of habitat in areas other than the WMWR, as well as nest predation by the brown-headed cowbird. The WMWR black-capped vireo population is currently estimated at 5,000 birds, which is the largest breeding colony in the state of Oklahoma.

Bald eagles utilize WMWR lakes for feeding and secluded WMWR sites for roosting during winter months. The number of wintering eagles, both bald and golden, varies from three to six in most years. Refuge management for this species is primarily protection from harassment, providing habitat, and active fishery management to ensure an adequate food supply for the eagles. Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act, which prohibits “take” of individual birds and their parts (feathers, skins, etc.), eggs, or nests.

### 3.5.2 Environmental Consequences

#### 3.5.2.1 No Action Alternative

Under the No Action Alternative, no impacts to biological resources would be expected. Baseline conditions at Fort Sill would continue.

#### 3.5.2.2 Alternative 1 – Demonstrations on West Range Area

##### 3.5.2.2.1 Vegetation and Wildlife

Construction activities associated with the implementation of Alternative 1 could result in minor adverse impacts to vegetation and wildlife resources at Firing Point 240E. Impacts would be minor as this area is already utilized as a firing point for artillery and has been previously disturbed in the past. There is no unique habitat in this area and the impacts resulting from the earth work to remove and flatten existing man-made berms, construction of a gravel parking area and new facilities, increased ground disturbance, additional personnel, and from the slight increase in equipment and military training activities would be minor. These impacts are not anticipated to be significant or have long-term effects on population viability.

Demonstrations of electro-dynamic kinetic energy systems and LAMS associated with the implementation of Alternative 1 could result in minor adverse impacts to vegetation and wildlife resources in the West Range area. Impacts would primarily be related to the effects of projectiles...
or explosives in the impact area. However, this area is currently impacted by projectiles on a regular basis through normal range operations.

According to a noise analysis conducted in 2008 (U.S. Army Center for Health Promotion and Preventative Medicine 2008), Fort Sill annual operations include the use of over 138,000 demolition and large caliber events at the installation. For the purposes of this analysis an assumption was made that the existing 138,000 demolition and large caliber weapons used at the installation occur equally among the Quanah, West, and East Ranges. A conservative estimate was made that all six proposed annual demonstrations would be electro-dynamic kinetic energy systems/LAMS and that each event would use up to 100 rounds. Using these measures, it would be anticipated that demonstrations of electro-dynamic kinetic energy systems/LAMS would account for 600 events or 0.01 percent (600/46,000) of the current demolition and large caliber usage at the West Range area. This minimal increase of events is not anticipated to have a significant impact on vegetation or wildlife in the West Range area.

In addition to potential effects related to the damage caused by projectiles certain electrodynamic kinetic energy systems (e.g. railguns) might produce strong electric or magnetic fields. These fields are limited to the immediate vicinity of the system. The IEEE C95.1 standards for human health were based on known effects to animals with conservative factors added to minimize potential impacts to human health (IEEE 2005). Therefore, no impacts to wildlife are anticipated from the EM fields associated with the power levels for the electro-dynamic kinetic energy systems proposed for demonstrations in the West Range area of Fort Sill.

Directed energy system demonstrations associated with the implementation of Alternative 1 could result in minor adverse impacts to wildlife resources in the West Range area. These systems are anticipated to have negligible impacts on vegetation. The specific impacts to wildlife from directed energy systems would be related to the type of system used (acoustic, laser, and high power microwave/radio frequency) and are discussed below.

Acoustic – Acoustic systems use directed sound waves to either communicate warnings or broadcast deterrent tones. These systems focus sound along a relatively narrow beam. Potential impacts to wildlife would be due to exposure to the high decibel levels that these systems are capable of producing. Long-term exposure to high decibel levels could cause hearing loss if wildlife do not move and are consistently exposed to these sound levels.

The potential for wildlife exposure would be minimized by the standard range operating procedures to minimize impacts to wildlife (Fort Sill 385-1). Prior to a demonstration, all non-participating personnel and visible wildlife would be cleared from the demonstration area, and the demonstration would cease if non-participating personnel or any wildlife would happen to enter the demonstration area. The system would only remain on for the time necessary to accomplish the purpose of the demonstration. No significant impacts are anticipated to wildlife as a result of acoustic demonstrations at Fort Sill.

Laser, Particle Beam, Laser Induced Plasma Channel – Potential impacts to wildlife from lasers are mainly related to potential damage to vision as a result of directly viewing the laser. The highest power lasers could cause direct damage to skin and eyes and have the potential to damage vision from indirect reflections of the laser beam. The system would only remain on for
the time necessary to accomplish the purpose of the demonstration. Prior to a demonstration, all personnel and visible wildlife would be cleared from the demonstration area and the demonstration would cease if people or wildlife approached the laser corridor. As described in Section 3.2, Fort Sill currently has a rigorous safety program for the use of lasers which further reduces the likelihood of direct and indirect laser impacts.

While particle beam and laser induced plasma channel systems are still undergoing development in laboratories, impacts to wildlife from these systems are expected to be minimal. These systems are designed to target and disrupt electronic systems, and impacts would be similar to those of lasers. Should future applications of these technologies achieve levels that could be potentially harmful to wildlife and the probability of impacts to wildlife increase beyond that discussed below, additional evaluation of these systems would be required.

The probability of a bird or other wildlife straying into a beam during a demonstration is considered low due to the short duration of a laser, particle, or laser induced plasma channel beam and the small area represented by these beams. Therefore, impacts to wildlife resulting from these demonstrations would be considered short-term minor adverse impacts. No significant impacts to wildlife are anticipated as a result of these demonstrations in the West Range area of Fort Sill.

**High Power Microwave/Radio Frequency** – The hazards of EM fields associated with demonstrations of high power microwave and radio frequency are associated with the heating effects related to the amount of energy absorbed by the body. Exposure to low-frequency EM energy (<100 kilohertz) does not typically result in significant levels of energy absorption and therefore does not result in increases in body temperature (ICNIRP 1998). Prolonged exposure to high frequencies (>100 kilohertz) can lead to significant absorption of energy, resulting in an increase in body temperature and detrimental impacts to an organism if this increase in temperature is more than the organism can regulate.

Section 3.2 discusses the IEEE standards for human exposure to radio frequency and EM fields. As explained in the IEEE C95.1 standard (IEEE 2005) Annex C, these standards for human health were based on known effects (not necessarily adverse effects) to animals with conservative factors added to eliminate or minimize impacts to human health. Therefore human health limits represent an initial point for comparison to determine potential impacts to animals. However, the conservative factors used to determine human health impacts also imply that actual effects to animals would occur at levels higher than human health limits.

Demonstrations at Fort Sill would include exclusions zones where levels would exceed the human health safety limits. These zones would be established to protect personnel and provide a conservative approach to protect wildlife. Personnel are excluded from zones where the potential exposure would exceed the relevant IEEE C95.1 (IEEE 2005 or most current version) and DoD standards (DODI 6055.11). Since physical exclusion is not always feasible for wildlife, the safety zones would be monitored for visible wildlife in accordance with Fort Sill Range Regulations (Fort Sill 358-1). As described in the above paragraph, impacts to wildlife are not anticipated but in accordance with Fort Sill regulations, any wildlife observed in these zones would be removed prior to a demonstration. Should wildlife wander into a zone during a demonstration, the demonstration would cease.
The following factors further minimize the risk and impacts of wildlife being struck by a high power microwave or radio frequency beam. The pulsed short duration of beam length (fractions of a second) and the focused beam size (see Section 3.2) make it unlikely that wildlife would stray into the beam during a demonstration. Demonstrations would require clear LOSs between the directed energy system and the target of the demonstration. These sight lines would be clear of vegetation that could potentially hide wildlife. Also the power levels from high powered microwave and radio frequency demonstrations dissipates quickly so that the maximum power levels generated near the source of the demonstration would not extend down range. Table 3.5-2 shows a comparison of EM levels by distance for a potential directed energy system at Fort Sill. This table shows that EM energy levels generated during demonstration of a 10-GW system would not exceed human limits and are thus not anticipated to be harmful to wildlife. No significant impacts to wildlife are anticipated to result from high powered microwave or radio frequency demonstrations in the West Range area of Fort Sill. Table 3.5-2 shows a comparison of EM levels by distance for a potential 10 GW 1.442 GHz high power microwave directed energy system at Fort Sill designed for 26 pulse operations at 100 nanoseconds (ns) each.

### Table 3.5-2. Representative Demonstration Using a 10-Gigawatt High-Powered Microwave

<table>
<thead>
<tr>
<th>Distance From Fire Point (km)</th>
<th>EM Power Flux Density At Location (kW/cm²)</th>
<th>Human Health Limit (kW/cm²)*</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>650</td>
<td>665</td>
<td>No effect–under the limit</td>
</tr>
<tr>
<td>1</td>
<td>0.04</td>
<td>665</td>
<td>No effect. Far under limit</td>
</tr>
<tr>
<td>2</td>
<td>0.01</td>
<td>665</td>
<td>No effect. Far under limit</td>
</tr>
<tr>
<td>3</td>
<td>0.004</td>
<td>665</td>
<td>No effect. Far under limit</td>
</tr>
</tbody>
</table>

#### 3.5.2.2.2 Special Status Species

In addition to MBTA compliance, Fort Sill would continue to operate under the terms and conditions outlined in the ESMP to ensure population and habitat enhancement of special status species located within the installation.

The demonstration of electro-dynamic kinetic energy systems and LAMS would always be directed into the impact area at the West Range. No habitat for the vireo has been recorded in the impact area. Therefore, no significant impacts to the black-capped vireo or vireo habitat are anticipated as a result of these demonstrations.

Vireo nesting habitat occurs in the West Range training areas (Figure 3.1-1). During the vireo nesting season (April-July), directed energy systems would not be demonstrated into or over known vireo nesting territories if the systems have the potential to exceed the current IEEE standards for human health. Compliance with the requirements of the Biological Opinion would ensure that no significant impacts to the black-capped vireo would occur as a result of implementation of Alternative 1.

For the reasons described in Section 3.5.2.2.1, the potential for migratory birds to be impacted by Alternative 1 is minimal. No significant impacts to migratory bird species are anticipated.
3.5.2.2.3 Natural Resource Area of Concern

Implementation of Alternative 1 would have no significant impacts to natural resource areas of concern. The Electric Fires Office has implemented the DSW process to ensure thorough review of all demonstrations at Fort Sill (see Appendix B). Part of this review process includes the creation of an approved safety zone for the system being demonstrated. Should any portion of the proposed safety zone extend into a natural resource area of concern, the demonstration would not be completed at that location.

3.5.2.3 Alternative 2 – Demonstrations on East Range Area

Implementation of Alternative 2 would mean that Electric Fires and LAMS would be demonstrated in the East Range area of Fort Sill. Because the types of demonstrations proposed to occur in the East Range area would be the same as proposed under Alternative 1, the potential impacts to biological resources resulting from implementation of each of the systems listed in Table 2.3-1 would also be very similar or the same. The primary differences between the two alternatives is the juxtaposition of habitat, agricultural leases (could focus wildlife) and the boundaries of Fort Sill relative to the proposed demonstration sites.

No construction-related impacts would occur as a result of the implementation of Alternative 2. Implementation of Alternative 2 could result in minor, short-term impacts to biological resources. These impacts for vegetation, wildlife, natural resource areas, and migratory birds would be the same as those described for Alternative 1.

No black-capped vireo habitat is known to occur in the East Range area; therefore, no impacts to this endangered species are anticipated as a result of implementation of Alternative 2.

3.6 CULTURAL

3.6.1 Affected Environment

3.6.1.1 Definition of Resource

For cultural resources, the ROI is the area of proposed construction at Firing Point 240E within the West Range area.

The National Historic Preservation Act (NHPA) was passed into law in 1966 to help stop the inadvertent loss of historic properties significant to our heritage. The NHPA includes provisions for the Department of Interior (DOI) to maintain the National Register of Historic Places (NRHP). The NRHP is composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. The DOI is responsible for designating the “Keeper of the Register” (Keeper). Per 36 CFR 60.3(f), the Keeper is the individual who has been delegated the authority by DOI to list properties and determine their eligibility for the NRHP.

As defined by Fort Sill, and as used in the 2014 Integrated Cultural Resources Management Plan (ICRMP) (Fort Sill 2014), “cultural resources consist of and include the following:
- Historic properties as defined in 36 CFR 800.16(l) pursuant to the NHPA (16 U.S.C. 470 et seq.) and including artifacts, records, and material remains related to such resources;
- Archeological resources as defined in the Archaeological Resources Protection Act (ARPA) (16 U.S.C. 470aa-mm) and the Archeological and Historic Preservation Act (AHPA) (16 U.S.C. 469-469c-2);
- Archeological artifact collections and associated records as defined in 36 CFR 79;
- Sacred sites under EO 13007 and the American Indian Religious Freedom Act (AIRFA) (42 U.S.C. 1996 and 1996a); and,
- Native American remains, objects of cultural patrimony, and cultural items as detailed in the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001 et seq.)."

The management of cultural resources is guided by Chapter 6 of AR 200-1. As outlined in AR 200-1, the cultural resources management program at Fort Sill has responsibility for compliance with Sections 106 and 110 of the NHPA, as well as the ARPA, AHPA, NAGPRA, AIRFA, and EOs 13007 and 13175. Responsibilities of the Fort Sill cultural resources management program are outlined in the ICRMP, which covers a wide diversity of cultural resources on the installation in compliance with Army regulations, federal legislation, and applicable guidelines.

Three broad category types of cultural resources have been identified at Fort Sill. Category 1 consists of archeological sites, including prehistoric (pre-1500), protohistoric (1500-1719), and historic period (post-1719) sites. Category 2 includes architectural/historic resources, including buildings, structures, landscapes, objects, and historic districts. Category 3 is restricted to NAGPRA-related remains, objects, and items. Sacred sites and Traditional Cultural Properties (TCPs) are not identified as separate categories, as these resources generally fall within Category 1 or 2.

3.6.1.2 Existing Conditions

Evaluating known cultural resources has been a major focus at Fort Sill in the recent past. As of September 2013, all standing buildings and structures constructed prior to 1967 and nearly 200 archaeological sites have been evaluated for NRHP eligibility. The archaeological site evaluations are ongoing and the structures will continue to be evaluated as they meet the 45-year age requirement for NRHP evaluation (RCG&A 2013).

There are currently nine properties on Fort Sill listed in the NRHP and more than 400 NRHP-eligible properties (consisting of 36 archaeological sites; 19 individual architectural/historic buildings, structures, and sites; and 10 historic districts containing approximately 368 standing resources).

EO 13007 identifies Native American sacred sites as special floral and faunal and mineral areas that contain resources used in religious ceremonies, among other natural and cultural resources. Confidentiality and access to these sites is mandated by this EO and the AIRFA. For these reasons, no maps or descriptions are publicly available.
Fort Sill consults with Native American tribes to provide access to sacred sites (including plants, animals, and landscapes considered sacred) located on Fort Sill; however, in accordance with AR 200-1, the Garrison Commander could impose reasonable restrictions and conditions on access to sacred sites on Fort Sill for the protection of health and safety or for reasons of national security (RCG&A 2013).

There are no cultural resource sites in the immediate vicinity of Firing Point 240E. The closest site is located over 1,000 feet south southwest of the site and is not NRHP-eligible.

### 3.6.2 Environmental Consequences

#### 3.6.2.1 No Action Alternative

Under the No Action Alternative, there would be no construction related activities and no impacts to cultural resources.

#### 3.6.2.2 Alternative 1 – Demonstrations on West Range Area

Implementation of the proposed action is not anticipated to result in adverse impacts to cultural resources. Construction related impacts and land disturbance would be limited to the immediate area around Firing Point 240E (Section 2.6.1 and Figure 2.6-2). There are no known cultural resource sites at this location. In compliance with Section 106 of the NHPA, Fort Sill is coordinating with the SHPO and affiliated Tribes for concurrence on a finding of no effect to cultural resources as a result of implementing the proposed action.

The demonstration of electro-dynamic kinetic energy systems would be conducted in accordance with the same regulations and procedures applicable to existing projectile systems at Fort Sill. Projectiles would be fired into the existing impact areas and no impacts to cultural resources are anticipated. The demonstration of directed energy systems such as acoustic, high power microwave, and radio frequency systems would have no potential to impact cultural resources at Fort Sill. Directed energy systems such as the laser, particle beam, or laser induced plasma channel would also be demonstrated into the impact areas, and no impacts to cultural resources are anticipated to result from these systems.

Although the potential for undiscovered resources is low, inadvertent discoveries are protected and maintained in accordance with the NHPA, ARPA and NAGPRA. If cultural resources are discovered during military training or other activities, all work with the potential to impact the discovery immediately stops, reasonable effort is taken to protect cultural resources from further impact, and the Fort Sill Cultural Resources Officer (CRO) is to be immediately contacted. If the CRO determines the presence of cultural items in accordance with the NAGPRA, the CRO follows the NAGPRA compliance procedures. If cultural items in accordance with the NAGPRA are not present, the CRO determines if the discovery is an isolated find or an archeological site. The discovery is documented according to the CRO’s determination of type discovery. The appropriate parties are then informed and/or consulted concerning a determination of NRHP eligibility and the proposed actions to avoid, minimize, or mitigate adverse effects to cultural resources. The CRO permanently maintains all documentation related to the discovery in his/her files (RCG&A 2013).
3.6.2.3 Alternative 2 – Demonstrations on East Range Area

No construction would occur with the implementation of Alternative 2 and there is no potential for adverse impacts to cultural resources.

3.7 HAZARDOUS MATERIALS AND WASTE

3.7.1 Affected Environment

3.7.1.1 Definition of the Resource

The terms “hazardous materials” and “hazardous waste” refer to substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristic, could present substantial danger to public health or the environment when released into the environment. Products containing hazardous materials that could result in the generation of hazardous waste include fuel, adhesives, sealants, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, and cleaners.

The key Federal regulatory requirements related to hazardous materials and waste include:

- Spill Prevention, Control and Countermeasure Rule (40 CFR 112)
- USEPA Regulation on Identification and Listing of Hazardous Waste (40 CFR 261)
- USEPA Regulation on Standards for the Management of Used Oil (40 CFR 279)
- USEPA Regulation on Designation, Reportable Quantities, and Notification (40 CFR 302)
- EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance
- Clean Air Act of 1970, including the 1990 Clean Air Act Amendments (40 CFR 61)

The Army policy for hazardous material and waste management is contained in AR 200-1, Environmental Protection and Enhancement.

For the purposes of this hazardous materials and waste analysis, the ROI for Alternatives 1, 2, and the No Action Alternative includes Fort Sill where these substances are used, stored, transported, or disposed.
The qualitative assessment of impacts from hazardous materials and waste management focuses on how (context) and to what degree (intensity) each alternative could affect hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal. Potential impacts related to hazardous materials and wastes were analyzed for the following five effects:

1. Generation of hazardous material/waste types or quantities could not be accommodated by the current management system.
2. Increased likelihood of an uncontrolled release of hazardous materials that could contaminate the soil, surface water, groundwater, or air.
3. Non-compliance with applicable Federal and state regulations as a result of the proposed action.
4. Disturbance or creation of contaminated sites, resulting in adverse effects on human health and/or the environment.
5. Established management policies, procedures, and handling capacities could not accommodate the proposed action.

3.7.1.2 Existing Conditions

3.7.1.2.1 Installation

Fort Sill is a Large Quantity Generator as defined by the USEPA with an USEPA identification number of OK4213720846. Hazardous materials and wastes on Fort Sill are managed according to the Fort Sill Hazardous Material and Waste Management Plan (Fort Sill 2013a). This plan lays out the responsibilities, policies, and procedures for managing hazardous materials and wastes on the installation and ensures compliance with applicable federal, state, and local laws and regulations. The Hazardous Material and Waste Management Plan applies to all organizations and activities located on or occurring at Fort Sill (Fort Sill 2013a).

Fort Sill manages hazardous substance spills and releases through the implementation of its Installation Spill Contingency Plan (ISCP) (Fort Sill 2011a). The ISCP is a complement to the installation’s Spill Prevention, Control, and Countermeasure (SPCC) Plan (Fort Sill 2011b) and serves to minimize the impacts to human health and the environment, including waters resources and wildlife, caused by spills of hazardous materials and wastes at Fort Sill. The SPCC Plan and ISCP establish the responsibilities, duties, procedures, and resources to be used to contain, mitigate, and clean-up oil products and hazardous material or waste spills on the installation (Fort Sill 2011a and b).

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

Under the No Action Alternative, Alternative 1 or 2 would not be implemented and no construction or the demonstrations of Electric Fires and LAMS would occur. Fort Sill would continue to use, manage, and dispose of hazardous materials and waste as described in Section 3.7.1.2, Existing Conditions. There would be no effects on management, use, or generation of hazardous materials and waste.
3.7.2.2 Alternative 1 – Demonstrations on West Range Area

Implementation of Alternative 1 includes the improvement of and construction at Firing Point 240E. No asbestos-containing materials, poly-chlorinated bi-phenols, or lead-based paint would be used or are anticipated to be encountered. During the proposed improvements and construction, no site contamination or UXO is anticipated to be encountered. During these improvement and construction activities, the construction contractor would be responsible for properly handling, storing, transporting, and disposing of potentially hazardous materials and wastes (paints, fuels, oils, lubricants, etc.) in accordance with Fort Sill Hazardous Material and Waste Management Plan (Fort Sill 2013a) and applicable federal, state, and local laws and regulations.

Under Alternative 1, demonstrations of Electric Fires and LAMS would also occur at the West Range, Firing Point 240E, and the other sub-ranges in the West Range area. As described in Section 2.3.2, these demonstrations would be of a relatively short duration (4-6 weeks) and occur approximately six times per year. Demonstrations of the various Electric Fires and LAMS (see Section 2.3.1) could require the use of hazardous materials and could potentially produce hazardous waste. Should hazardous materials be needed or hazardous waste generated during any demonstrations of Electric Fires or LAMS, the material or waste would require Fort Sill EQD approval, and be tracked and managed according to the Fort Sill Hazardous Material and Waste Management Plan (Fort Sill 2013a).

Examples of hazardous materials or wastes used or generated during the demonstrations are listed in Table 3.7-1. This list is not intended to be comprehensive and as the technologies evolve, the list of associated hazardous materials and wastes could change. Any hazardous material used or waste generated as a result of the implementation of Alternative 1 would be the responsibility of the entity performing the demonstration and disposed of in accordance with applicable federal, state, and local laws and regulations.

Table 3.7-1. Hazardous Material or Waste Potentially Associated with the Current Electric Fires and Loitering Aerial Munition System Technologiesa

<table>
<thead>
<tr>
<th>Technology b</th>
<th>HAZMAT/WASTE</th>
<th>Volume</th>
<th>Purpose/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electro-Dynamic Kinetic Energy Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM Launch (Railgun)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Combustion Light Gas Gun</td>
<td>hydrogen, oxygen</td>
<td>various</td>
<td>propellant</td>
</tr>
<tr>
<td>Electrothermal-Chemical Gun</td>
<td>cyclotrimethylenetrinitramine (RDX)</td>
<td>various</td>
<td>solid explosive propellant</td>
</tr>
<tr>
<td>All</td>
<td>gun cleaners, mineral spirits, hydraulic fluid, grease/moly, break free, etc.</td>
<td>various small quantities</td>
<td>weapons maintenance</td>
</tr>
<tr>
<td></td>
<td>diesel</td>
<td>various</td>
<td>component backup power sources</td>
</tr>
<tr>
<td>Technology b</td>
<td>HAZMAT/WASTE</td>
<td>Volume</td>
<td>Purpose/Notes</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
<td>--------</td>
<td>---------------</td>
</tr>
<tr>
<td><strong>Directed Energy Systems</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic (Example: LRAD)</td>
<td>Absorbed Glass Mat (AGM) battery pack (sealed lead acid)</td>
<td>21 Amp-Hour, various</td>
<td>portable power pack</td>
</tr>
<tr>
<td>High Power Microwave (Examples: ADS, CHAMP, Phaser, etc.)</td>
<td>lubricants and oils</td>
<td>various</td>
<td>high-voltage insulation, heat transfer fluid</td>
</tr>
<tr>
<td></td>
<td>lithium ion batteries</td>
<td>various</td>
<td>component backup power source</td>
</tr>
<tr>
<td>Radio frequency</td>
<td>lubricants and oils</td>
<td>various</td>
<td>high-voltage insulation, heat transfer fluid</td>
</tr>
<tr>
<td></td>
<td>lithium ion batteries</td>
<td>various</td>
<td>component backup power source</td>
</tr>
<tr>
<td>High Energy Laser (Examples: Mobile Demonstrator, Solid State Lasers, etc.)</td>
<td>lithium ion batteries</td>
<td>various</td>
<td>component backup power source</td>
</tr>
<tr>
<td></td>
<td>lubricants and oils</td>
<td>various</td>
<td>high-voltage insulation</td>
</tr>
<tr>
<td>Particle Beam</td>
<td>lubricants and oils</td>
<td>various</td>
<td>high-voltage insulation, heat transfer fluid</td>
</tr>
<tr>
<td></td>
<td>lithium ion batteries</td>
<td>various</td>
<td>component backup power source</td>
</tr>
<tr>
<td>Laser Induced Plasma Channel</td>
<td>same as laser</td>
<td>various</td>
<td>same as laser</td>
</tr>
<tr>
<td>All</td>
<td>diesel</td>
<td>various</td>
<td>component backup power sources</td>
</tr>
<tr>
<td><strong>Loitering Aerial Munition Systems</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examples: Switchblade, BattleHawk, Terminator, etc.</td>
<td>lithium ion batteries</td>
<td>various</td>
<td>power source</td>
</tr>
<tr>
<td></td>
<td>BKNO3 Fines, Diphenylamine, Nitrocellulose</td>
<td>various (~3.0 grams)</td>
<td>igniter squib</td>
</tr>
<tr>
<td></td>
<td>Explosive munition</td>
<td>various</td>
<td>munition/payload</td>
</tr>
</tbody>
</table>

a – This table is not intended to be complete or comprehensive and as the technologies evolve, the list of associated hazardous materials and wastes could change.

b – Technologies located on or associated with a mobile platform, vehicle(s), and/or power generator(s) would also utilize the associated hazardous materials (fuels, oils, lubricants, coolants, etc.).

N/A – not applicable

In the event of an accidental hazardous material or waste release during the construction or proposed demonstrations, the proper notifications and actions would be taken in accordance with the Fort Sill ISCP and SPCC Plan (Fort Sill 2011a, 2011b). Spill kits would be available and accessible during portable generator refueling.

Therefore, there would be negligible impacts to hazardous materials and waste management associated with the implementation of Alternative 1. Implementation of this alternative would not affect the generator status or negatively affect the hazardous materials and waste program.

3.7.2.3 Alternative 2 – Demonstrations on East Range Area

Under Alternative 2, demonstrations of Electric Fires and LAMS would occur at the East Range area and, depending upon the type of demonstration, at various sub-ranges in the East Range
area. However, there would be no construction or improvements to any firing point(s) or other range infrastructure. The environmental consequences associated with the implementation of Alternative 2 would be the same as those for Alternative 1, minus the construction, as discussed in Section 3.7.2.2.

### 3.8 CUMULATIVE

According to CEQ regulations, cumulative effects analysis should consider the potential environmental impacts resulting from “the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (40 CFR 1508.7).

Cumulative effects could occur when there is a relationship between a proposed action or alternative and other actions expected to occur in a similar location or during a similar time period. This relationship might not be obvious at the time of implementing the proposed action. The effects could then be incremental and result in cumulative impacts. The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur.

In this EA, the Army has made an effort to identify actions in or near the ROI that are under consideration and in the planning stage at this time. These actions are included in the cumulative impacts analysis to the extent that details regarding such actions exist and the actions have a potential to interact with the proposed action or alternatives outlined in this EA. Although the level of detail available for those future actions varies, this approach provides the decision maker with the most current information to evaluate the consequences of the alternatives. This EA addresses cumulative impacts to assess the incremental contribution of the proposed action to impacts on affected resources from all factors.

The analysis first describes past actions, events, and circumstances that are relevant to the environments associated with the demonstration of Electric Fires and LAMS at Fort Sill. Following is a discussion of other actions that, when combined with the proposed actions, could result in incremental impacts. However, if the analysis indicates that there would not be any anticipated impacts to the resources described in the EA, there would be no chance cumulative impacts could occur to those resources.

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

Recent past and present military and civilian actions in the region were considered as part of the baseline or existing conditions in the ROI (Table 3.9-1). Numerous construction-related activities occur continuously at Fort Sill. On an annual basis, the Fort Sill EQD reviews approximately 450 construction-type actions ranging from construction maintenance, building demolitions, renovations or alterations to the installation of signs or displays and rang upgrades. However, as this project would not include significant construction, cumulative impacts related to construction are not anticipated.

The only recent change in the vicinity of the West and East Range areas was the designation of adaptable use zones (AUZs). This change was implemented for planning purposes and to streamline environmental reviews for projects in the AUZs. It is not anticipated that the AUZs
would have any cumulative impacts associated with implementation of the proposed demonstrations under Alternatives 1 or 2.

Table 3.8-1. Past, Present and Reasonably Foreseeably Actions at Fort Sill and Lawton

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Descriptions</th>
<th>Construction/Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUZs</td>
<td>Designated areas used for planning purposes and streamlining NEPA.</td>
<td>2014</td>
</tr>
<tr>
<td>Fort Sill RA</td>
<td>Creation of new RA to the north of the installation boundaries.</td>
<td>~2015</td>
</tr>
<tr>
<td>Various Construction and Demolition Projects</td>
<td>Numerous construction projects are planned for upcoming years. Focus of construction is the cantonment area. See Programmatic EA for the Fort Sill Mission (Fort Sill 2013b) for additional information.</td>
<td>Various</td>
</tr>
<tr>
<td>Conversion of a Portion of the Quanah Range Buffer Area (QRBA)</td>
<td>Project includes conversion of a portion of the QRBA from duded impact area to maneuver area heavy.</td>
<td>2015</td>
</tr>
<tr>
<td>Infantry Squad Battle Course</td>
<td>Firing range in South Arbuckle (East Range) by the eastern Fort Sill boundary.</td>
<td>2010</td>
</tr>
<tr>
<td>UAS and Aviation Training Facility</td>
<td>Construction of a UAS and Aviation Training Facility consisting of a maintenance building, a 3,500-foot dirt runway, a latrine, a covered hardstand, and bleachers. Project is planned for the East Range, Frisco Ridge.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Agricultural Lease Renewal</td>
<td>Agricultural leases at Fort Sill are due to expire in the next 2 to 3 years.</td>
<td>Multi-year</td>
</tr>
<tr>
<td>ACUB</td>
<td>Purchase of permanent easements to ensure appropriate training buffer and conservation purposes.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Electric Fires and LAM Demonstrations</td>
<td>Demonstrate various Electric Fires and LAM systems at Fort Sill Firing Point 240E or other locations at Fort Sill.</td>
<td>2015</td>
</tr>
<tr>
<td>Fire Mitigation Plan</td>
<td>Fort Sill is in the process of updating and implementing a new installation Fire Mitigation Plan. Full implementation is anticipated in 2015.</td>
<td>2015</td>
</tr>
<tr>
<td>American Water Enterprises Lagoon Expansion</td>
<td>American Water Enterprises is proposing to expand their lagoon in the northern portion of the West Range area. Environmental analysis of this project is ongoing and there might be a potential for the project to impact vireo habitat.</td>
<td>2015</td>
</tr>
<tr>
<td>Serco Incorporated</td>
<td>A leading provider of professional, technology, and management services primarily to the federal government moved into Lawton in 2013 and currently employs approximately 400 people.</td>
<td>2013</td>
</tr>
<tr>
<td>Phase 2 Downtown Revitalization</td>
<td>Development of additional job programs, creation of a tax-increment-financing district and office space.</td>
<td>2014</td>
</tr>
<tr>
<td>East Range Landfill</td>
<td>Fort Sill’s East Range Landfill is anticipated to reach capacity in the year 2022. The landfill is being evaluated to determine viability after this date. Details on the proposed solution are not clear at this time, but could include expansion, construction of a new landfill, or taking waste off-post. Additional NEPA documentation will occur for this project as more information is acquired.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Army Force Reduction</td>
<td>The Fiscal Year 13 defense budget directs an end strength reduction from 562,000 to 490,000. Although actual numbers are not known, the 2020 Force Structure EA indicated that Fort Sill could lose up to 6,842 Army positions (6,022 Soldiers and 820 Army civilians).</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

3.8.2 Cumulative Effects Analysis

As described in Chapter 1 of this EA, the proposed action would produce no impacts to airspace, soil and water, aesthetics and visual resources, surface transportation, utilities, socioeconomics,
or environmental justice and the protection of children. Therefore, no cumulative impacts to any of these resources would be anticipated as a result of implementing either of the action alternatives in conjunction with past, present, or reasonably foreseeable projects in the ROI.

No additional cumulative impacts are anticipated should the demonstrations occur in the West Range or East Range areas of Fort Sill. Where applicable, environmental analysis was or will be completed on the other projects included in Table 3.8-1. Of those that have been completed, no significant impacts were identified, with the exception of the potential force reductions. The Army 2020 Force Structure Realignment EA identified the potential for significant impacts to socioeconomic resources should the force reductions occur (Army 2014). Implementation of demonstrations at the West or East ranges is not anticipated to incrementally compound these impacts. Therefore, the incremental effects of the action alternatives, in combination with potential impacts associated with reasonably foreseeable future actions, would not be expected to create significant or adverse cumulative effects to regional resources beyond those described in the environmental consequences sections of Chapter 3.
4. REFERENCES


IEEE (Institute of Electrical and Electronic Engineers) 2005. IEEE C95.1 Standard for Safety Levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields, 3kHz to 300 GHz.


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Sarrat 2014. Sarratt, G., personal communication with Michael R. Spears. 9 November 2014. Email. Subject: SMAM -- The operator has access to and records the GPS coordinates during the flight. An inert SMAM will continue to transmit GPS info while sitting in the catch net and sometimes on the ground until the battery dies. Before launch we will put a falcon bird tracker on the SMAM. If the SMAM lands in high weeds or brush, the falcon transmits low power beeps and we will find it with a handheld directional receiver.

Spears 2014. Spears, M., personal communication with Tom Daues. 20 November 2014. Email. Subject: SMAM SDZ Information -- Conducted calculations based on formulas on the attached revised Figure 3.2-6. The penned in numbers are the updated ranges/areas with greater size LAM.

Stubbs 2014. Stubbs, K., personal communication with Sarah Bresnan, 25 September 2014. Email. Subject: Red Knot (Calidris canutus rufa) Oklahoma habitat. Finding -- The red knot could potentially migrate through Comanche County, however there are no known nesting sites or stopover habitat within Oklahoma. USFWS. Tulsa, OK.


U.S. Army Center for Health Promotion and Preventative Medicine, 2008. Operational Noise Consultation, No. 52-0N-09WM-08, Grow the Army Operational Noise Contours. Fort Sill, Oklahoma, June.


5. **RELEVANT ENVIRONMENTAL LAWS, REGULATIONS, AND POLICIES**

This EA has been prepared in consideration of and compliance with relevant environmental laws, regulations, and policies. These include, but are not limited to, federal laws, regulations, and EOs; and military regulations and instructions (e.g., AFIs, DoDIs, and Army and Fort Still Regulations) listed herein.

5.1 **FEDERAL LAWS AND REGULATIONS**

**Federal Laws**
- Archaeological Resources Protection Act (ARPA) – 16 U.S.C. 470aa-mm
- Clean Air Act (CAA) – 42 U.S.C. 7401 et seq.
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) – 42 U.S.C. 9601-9675
- Emergency Planning and Community Right-to-Know Act (EPCRA) – 42 U.S.C. 116

**Federal Regulations**
- Title 29 CFR 1910.1000: Air Contamination
- Title 32 CFR 651: Environmental Analysis of Army Actions
- Title 36 CFR 60: National Register of Historic Places
- Title 36 CFR 79: Curation of Federally-Owned and Administered Archaeological Collections
- Title 36 CFR 800: Protection of Historic Properties
- Title 40 CFR 112: Oil Pollution Prevention
- Title 40 CFR 261: Identification and Listing of Hazardous Waste
Federal Regulations (Continued)

- Title 40 CFR 279: Standards for the Management of Used Oil
- Title 40 CFR 302: Designation, Reportable Quantities, and Notification
- Title 40 CFR 1500-1508: Council on Environmental Quality

Executive Orders

- EO 12196, Occupational Safety and Health Programs for Federal Employees
- EO 12372, Intergovernmental Review of Federal Programs
- EO 13007, Indian Sacred Sites
- EO 13175, Consultation and Coordination with Indian Tribal Governments
- EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance

5.2 Military Regulations and Instructions

Army and Fort Sill Regulations

- AR 5-12, Army Use of the Electromagnetic Spectrum
- AR 5-22, The Army Force Modernization Proponent System
- AR 73-1, Test and Evaluation Policy
- AR 200-1, Environmental Protection and Enhancement
- AR 350-19, The Army Sustainable Range Program
- AR 385-10, Army Safety Program
- AR 385-63, Range Safety

- DA PAM 385-24, The Army Radiation Safety Program
- DA PAM 385-63, Range Safety

- TRADOC Regulation 71-20, Concept Development, Capabilities Determination, and Capabilities Integration

- Fort Sill Regulation 200-1, Recreational Use, Management, Harvest, and Protection of Natural Resources
- Fort Sill Regulation 385-1, Post Range Regulation
- Fort Sill Regulation 385-10, Safety Regulation

Air Force and Department of Defense Instructions

- AFI 13-212, Range Planning and Operations
- AFI 48-139, Laser and Optical Radiation Protection Program

- DoDI 6055 Series, DOD Safety and Occupational (SOH) Program
- DoDI 6055.11, Protecting Personnel from Electromagnetic Fields

- MIL-HDBK-828B, Department of Defense Handbook, Laser Safety on Ranges and in Other Outdoor Areas
6. LIST OF CONTACTED AGENCIES, NATIVE AMERICAN TRIBES, AND GOVERNMENT OFFICIALS

6.1 FEDERAL AND STATE AGENCIES

Federal Agencies
- Bureau of Indian Affairs, Southern Plains Regional Office
- U.S Army Corps of Engineers
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

State Agencies
- Oklahoma Archeological Survey
- Oklahoma Biological Survey
- Oklahoma Department of Environmental Quality
- Oklahoma Department of Wildlife Conservation
- Oklahoma State Historic Preservation Office
- Oklahoma Water Resources Board

6.2 NATIVE AMERICAN TRIBES

- Apache Tribe of Oklahoma
- Caddo Nation
- Cheyenne and Arapaho Tribes of Oklahoma
- Chickasaw Nation
- Comanche Nation of Oklahoma
- Delaware Nation
- Fort Sill Apache Tribe of Oklahoma
- Kiowa Tribe of Oklahoma
- Wichita and Affiliated Tribes

6.3 FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

Federal Government Officials
- Tom Cole, U.S. House of Representatives
- James Lankford, U.S. Senate
- Jim Inhofe, U.S. Senate

State and Local Government Officials
- Ann Coody, Oklahoma House of Representatives
- Jeff Coody, Oklahoma House of Representatives
- John Michael Montgomery, Oklahoma House of Representatives
- Scooter Park, Oklahoma House of Representatives
- Don Barrington, Oklahoma Senate
- Randy Bass, Oklahoma Senate
State and Local Government Officials (Continued)

- Comanche County Commissioners
- Lawton City Manager
- Mayor of Cache
- Mayor of Elgin
- Mayor of Lawton
- Mayor of Medicine Park
### 7. LIST OF PREPARERS

#### Government Agency Development Team

<table>
<thead>
<tr>
<th>Name/Title</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Quality Division</td>
<td>Environmental Planning/Lead EA Development</td>
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<tr>
<td>Electric Fires Office</td>
<td>Proponent</td>
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#### Contractor Development Team

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<th>Name/Title</th>
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<th>Qualifications</th>
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<tr>
<td><strong>Brad Boykin</strong></td>
<td>Section Author</td>
<td>Air Quality</td>
<td>7 years environmental science</td>
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<tr>
<td>Environmental Scientist</td>
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<td>M.S. Biotechnology</td>
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<td><strong>Sarah Bresnan</strong></td>
<td>Section Author</td>
<td>Biological Resources</td>
<td>8 years environmental science</td>
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<td>Conservation Ecologist</td>
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<td>B.S. Plant Biology,</td>
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<td><strong>Dennis Chambers, CHP, RRPT</strong></td>
<td>Project Support</td>
<td>Health Physics, Safety</td>
<td>&gt;30 years health physicist</td>
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<tr>
<td>Certified Health Physicist</td>
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<td>BSAST Radiation Protection</td>
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<tr>
<td><strong>Tom Daues, PMP</strong></td>
<td>Project Manager,</td>
<td>Cumulative Impacts,</td>
<td>23 years environmental science</td>
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<tr>
<td>Biologist</td>
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<td><strong>Denise DeLancey</strong></td>
<td>Document Production</td>
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<tr>
<td>Electronic Publishing Specialist</td>
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<td><strong>Dave Dischner</strong></td>
<td>Section Author</td>
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<td>Senior Environmental Analyst</td>
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<td><strong>Anthony Finley</strong></td>
<td>Document Production</td>
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<tr>
<td><strong>Nathan Gross, CHMM</strong></td>
<td>Section Author</td>
<td>Hazardous Materials and</td>
<td>13 years environmental science</td>
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<tr>
<td>Environmental Scientist</td>
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<td>Waste, Land Use</td>
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<tr>
<td><strong>Brian Tutterow</strong></td>
<td>Section Author</td>
<td>Cultural Resources,</td>
<td>15 years environmental science</td>
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<tr>
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<td>B.S. Biology</td>
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Appendix A

Public Outreach
Announcing: Comment Period for the Draft Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems, Fort Sill, OK in compliance with The National Environmental Policy Act


The Draft Environmental Assessment (EA) addresses the potential environmental consequences resulting from the demonstration of various electric fires and loitering aerial munition systems (LAMS) at Fort Sill. Electric Fires is a conceptual term used by the Army to identify systems that use electromagnetic energy to destroy, degrade, and deny enemy threats. Examples of electric fires systems include rail guns, high powered microwave and high powered laser systems. The LAMS are explosive guided munitions used to counter aerial and ground threats. The public is invited to review the Draft EA and provide comments.

An electronic copy of the Draft EA is available at http://sill-www.army.mil/USAG/dpw/Environmental.html, the Draft EA is located under the “Public Review Tab” on the webpage. Hardcopies of the Draft EA will also be available at the following local libraries:

Lawton Public Library  Nye Library
110 SW 4th Street  1640 Randolph Road
Lawton, OK 73501  Fort Sill, OK 73503
580-581-3450  580-442-3806

Substantive written comments and questions will be addressed in the Final EA. To be included in the Final EA, substantive comments and questions must be received prior to the close of the formal comment period on January 22, 2015. Comments and questions about the Draft EA or the comment process can be directed to:

Ms. Sarah Sminkey, NEPA Coordinator
Fort Sill DPW-EQD
2515 Ringgold Road
Fort Sill, Oklahoma 73503
Phone: 580-442-2849
e-mail: sarah.e.sminkey.civ@mail.mil

HEALTH & WELLNESS

The state of Oklahoma is ranked #44 in overall health by America’s Health Rankings and United Health Foundation. The Lawton Constitution wants to help readers make the choice to be more healthy in 2015 and beyond with our Health & Wellness special section. This feature will be packed with information on steps everyone can take to get healthier.

As an advertiser in our guide for Health & Wellness you will reach people at the time of year when being healthier is on everyone’s mind. With information on physical fitness, emotional health, spiritual health, financial health and more, this special section will be a resource to help southwest Oklahomans welcome 2015 with a commitment to healthier living.

Publication Date: Wednesday, Jan. 14th
Ad Reservation Date: Monday, Jan. 5th
Deadline for ad revise: Wednesday, Jan. 7th

To reserve your ad space
Call Today 580.585.5044
Shaw becomes county's first female judge in decades

STEVE ALBIN  
KNEWS.COM

A maneuver teen accused of gunning down his family will await three charges in prison as he seeks to serve time for another.

Hruby, 19, was moved from the Stephens County Jail to the Kansas State Department of Corrections, Lexington facility to begin a three-year sentence for an Aug. 2013 felony charge of using the credit card of another — his mother, court records indicate. He received the sentence during a Dec. 4 hearing in Stephens County District Court.

Hruby had been in the Stephens County Jail since October after he was arrested in connection with the Oct. 9 killing of his father John, 50; mother Joy “Tinker,” 48; and sister Katherine, 17. He has been charged with three counts of first-degree murder and faces the prospect of either a life sentence, a life sentence without parole or the death penalty.

The teen is accused of stealing his father’s handgun and then on Oct. 9 awaiting the family at their home at 1217 Bent Tree, receiving a three-year sentence for an Aug. 2013 felony charge of using the credit card of another — his mother, court records indicate. He received the sentence during a Dec. 4 hearing in Stephens County District Court.

A 30-day public review and comment period for a “Draft Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill” will end Jan. 22.

The environmental assessment was developed in accordance with the National Environmental Policy Act (NEPA) of 1969. It yielded a “finding of no significant impact” for the preferred alternative, alternative B.

The 146-page environmental assessment report may be found online at http://tinyurl.com/kjt9usv. Hard copies may be found at the Lawton Public Library, 11640 Randolph Road, Fort Sill.

Letters or other written or oral comments provided to the U.S. Army at the Fort Sill garrison will be published in the final environmental assessment and made available to the public. To be included, substantive comments and questions must be received prior to the close of the formal comment period on Jan. 22.

Comments and questions about the draft EA or the comment process can be directed to Sarah Sminkey, NEPA coordinator, Fort Sill DPW-EQD, 2515 Ringgold Road, Fort Sill, OK 73503. You may also phone 442-2849 or email sarah.e.sminkey@mail.mil.

According to the Fort Sill Public Affairs Office, comments may be made online via either the Federal Register or the Army Environmental Command website. There will be no public listening session as there was with the drafts of the Programmatic Environmental Assessment (PEA) in April 2013 or the Supplemental Programmatic Environmental Assessment (SPEA) on Dec. 9. Lt. Col. Rory Crooks, Fort Sill’s director of strategic communications, said those are only for “big things where a large impact, like losing 6,800 people.”

The purpose of the proposed action is to demonstrate concepts and capabilities that have the potential to change the way the Army conducts operations in the future. The demonstrations are proposed to examine or develop solutions and determine which solutions, if implemented, would result in the highest level of capability, effectiveness and efficiency to the force.
SILL: Alternatives include using east or west ranges to test new technologies

CONTINUED FROM 1A

The need for the proposed action is a direct result of the requirement for the Capabilities Development and Integration Directorate (CDID) to develop and integrate new technologies to defend the nation and its interests.

Electric fires and loitering aerial munition systems (LAMS) are both new technologies that promise advances in the ability of the warfighter to communicate, defend against enemy weapons and destroy enemy threats with levels of speed, accuracy and safety not possible with current conventional weapons.

LAMS are guided munitions, while electric fires technologies are grouped into two categories: electromagnetic kinetic energy and directed energy. Examples of the former are electromagnetic launch (rail gun), combustion light gas gun and electrothermal-chemical. Examples of the second group are acoustic, high-power microwave, radio frequency, laser, particle beam and laser-induced plasma channel.

These revolutionary technologies could be linked to any specific platform, such as tanks, aircraft or trucks, and would eventually replace gunpowder-based systems of today.

Three alternatives were considered: the no action alternative; alternative 1, demonstrations on the West Range area; and alternative 2, demonstrations on the East Range area.

No demonstrations of electric fires or LAMS would occur under the “no action alternative.”

Alternative 1 would mean that the demonstrations would be conducted in the portion of the West Range west of Tower Two Road. No demonstrations would occur east of Tower Two Road as part of this alternative.

Alternative 1 was selected as the preferred alternative for a number of reasons, including ease of access to the training area, fewer potential conflicts with existing range uses (for example, fewer agricultural fields and less interference with the basic and small arms training activities) and greater topographic relief.

CONTINUED FROM 1A

SHAW: No big changes planned

She also thanked her campaign chairman, Clay Hillis, and Stratton, whom she praised for his excellent reputation in juvenile justice circles.

Shaw said becoming a judge has been a long-term goal for her. She believes her extensive background as a prosecutor of juvenile cases will aid her in working for the best interests of young people as a judge.

“Think that’s kind of cool,” Shaw said when asked what being the first female judge in the county since the 1960s means to her.

She added that the last at the age of 95. She was a big change for the family and court reporter Michelle

LOCAL & AREA

TUESDAY, JANUARY 13, 2015

FALLIN: Lower oil price may mean trouble

From left, Comanche County District Judge Mark Smith, presiding judge of the Southwest Judicial Administrative District, administers the oath of office to Comanche County District Judges Emmitt Tayloe, Keith B. Aycock and Gerald Neuwirth Monday. Smith, Aycock and Neuwirth were re-elected to four-year terms without opposition; Tayloe, who was appointed last year to fill an open seat, won election in the November general election.

CONTINUED FROM 1A

from falling rock was removed last week ahead of the inaugural ceremonies.

In her address, Fallin touted her accomplishments during her first four years in office, including a state economy that has roared back from the recession with lower unemployment, increasing personal incomes and a record $530 million in the state’s Rainy Day Fund.

“I believe the story of the last four years will be a story of an economy lifted out of its deepest recession,” Fallin said.

Fallin also charted a course for her second term.

While Oklahoma’s economy has improved, initial projections show state legislators will have about $300 million less to spend on next year’s budget, a hole that could grow deeper if oil prices remain depressed.

Much of the shortfall is due to numerous one-time funding sources that were used for the current year’s budget.

The Legislature will convene on Feb. 2, when Fallin will deliver her State of the State speech and present lawmakers with her executive budget proposal.

During the ceremony, noted Oklahoma sculptor Paul
The City of Lawton has begun to implement changes that are calculated to lessen demand on its existing raw water supply. City Council members voted in mid-January to implement an immediate change to building code requirements for commercial car washes. The first action was one council members discussed months ago new construction requirements for future commercial car washes. The new regulation, which came with an emergency clause, that put it into effect immediately, specifies that buildings who build a car wash must install and use a water recycling system that captures and re-uses at least 50 percent of the facility’s wash and rinse water.

Now water is mixed with recycled water, meaning that for the cost of that final stage has prompt-}

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Now water is mixed with recycled water, meaning that for the cost of that final stage has prompt-
January 11, 2015

Ms. Sarah Sminkey-NEPA Coordinator

Ft. Sill DPW-EQD

2515 Ringgold Road

Ft. Sill, OK 73503

RE: DRAFT EA for the DEMONSTRATION OD VARIOUS ELECTRIC FIRES AND LOITERING AERIAL MUNITION SYSTEMS, FT. SILL, OKLAHOMA

Greetings Ms. Sminkey,

I have read the Draft EA mentioned above and have serious concerns for the safety of humans, plants, wildlife, water, air, soil and infrastructure in or around the Ft. Sill ranges—to include Cache, Medicine Park, Wichita Mountains Wildlife Refuge, Wichita Mountain Estates area, Elgin and Lawton. The Draft EA is written from a perspective of perfection of performance on the part of all personnel and all machinery and weaponry involved. It also fails, in my opinion, to consider long-term, cumulative effects of such weapons being used not occasionally but normally for years and years in the same relative area. We are expected to have full confidence that everything will always be done in a safe manner. In fact, on page 3-10 this sentence appears: “None of the systems evaluated in this EA would be intentionally directed at military or civilian personnel.” This begs the obvious question. **What are the consequences of UNINTENTIONALLY directing and “firing” these weapons? What will Ft. Sill do if such a tragedy occurs?**

Do we have data on the long-term effects of using high-powered microwaves, lasers, sound, particle beams and strong magnetic fields, etc. over and over again in the same area? The Draft EA states that including some or all of these weapons into the soldiers’ training at Ft. Sill is an ultimate goal. Surely, there are effects that may not appear instantly or perhaps even for months or years to plants, animals and people living in and around or near these weapons usage zones. **Just how far away is far enough away?** I question also whether repeated use of some or all of these weapons could adversely affect our air or water shed. **Could such repeated uses of any of these weapons possibly cause any radiation or other threats of contamination to the soil or underground water table?** If so, what possible adverse effects could that cause not only to the immediate area but down wind or down-stream?

Infrastructural issues such as power lines, antenna signals for computers, cell phones, radios and television and people with pace-makers are already mentioned as an issue. The report states that about a mile and a half of power lines will have to be buried to prevent frying it. And, people in the area with pace-makers will have to be removed to a safer location. Maybe I missed it, but I saw no measurement on just how far away is safe. **Is it reasonable to assume that repeated use of these systems over months, years or decades in the same general areas cause some type of unsafe build-up of anything like radiation or a contaminant to that area and the surrounding areas?** Do we really have enough data on these issues or are we just hoping that the populace in and around Ft. Sill cares more about its own pocketbooks than about being guinea-pigs.
I propose that the classroom and simulation training be done here at Ft. Sill, and consider the money well spent on travel to the already known to be safe proving grounds for actual use of these systems. That’s why we have wide-open vast unpopulated areas like White Sands, NM and the like. If something goes wrong in a place like that, only the immediate personnel are at risk because there is no surrounding populace and virtually nothing else but sand for many, many miles around.

I encourage the Ft. Sill big brass not to take us for granted. I encourage them to extend the time limits for decision on this issue and to HOLD SEVERAL PUBLIC MEETINGS so that anyone can ask questions, make comments to military experts on these systems as well as non-affiliated experts- not chosen by the military or their associates. Perhaps a teleconference could be done and recorded and aired on the internet or at a local theatre. After all, if these proposed weapon systems are truly as non-threatening as the Draft EA claims, Ft. Sill should jump at the chance to give this courtesy to all of her neighbors and delight in all the benefits this will bring to us.

Sincerely,
Moonlight Walk to fight drugs slated for March 27

By Trent Asun

The annual Friends of the Library Book Sale will run from 9 a.m. to 6 p.m. Thursday and Friday and from 9 a.m. to 1 p.m. Saturday at Anadarko Masonic Lodge No. 21 at the intersection of South 3rd Street and Oklahoma Avenue.

The first sale the Lodge has helped out with, the book sale is glad to have the assistance.

“We used to have a sale in our community room, but we have now so many books this year that we can’t hold it in there,” she said. “So they stepped in and offered to let us have it at the Lodge, which is a little history to us. So we’re going to be packing it.”

The books will be priced to move, with the proceeds being donated to the Friends of the Library, which uses the money to fund programs throughout the year.

“IT’s a family fun event to bring awareness of the dangers of drugs,” Clark said. “And a great way to raise awareness about the effects of drugs on the community and how to combat drug abuse.”

Gates said Crime Stoppers and Drug Busters of Southwest Oklahoma has paid out over $431,000 in rewards since its creation, from information that led to 2,870 felony arrests.

Tipsters remain confidential throughout the entire process, she said.

STAFF WRITER
MARCH 8, 2015
Appendix B

Demonstration Support Worksheet (DSW)
Fort Sill, Oklahoma (FSOK)
Demonstration Support Worksheet (DSW) Preparation Instructions

General
Submit a copy of the security classification guide for your demonstration program along with the DSW.

Submit a copy of any environmental and/or safety assessments or studies completed for your demonstration program along with the DSW.

Submit all Information Assurance documentation (such as Authority to Operate) with the DSW, as well as network and data exchange formats/methods (e.g. VMF, XML etc via FM). This should include information exchange documentation.

Enter the date you are preparing the DSW. If you are revising the basic document, enter the date of the revision and the version number. On each subsequent page, enter the version number, if applicable.

If additional space is required in any section or box, use additional sheets listing the appropriate headings.

Section I – Demonstration Program Identification
Box 1 – Enter the demonstration program title.

Box 2 – Enter the official or accepted unclassified short title.

Box 3 – Responsible Agencies and Key Personnel:
   a. User Agency: Enter the name of the agency with prime responsibility for the program.
   b. User Representative: Enter the name of the individual representing the requesting agency.
   c. User Contractor Representative: Enter the name of the individual representing the prime contractor for the requesting agency (if applicable).
   d. Fort Sill, Oklahoma (FSOK) Government Support Coordinator: Enter the name of the government coordinator assigned to support the customer demonstration program.
   e. FSOK Lead Support Contractor Rep: Enter the name of the lead government contractor assigned to support the demonstration program.

Box 4 – Technology Category: mark all appropriate boxes with a check to identify the general categories of technologies that will be demonstrated.

Box 5 – Demonstration Program Information:
   a. Type Of Program: Enter the type of specific demonstration program of the primary technology (e.g., high energy laser, high power microwave, etc.)
   b. Start Date: Enter the anticipated date of initial demonstration activity, such as arrival of personnel.
   c. First Demonstration Date: Provide the estimated date of the first significant demonstration event.
   d. Completion Date: Enter the estimated date of termination of demonstration program activity at FSOK.
   e. Program Status: Check the applicable boxes indicating the approval and funding status of the program.
   f. Program Security Classification: Enter the overall security classification for the program.
g. Security Classification Guide: Enter the title, originator, and classification authority for the security classification guide applicable to the demonstration program. A copy of the guide must be submitted along with the DSW.

Box 6 – Requesting Agency Authentication: Enter agency name, signature, name and title, and telephone number of your organization.

Box 7 – Receiving Agency Authentication: Support Agency Receipt. As the receiving agency, a representative from FSOK Capabilities Development and Integration Directorate (CDID) will complete the information in this box.

Section II – Demonstration Program And Mission Information
Box 1 – Program Background Information: Provide a brief narrative discussion of the program context and significant milestones or events leading to the demonstration.

Box 2 – Demonstration Program Milestones and Phases: On this chart, list the appropriate milestones and phases for the demonstration program and indicate the fiscal years and quarters in which you expect to achieve them. Drop down boxes are provided for the fiscal year and quarter designations.

Box 3 – Success/Exit Criteria: Provide the objective criteria to be used to assess successful completion of the demonstration program.

Box 4 – Activity Plan: Enter the number of static lethal and dynamic demonstrations and other operations to be conducted during each FY quarter during the course of the program. Use double-headed arrows to indicate the time span to be covered by each listed phase of program activity. Drop down boxes are provided for the fiscal year and quarter designations.

Box 5 – Narrative of Demonstration Description and Objectives at FSOK: Provide a narrative description of each demonstration to be conducted. If a single scenario is to be repeated several times, only one description is needed. If there are variations to the demonstration scenarios, each variation should be described. If the scenario is known only in vague detail, provide what is known and state that the description is a rough outline of the demonstrations to be performed. Provide demonstration details as specific as possible in relation to timelines, requirements, and environmental and safety hazards.

Box 6 – Demonstration Equipment Characteristics: Complete this block with information required to provide a detailed description of the demonstration system. This will include: the type of technology (laser, high power microwave, etc.); length; width; height; diameter; weight; fuel(s) consumed; surface finish; chemical composition (as required); any explosive type used; explosive weight; amount of electrical power generated by the system; operating frequency of the system (as required); and any projectile material composition and weight (as required). Drop down boxes are provided for length, width, height, diameter and weight designations.

Box 7 – Environmental Policy Act Compliance: Check the applicable boxes to indicate: a) whether an Environmental Assessment has been made of the program, b) whether an Environmental Statement has been prepared, c) attach historical environmental documents to the DSW, d) if the system emits air pollutants, e) if the systems generates hazardous waste (if so, specify what type, quantities and disposal plan in separate narrative), and f) if the system will increase surrounding noise levels. The assigned FSOK
representatives, in conjunction with Garrison Environmental Quality Division (EQD), will assist you in determining environmental requirements for your demonstration program.

Box 8 – Dynamic/Static Target Description and Engagement Events: Describe the dynamic or static targets planned for use in the demonstration, and their usage in the demonstration program.

Box 9a. – Dynamic Target Characteristics: Provide sufficient detail by completing the designated characteristic data to determine its size, configuration, intended trajectory, and number of launches anticipated. This information will include: the target type, basic physical characteristics, and type of guidance and propulsion system. Drop down boxes are provided for length, width, height, diameter, and wingspan designations.

Box 9b. – Static Target Characteristics: Provide sufficient detail by completing the designated characteristic data to determine its size, configuration, composition, and number of anticipated engagements. Drop down boxes are provided for length, width, height, diameter and weight designations.

Box 10 – User-supplied Instrumentation and Equipment: List all instrumentation and equipment to be supplied by the requesting agency and indicate the anticipated date of delivery to FSOK. (NOTE: Do not delay submitting the DSW because information to complete this page is unavailable. FSOK will accept this information at a later date.)

Box 11 – User-supplied Laser Systems: Mark “Y” or “N” at the top of the block to answer the question for Laser Clearing House registration. Provide all the information required in items a through p. Customer lasers delivered to FSOK must be approved for use prior to the demonstration through numerous organizations. Lasers that are not programs of record, will have to apply for registration with the Laser Clearing House. Additional agencies will require further coordination that FSOK representatives will execute. Drop down boxes are provided for laser type and class.

Box 12 – FSOK-supplied Equipment: Provide a description of any equipment or resources you want FSOK to provide in support of the demonstration. For each item, enter the required availability date(s). This request alone does not guarantee that FSOK will provide this equipment or resources, and a Demonstration Agreement must be signed between FSOK representatives and the requesting agency.

Section III – Demonstration Support Requirements
Box 1 – Recovery Requirements: Describe components of dynamic target debris to be recovered and provide details on potential hazards associated with recovery. Explosive ordnance disposal personnel may be required to dispose of contaminated, classified, or hazardous material.

Box 2 – Meteorological Considerations: Describe meteorological support required, including update frequency of temperature, barometric pressure, and crosswinds. Discuss weather minima required to support the demonstration (e.g., ceiling, crosswinds, etc.).

Box 3 – Communications Request: Provide information on intercom, hand-held radio, and telephone requirements. Indicate whether secure voice communications and secure email access are required to support the demonstration program.
Box 4 – Medical Requirements: Describe hazardous demonstration operations that may require the availability of medical support in addition to FSOK Emergency Medical Technicians.

Box 5 – Security Requirements: Provide details on security measures necessary to meet requirements in the security classification guide for the demonstration program (e.g. counter-surveillance canopies, target access and storage, restricted test area access, etc.). Each agency approved to conduct a demonstration at FSOK will be responsible to provide their own continuous guard force with a minimum requirement of two personnel at all times.
### FSOK Demonstration Support Worksheet

#### I. Demonstration Program Identification

<table>
<thead>
<tr>
<th>1. Program Title</th>
<th>2. Short Title</th>
</tr>
</thead>
</table>

#### 3. Responsible Agencies and Key Personnel

- a. User Agency
- b. User Representative
- c. User Contractor Representative
- d. FSOK Government Support Coordinator
- e. FSOK Lead Support Contractor/Rep.

#### 4. Technology Category

<table>
<thead>
<tr>
<th>a. Acoustic</th>
<th>e. Particle Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. Laser</td>
<td>g. Electrothermal Chemical</td>
</tr>
<tr>
<td>d. Laser Induced Plasma Channel</td>
<td>h. Combustion Light Gas</td>
</tr>
</tbody>
</table>

#### 5. Demonstration Program Information

<table>
<thead>
<tr>
<th>a. Type of Program</th>
<th>f. Program Security Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Start Date (DD-MM-YY)</td>
<td>g. Security Classification Guide</td>
</tr>
<tr>
<td>c. First Demo Date (DD-MM-YY)</td>
<td>(1) Title</td>
</tr>
<tr>
<td>d. Completion Date (DD-MM-YY)</td>
<td>(2) Originator</td>
</tr>
<tr>
<td>e. Program Status</td>
<td>(3) Classification Authority</td>
</tr>
<tr>
<td>Funded</td>
<td>Approved</td>
</tr>
</tbody>
</table>

#### 6. Requesting Agency Authentication

The services requested herein are required for conduct of the demonstration and are not within any currently approved scope of work except as follows:

- Requesting Agency __________________________ Date ________________ (DD-MM-YY)
- Signature ___________________________ Agency __________________________
- Name and Title __________________________
- Phone __________________________

#### 7. Receiving Agency Authentication

- Signature ___________________________ Date ________________ (DD-MM-YY)
- Name and Title __________________________ Agency __________________________
- Phone __________________________

- Capabilities Development and Integration Directorate Receipt
## II. Demonstration Program and Mission Information

1. Program Background Information

<table>
<thead>
<tr>
<th>2. Program Milestone Phases</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3. Success/Exit Criteria</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>4. Activity Plan</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
<th>FY</th>
</tr>
</thead>
</table>

---
5. Narrative of Demonstration Description and Objectives at FSOK

__________________________________________________________________________

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__________________________________________________________________________
6. Demonstration Equipment Characteristics

<table>
<thead>
<tr>
<th>a. Type</th>
<th>i. Chemical Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Length</td>
<td></td>
</tr>
<tr>
<td>c. Width</td>
<td>k. Explosive Weight</td>
</tr>
<tr>
<td>d. Height</td>
<td>l. Power generated by system</td>
</tr>
<tr>
<td>e. Diameter</td>
<td>m. Frequency of the system</td>
</tr>
<tr>
<td>f. Weight</td>
<td>n. Projectile material composition</td>
</tr>
<tr>
<td>g. Fuel(s)</td>
<td>o. Projectile weight</td>
</tr>
<tr>
<td>h. Surface</td>
<td></td>
</tr>
</tbody>
</table>

7. Environmental Policy Act Compliance

As required by Public Law 91-190, National Environmental Policy Act, and DoD Directive 6060.1, an

- a. Environmental Assessment [ ] has been made [ ] has not been made
- b. Record of Environmental Consideration [ ] has been prepared [ ] has not been made
- c. Provide copies of any historical environmental documentation.
- d. Will use of the system or its auxiliary equipment emit hazardous air pollutants? [ ] no [ ] yes
- e. Will use of the system or its auxiliary equipment generate hazardous waste? [ ] no [ ] yes
- f. Will use of the system or its auxiliary equipment potentially increase surrounding noise levels? [ ] no [ ] yes

8. Dynamic/Static Target Description and Engagement Events

---

9a. Dynamic Target Characteristics

<table>
<thead>
<tr>
<th>a. Target Type</th>
<th>i. Surface Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Length</td>
<td>j. Guidance System</td>
</tr>
<tr>
<td>c. Width</td>
<td>k. Propulsion System</td>
</tr>
<tr>
<td>d. Height</td>
<td>l. Flight Termination System Requirement [ ] Yes [ ] No</td>
</tr>
<tr>
<td>e. Diameter</td>
<td>m. System Explosive Weight</td>
</tr>
<tr>
<td>f. Weight</td>
<td>n. Launch System</td>
</tr>
<tr>
<td>g. Wing Span</td>
<td>o. Previous FSOK Flight</td>
</tr>
<tr>
<td>h. Airframe</td>
<td>p. Other</td>
</tr>
</tbody>
</table>

9b. Static Target Characteristics

<table>
<thead>
<tr>
<th>a. Target Type</th>
<th>f. Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Length</td>
<td>g. Surface Material</td>
</tr>
<tr>
<td>c. Width</td>
<td>h. Explosive Characteristics</td>
</tr>
<tr>
<td>d. Height</td>
<td>i. Other</td>
</tr>
<tr>
<td>e. Diameter</td>
<td></td>
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</table>

10. User-supplied Instrumentation and Equipment

<table>
<thead>
<tr>
<th>Description</th>
<th>Delivery Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Operating Procedure</td>
<td>60 Days Prior to Demonstration Date</td>
</tr>
<tr>
<td>Interface Control Documentation</td>
<td>60 Days Prior to Demonstration Date</td>
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</tbody>
</table>

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Version No.:  
Page 4 of 6
## III. Demonstration Support Requirements

### 11. User-supplied Laser Systems

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CLASS</th>
<th>Laser registered with Laser Clearing House?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Type/Class</td>
<td></td>
<td>i. Tracking rate</td>
</tr>
<tr>
<td>b. Output energy/power</td>
<td></td>
<td>j. Jitter</td>
</tr>
<tr>
<td>c. Wavelength</td>
<td></td>
<td>k. Focus</td>
</tr>
<tr>
<td>d. Beam Divergence</td>
<td></td>
<td>l. Focus spot size</td>
</tr>
<tr>
<td>e. Beam aperture diameter</td>
<td></td>
<td>m. Laser beam termination system</td>
</tr>
<tr>
<td>f. Pulse repetition frequency</td>
<td></td>
<td>n. SOP Requirement</td>
</tr>
<tr>
<td>g. Pulse width</td>
<td></td>
<td>o. Laser Safety Analysis</td>
</tr>
<tr>
<td>h. Lasing azimuth and elevation</td>
<td></td>
<td>p. Other</td>
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</table>

### 12. FSOK-supplied Equipment

<table>
<thead>
<tr>
<th>Description</th>
<th>Date Required (DD-MM-YY)</th>
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<tr>
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</table>

### III. Demonstration Support Requirements

#### 1. Recovery Requirements

- ...
- ...
- ...
- ...
- ...

#### 2. Meteorological Considerations

- ...
- ...
- ...
- ...
- ...

#### 3. Communications Request

- ...
- ...
- ...
- ...
- ...
### 6. Requesting Agency Equipment and Personnel

What vehicles and equipment will the requesting agency **bring** with them to support the demonstration?

<table>
<thead>
<tr>
<th>Equipment/Vehicle Type</th>
<th>Quantity</th>
<th>PAX</th>
<th>Ownership</th>
<th>Additional Comments</th>
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</table>

### 7. Requesting Agency Equipment and Personnel

What vehicles and equipment will the requesting agency **request** from Fort Sill to support the demonstration?

<table>
<thead>
<tr>
<th>Equipment/Vehicle Type</th>
<th>Quantity</th>
<th>PAX</th>
<th>Ownership</th>
<th>Additional Comments</th>
</tr>
</thead>
<tbody>
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</table>
## Approval Process Requirements By System

<table>
<thead>
<tr>
<th>System Type</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Powered Microwave (HPM)/Radio Frequency</td>
<td>US Army/Public Health Command</td>
</tr>
<tr>
<td></td>
<td>TRADOC Capability Manager/Range Management</td>
</tr>
<tr>
<td></td>
<td>NEC &amp; Army Spectrum Manager</td>
</tr>
<tr>
<td></td>
<td>FCC</td>
</tr>
<tr>
<td></td>
<td>FAA</td>
</tr>
<tr>
<td></td>
<td>FAA UAS Approval Process Controls and Laboratories</td>
</tr>
<tr>
<td></td>
<td>Fort Sill Airfield</td>
</tr>
<tr>
<td></td>
<td>Range Operations (in general)</td>
</tr>
<tr>
<td></td>
<td>Range Operations (Note: Above the Horizon)</td>
</tr>
<tr>
<td></td>
<td>Range Operations (Note: Below the Horizon)</td>
</tr>
<tr>
<td></td>
<td>Range Operations (Note: Non-Area BTH)</td>
</tr>
<tr>
<td></td>
<td>Operations Orders</td>
</tr>
<tr>
<td></td>
<td>Safety Judge Advocate</td>
</tr>
<tr>
<td></td>
<td>Fire Department</td>
</tr>
<tr>
<td></td>
<td>Public Affairs Office</td>
</tr>
<tr>
<td></td>
<td>DPTMS</td>
</tr>
<tr>
<td></td>
<td>Demo Agreement/Security Agreement</td>
</tr>
<tr>
<td></td>
<td>Harmless Agreement (if no CRADA)</td>
</tr>
<tr>
<td></td>
<td>Harmless Agreement (if no CRADA)</td>
</tr>
<tr>
<td>High Energy Laser (HEL)</td>
<td>YES</td>
</tr>
<tr>
<td>Acoustic</td>
<td>YES</td>
</tr>
<tr>
<td>Laser Induced Plasma</td>
<td>YES</td>
</tr>
<tr>
<td>Particle Beam</td>
<td>YES</td>
</tr>
<tr>
<td>Acoustic</td>
<td>YES</td>
</tr>
<tr>
<td>High Powered Microwave (HPM)/Radio Frequency</td>
<td>YES</td>
</tr>
<tr>
<td>Rail Gun</td>
<td>YES</td>
</tr>
<tr>
<td>High Energy Laser (HEL)</td>
<td>YES</td>
</tr>
<tr>
<td>Acoustic</td>
<td>YES</td>
</tr>
<tr>
<td>Laser Induced Plasma</td>
<td>YES</td>
</tr>
<tr>
<td>Particle Beam</td>
<td>YES</td>
</tr>
</tbody>
</table>

### KEY

- YES
- NO
- See note on chart

### Note

1. UAS is being engaged by system or will be used to support during range operations.
2. The system uses a laser but not as the weapon itself, i.e. targeting or for any other reason. ATH
3. The system uses a laser as a secondary system and is only employed for a below the horizon shot.
4. ASMO will coordinate FAA approval based on the DD 1494 that you submit to ASMO.
<table>
<thead>
<tr>
<th>Name (Last, First)</th>
<th>Phone #</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Colville, Francis</td>
<td>410-436-6607/5066</td>
<td>U.S. Army Public Health Command</td>
</tr>
<tr>
<td>Mr. Pfoutz, Jeffrey</td>
<td>410-436-6607/5067</td>
<td>U.S. Army Public Health Command</td>
</tr>
<tr>
<td>Mr. Webers, Joseph</td>
<td>757-878-0516</td>
<td>TRADOC Capability Manager-Range</td>
</tr>
<tr>
<td>Mr. Durrani, Agha (AJ)</td>
<td>301-225-3758</td>
<td>Army Spectrum Management</td>
</tr>
<tr>
<td>Mrs. Witts, Heather</td>
<td>805-606-1282</td>
<td>Laser Clearing House (Primary POC)</td>
</tr>
<tr>
<td>MAJ Pindrock, Douglas</td>
<td>805-606-1282</td>
<td>Laser Clearing House (Alternate POC)</td>
</tr>
<tr>
<td>MSGT Roberts, Michael</td>
<td>805-606-1282</td>
<td>Laser Clearing House (Alternate POC)</td>
</tr>
<tr>
<td>CPT Mason, Alice</td>
<td>805-606-1282</td>
<td>Laser Clearing House (Alternate POC)</td>
</tr>
<tr>
<td>Mr. Pease, Christopher</td>
<td>580-442-3003</td>
<td>Directorate of Plans Training Mobilization and Security (DPTMS)</td>
</tr>
<tr>
<td>Mr. Deaville, William</td>
<td>580-442-1970</td>
<td>Network Enterprise Center (NEC)</td>
</tr>
<tr>
<td>Mr. Cordes, John</td>
<td>580-442-4701</td>
<td>Post Safety</td>
</tr>
<tr>
<td>MAJ Brewer, Carol</td>
<td>580-442-1589</td>
<td>Staff Judge Advocate (SJA)</td>
</tr>
<tr>
<td>Mr. Langford, Clint</td>
<td>850-442-6010</td>
<td>Fire Department</td>
</tr>
<tr>
<td>Mr. Aller, Larry</td>
<td>580-442-5191/5613</td>
<td>Range Operations/Post Laser Safety Office</td>
</tr>
<tr>
<td>Mr. Thornton, Sheldon</td>
<td>580-442-2387</td>
<td>Airfield/UAS Approval Authority/Notice To Airmen (NOTAM)</td>
</tr>
<tr>
<td>Mr. Ames, Darrel</td>
<td>580-442-4500</td>
<td>Public Affairs Office (PAO)</td>
</tr>
<tr>
<td>Mrs. Sminkey, Sarah</td>
<td>580-442-2849/2715</td>
<td>Environmental Office</td>
</tr>
<tr>
<td>Mr. Wheat, Thomas</td>
<td>580-442-2849/2716</td>
<td>Environmental Office</td>
</tr>
<tr>
<td>Mr. Benitezpena, William</td>
<td>580-442-8865</td>
<td>G-3</td>
</tr>
<tr>
<td>Mr. White, James</td>
<td>580-442-3132</td>
<td>Memorandum of Agreement (MOA) FCoE G-8</td>
</tr>
<tr>
<td>Ms. McRae, Susan</td>
<td>256-955-1501</td>
<td>Cooperative Research and Development Agreement (CRADA) SMDC</td>
</tr>
<tr>
<td>Mr. Cox, David</td>
<td>256-955-9923</td>
<td>Cooperative Research and Development Agreement (CRADA) SMDC</td>
</tr>
</tbody>
</table>
Contact Mr. White for Memorandum of Agreement assistance. Initiate MoA with Public Health Command (PHC).

Draft MoA approval through Battle Lab and CDID.

Coordinate MOA draft with PHC.

Initial Range Concept and Intent Brief (FBL, CDID, DPTMS, EQD, FA/ADA, CG)

Contact Network Enterprise Center (NEC) for an "Authority to Radiate" on the range based on system specifications and parameters.

Review MIL-HDBK-828B. Approval from Range Operations if Laser is Program of Record. If non-POR, then approval from LCH (Above the Horizon Only).

Follow-up with NEC for memorandum. If local authority cannot approve the specific frequencies, the request will go to ASMO whom works with the FCC.

Contact Laser Clearinghouse if a laser system will be employing a non-POR Laser (Above the Horizon Only).
<p>| M  | T  | W  |  F  |  S  | S | M  | T  | W  |  T  |  F  |  S  | S | M  | T  | W  |  T  |  F  |  S  | S | M  | T  | W  |  T  |  F  |  S  | S |
|----|----|----|-----|-----|---|----|----|----|-----|-----|-----|---|----|----|----|-----|-----|---|----|----|----|-----|-----|---|----|----|----|-----|-----|---|
| T-32|   |   |     |     |   | T-31|   |   |     |     |   |   | T-30|   |   |     |     |   |   |   |   |   |   |   |
|     | PHC Approval Received |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | PHC Approval forwarded to TCM-Range along with specific Ft. Sill range and system technical specs. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | TCM-Range create Surface Danger Zone (SDZ). |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor status of DD Form 1494 submission. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Submit request to Laser Clearinghouse for approval. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
| T-28|     |     |     |     |   |     |     |     |     |     |   |   | T-27|     |     |     |     |   |     |     |     |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Coordinate with Fires Center G-3 for Operations Order (OPORD) and Warning Order (WARNO) format and requirements. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Submit WARNO to Fires Center G-3 for publication and tasking. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
| T-24|     |     |     |     |   |     |     |     |     |     |   |   | T-23|     |     |     |     |   |     |     |     |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Contact Sill Post Safety Office and complete DD 2977, Composite Risk Management for the range |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Receive SJA approval for range operations. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Receive approved DD Form 2977 from Post Safety Office. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
| T-20|     |     |     |     |   |     |     |     |     |     |   |   | T-19|     |     |     |     |   |     |     |     |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Submit WARNO for approval through Battle Lab and CDID. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
| T-18|     |     |     |     |   |     |     |     |     |     |   |   | T-17|     |     |     |     |   |     |     |     |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
| T-16|     |     |     |     |   |     |     |     |     |     |   |   | T-15|     |     |     |     |   |     |     |     |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Monitor Laser Clearinghouse request. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Draft OPORD for range operations |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
| T-14|     |     |     |     |   |     |     |     |     |     |   |   | T-13|     |     |     |     |   |     |     |     |   |   |   |   |
|     | ASMO Coordinates with FCC and FAA |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Submit OPORD for approval through Battle Lab and CDID. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |
|     | Submit OPORD to Fires Center G-3 for publication and tasking. |     |     |     |   |     |     |   |     |     |   |   |     |   |   |     |     |   |   |   |   |   |   |   |</p>
<table>
<thead>
<tr>
<th>M T W T F S S</th>
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<tbody>
<tr>
<td>T-12</td>
<td>T-11</td>
<td>T-10</td>
<td>T-9</td>
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</tr>
<tr>
<td><strong>Notify Sill Airfield of range operations so they can produce a &quot;Notice to Airmen&quot; (NOTAM)</strong></td>
<td><strong>Notify Sill Public Affairs Office of event. Coordinate request for information release through SJA.</strong></td>
<td><strong>Complete any final coordination with Sill agencies or off-post agencies</strong></td>
<td><strong>Receive final FCC and FAA approval from AMSO.</strong></td>
</tr>
<tr>
<td><strong>Submit FS 833-E for Bus Transportation</strong></td>
<td><strong>Notify FS Fire Department of Range Execution Dates and Times (for support)</strong></td>
<td></td>
<td><strong>Receive LCH Approval</strong></td>
</tr>
<tr>
<td><strong>Range Operations Rehearsal</strong></td>
<td><strong>Range Operations brief to Battle Lab Director.</strong></td>
<td><strong>Final Range Brief (FBL, CDID, FA/ADA)</strong></td>
<td><strong>CG Range Brief</strong></td>
</tr>
<tr>
<td><strong>Range Execution</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**CRADA Process (SMDC)**

1. **INDUSTRY:** establishes desire to use range facilities for a demonstration through SMDC
2. Notify SMDC
3. SMDC develops CRADA MOA
4. Sends To FBL
5. FBL Sends to G-8
6. Legal reviews MOA and Sends it to Chief of Staff
7. G-8 Approves and forwards to legal for review
8. FBL receives complete MOA - Retain for record - Forward to SMDC - Begin work with industry

**Demonstration Agreement**

1. **INDUSTRY:** establishes desire to use range facilities for a demonstration through FCoE/FBL
2. Notify Contracting Office
3. Contracting Office develops MOA/Contract
4. Sends To FBL
5. FBL receives complete MOA - Retain for record - Forward to SMDC - Begin work with industry
6. Chief of Staff Approves and returns it to FBL
7. Legal Sends MOA/Contract to G-8
8. G-8 Approves and forwards to Chief of Staff

**Note:** This MOA is separate from the MOA provided by PHC. You must have an MOA with industry via SMDC in order to begin a working relationship with said industry.

**Note:** This MOA/Contract is separate from the MOA provided by PHC. You must have an MOA with industry via the Contracting Office in order to begin a working relationship with said industry.
Notify PHC of intent

Provide System Parameters
- Provide System Power Source
- Provide System Power Output
- Provide System Range
- Provide System Safety Data

PHC Creates MOA

Provide it To
- TRADOC Capability Manager-Range

Maintain and File PHC MOA

Note: This information can be submitted in a PPT, Presentation Format. Industry should have a "Safety Study" or support FBL with a Safety Study.

Note: This stage of the process is in conjunction with the TCM-Range SDZ creation.

References (System Dependent)
- DODI 6055.11 Protection Personnel From Electromagnetic Fields
- IEEE C95.1 Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic
- ANSI N43.3 Radiation Safety for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV
Provide TCM-Range with MOA from PHC
Provide Range Information, System Parameters, and 5 W's Memorandum

TCM-Range Creates Surface Danger Zone (SDZ)

Maintain a Copy

SDZ

Provide to

Provide to

Directorate of Plans Training Mobilization and Security (DPTMS)

Provide to

Laser Clearing House if Necessary/System Dependent

Range Operations

Example
UAS Approval and Notice to Airmen (Fort Sill Airfield)

Provide with 5 W’s Memorandum

Notify Airfield of Range Location and Safety Stand off distance/Provide SDZ upon request

Airfield published Notice to Airmen (NOTAM)

60 days Notice from T-date
Provide Airfield with:

UAS Request Form

Airfield Provides UAS approval for use during Demonstration

Inform Airfield that you will be using UAS 10 days out from first UAS Flight

Airfield published Notice to Airmen (NOTAM)

Note: Regardless of using UAS

Note: only if using UAS during Live Fire event
Staff Judge Advocate (SJA)

Provide SJA with:

- 5 W's
- System Overview and Specs
- DD Form 2977
- SDZ

SJA Provides Feedback on all matters of Legality, Safety, Demonstration and Hold Harmless Agreements.
Army Spectrum Management

Additional Instructions
- Before beginning this step, review Network Enterprise Center.
- Follow Link for additional information.

The NEC approves "Authority to Radiate" for frequencies within their scope concerning Programs or Record Only. If they are unable to approve, the DD 1494 is forwarded to ASMO who forwards it to the FCC for "Authority to Radiate".

The NEC approves "Authority to Radiate" for frequencies within their scope concerning Programs or Record Only. If they are unable to approve, the DD 1494 is forwarded to ASMO who forwards it to the FCC for "Authority to Radiate".

Note: FAA is the approver for and coordinate of the possible impact of the system on commercial and local flight operations in the respective area of the demonstration.

Note: The FCC approves the overall usage of any frequency owned by the United States or its territories. The Spectrum Manager is there for a direct link to the FCC and has pre-approval for the usage of specific frequencies as granted by the FCC. The ASM does not however supersede the FCC in authority, and other mitigating factors involving the usage of a specific frequency at any given time or location.

You will receive a formalized response from ASMO/ Maintain and File (Permit to Radiate).
Post Safety/Risk Assessment

Electric Fires develops DA 2977 Deliberate Risk Management Worksheet

Gain local Approval

- Provide Post Safety DD 2977 Composite Risk Management Worksheet
- Provide Post Safety FS Form 51 Fort Sill Staff Action Memo

Post Safety signs FS 51 (Approves) or Returns for changes (Disapproves)

- Approval of DD 2977
- Disapproval DD 2977

Upon Approval enter Signature Process

- Post Safety provides input if necessary/ Adjust and resubmit for approval

Signature #1
DPTMS
Signature #2
CDID Director
Signature #3
G3
Signature #4
FCoE CG

Keep a copy/ Provide to Range Operations

No Signatures Required

EF Chief
Deputy Director
Director

Note: CG Signature required for all DE Live Fire Events

Page 12 of 17
Range Operations (Laser-focused)

Question 1

Will you be shooting below the Horizon?

- NO
  - See Laser Clearing House

- YES
  - Question

Does the system use a Laser that is a program of record?

- NO
  - Authority to Shoot is Granted

  - Approval
    - Develop Alternate Plan based on System Capabilities
  - Disapproval

  - Provide Range Operations with the following for their approval:
    - Safety Brief
      - SDZ
    - Continue to next step

- YES
  - Provide a memo scope, purpose, Laser Parameters & Target: Signed By FBL Director
  - Forward Signed Memo to CDID Director for approval
  - CDID Director forwards to FCoE CG for his endorsement
  - FCoE CG forwards to TRADOC G3/5/7 for Requirement Validation
  - TRADOC G3/5/7 forwards to HQDA G3/5/7 for final requirements approval and validation
  - The Approval return to FCoE/FBL via its outgoing route and then provided to Range Ops.

If shooting above the Horizon in any circumstance approval must be gained from LCH.
Established necessity for Range Support

G-3 Operations Orders Production and Distribution

Establish Date/Time/Location for support requirements

Develope draft WARNO (3-6 months for T-date) based on necessary support of personnel, equipment, logistics, and sustainment

Draft WARNO is approved by EF Chief/FBL Deputy Dir./FBL Director

FBL forwards WARNO to G-3 for publication to supporting units

G-3 published the final OPORD (1-3 months from T-Date)

FS Form 51

Support requirements are met upon execution on T-date

Determine Support Requirements

Established necessity for Range Support

Range Support Received

G-3 (POC: Mr. Benitezpena, William (560) 442-8865

COLOR CODE
OUTPUT/ITEM
ACTION
ORGANIZATION
DE RANGE ENDEAVOR
DECISION

Page 14 of 17
Laser Clearing House

Does the system use a Laser that is a program of record?

**NO**

Provide LCH with:

**YES**

Will you be shooting below the horizon?

**NO**

**YES**

Approval From Range Operations Only

**Step 1:** Registration of the Laser.

**Step 2:** Evaluation of the Lasers' potential to harm Satellites (waiver assessment).

**Step 3:** Analysis of alternative P/A approaches.

**Step 4:** Planning of implementation of P/A approaches.

**Step 5:** P/A capability validation.

**Step 6:** Authorization of the Laser activity.

**Laser Deconfliction Six Step Planning Process (Ref: Standard CPA plan Chap 3)**

- Step 1: Registration of the Laser.
- Step 2: Evaluation of the Laser's potential to harm Satellites (waiver assessment).
- Step 3: Analysis of alternative P/A approaches.
- Step 4: Planning of implementation of P/A approaches.
- Step 5: P/A capability validation.

**Continuous coordination with LCH for Changes or further provisions**

**LCH provides approval for Above the Horizon Laser Shot**

**EF/BFL provides LCH with all information required by "Standard CPA Plan (C1)" Tables 1-4; and specifically Table 5; and Appendix A, B, C, and D before, during, and after Laser usage or in the event of an incident involving the Laser or the "operating window" for the Laser Shoot.**

Note: "Standard CPA Plan (C1) (Signed) (2008-11-12)" is the guide used along with "Laser Registration Form (V5)" and holds all the necessary information and processes you must enter and complete to meet the LCH requirements to fire a Laser Above the Horizon. This spreadsheet is meant to give you an outline only. You must review the guide book and coordinate with LCH to receive any additional guidance or unique requirements your "Laser" may have to meet in addition to any request for information from LCH.

**Note:** LCH only requires the information in "Form V5" all requirements outlined in "Standard Centralized Predictive Avoidance and Capability Validation Plan".
<table>
<thead>
<tr>
<th>Form Number</th>
<th>Form Name or Contact</th>
<th>Blank Form/Link</th>
<th>Example Form</th>
<th>Form Guide</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FO3-4688</td>
<td>Application for Equipment Frequency Allocation</td>
<td>[Blank Form/Link]</td>
<td>[Example Form]</td>
<td>[Form Guide]</td>
<td>It is recommended that you use the extended version of this form unless otherwise instructed by OCS or Soldier Support.</td>
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<tr>
<td>Example Only</td>
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<td>FO3-5090</td>
<td>Surface Danger Zone</td>
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<tr>
<td>FO3-5063</td>
<td>Deliberate Risk Management Work Sheet</td>
<td>Example Located In Folder (Range Control)</td>
<td>[Example Form]</td>
<td>[Form Guide]</td>
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<tr>
<td>FO3-5079</td>
<td>Laser Clearance House - Appendix B from MIL-HDBK-828B with Change 1</td>
<td>[Blank Form/Link]</td>
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<td>Laser Registration Form (V5) (2008-05-31)</td>
<td>[Blank Form/Link]</td>
<td>[Example Form]</td>
<td>[Form Guide]</td>
<td>This example should be used as a starting point. Refinement will be necessary. Please view the final OPORD example in the &quot;Directed Energy Live Fire Procedures&quot; book (Tab 13) to determine what additional information you may want to add to your draft Order before it is sent through the Operations Orders Production Process.</td>
<td></td>
</tr>
<tr>
<td>Laser Registration Table</td>
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<td>[Example Form]</td>
<td>[Form Guide]</td>
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<td>[Form Guide]</td>
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<td>Operations Order (WARNO) Example</td>
<td>[Example Form Only]</td>
<td>[Form Guide]</td>
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<td>[Legend Support]</td>
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<tr>
<td>Bus Request</td>
<td>Request for Motor Transportation</td>
<td>FS Form 833-E</td>
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</tr>
<tr>
<td>Bleachers</td>
<td>Mr. Larry Aller</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fort Sill Staff Action Memorandum FS Form 51</td>
<td>Staff Action Memorandum (Update to CIL Risk Assessment Signature)</td>
<td>FS Form 51</td>
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### Comparison of Classifications

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Class 1</td>
<td>Any laser or laser system containing a laser that cannot emit laser radiation at levels that are known to cause eye or skin injury during normal operation. This does not apply to service periods requiring access to Class 1 enclosures containing higher class lasers.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 1M</td>
<td>Not known to cause eye or skin damage unless collecting optics are used.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 2a</td>
<td>Visible lasers that are not intended for viewing and cannot produce any known eye or skin injury during operation based on a maximum exposure time of 1000 seconds.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 2</td>
<td>Visible lasers considered incapable of emitting laser radiation at levels that are known to cause skin or eye injury within the time period of the human eye aversion response (0.25 seconds).</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 2M</td>
<td>Not known to cause eye or skin damage within the aversion response time unless collecting optics are used.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 3a</td>
<td>Lasers similar to Class 2 with the exception that collecting optics cannot be used to directly view the beam.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 3R</td>
<td>Replaces Class 3a and has different limits. Up to 5 times the Class 2 limit for visible and 5 times the Class 1 limits for some invisible.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Class 3b</td>
<td>Medium powered lasers (visible or invisible regions) that present a potential eye hazard for intrabeam (direct) or specular (mirror-like) conditions. Class 3b lasers do not present a diffuse (scatter) hazard or significant skin hazard except for higher powered 3b lasers operating at certain wavelength regions.</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Class 4</td>
<td>High powered lasers (visible or invisible) considered to present potential acute hazard to the eye and skin for both direct (intrabeam) and scatter (diffused) conditions. Also have potential hazard considerations for fire (ignition) and byproduct emissions from target or process materials.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Overview of Laser Safety Classes

<table>
<thead>
<tr>
<th>Class</th>
<th>Type of laser</th>
<th>Meaning</th>
<th>Relationship to MPE</th>
<th>Hazard Area</th>
<th>Typical AEL for CW Lasers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Very low power lasers or encapsulated lasers</td>
<td>Safe</td>
<td>MPEs are not exceeded, even for long exposure duration (either 100 seconds or 30000 seconds), even with the use of optical instruments</td>
<td>No hazard area (NOHA)</td>
<td>40 µW for blue</td>
</tr>
<tr>
<td>Class 1M</td>
<td>Very low power lasers; either collimated with large beam diameter or highly divergent</td>
<td>Safe for the naked eye, potentially hazardous when optical instruments** are used</td>
<td>MPEs are not exceeded for the naked eye, even for long exposure durations, but maybe exceeded with the use of optical instruments**</td>
<td>No hazard area for the naked eye, but hazard area for the use of optical instruments** (extended NOHA)</td>
<td>Same as Class 1, distinction with measurement requirements</td>
</tr>
<tr>
<td>Class 2</td>
<td>Visible low power lasers</td>
<td>Safe for unintended exposure, prolonged staring should be avoided</td>
<td>Blink reflex limits exposure duration to nominally 0.25 seconds. MPE for 0.25 seconds not exceeded, even with the use of optical instruments.</td>
<td>No hazard area when based on unintended exposure (0.25 seconds exposure duration)</td>
<td>1 mW</td>
</tr>
<tr>
<td>Class 2M</td>
<td>Visible low power lasers; either collimated with large beam diameter or highly divergent</td>
<td>Same as Class 2, but potentially hazardous when optical instruments** are used</td>
<td>MPE for 0.25 seconds not exceeded for the naked eye, but maybe exceeded with the use of optical instruments**</td>
<td>No hazard area for the naked eye when based on accidental exposure (0.25 seconds exposure duration), but hazard area for the use of optical instruments** (extended NOHA)</td>
<td>Same as Class 2, distinction with measurement requirements</td>
</tr>
<tr>
<td>Class 3R</td>
<td>Low power lasers</td>
<td>Safe when handled carefully. Only small hazard potential for accidental exposure</td>
<td>MPE with naked eye and optical instruments may be exceeded up to 5 times</td>
<td>5 times the limit of Class 1 in UV and IR, and 5 times the limit for Class 2 in visible, i.e. 5 mW</td>
<td>5 times the limit of Class 1 in UV and IR, and 5 times the limit for Class 2 in visible, i.e. 5 mW</td>
</tr>
<tr>
<td>Class 3B</td>
<td>Medium power lasers</td>
<td>Hazardous when eye is exposed. Wear Eye Protection within NOHA. Usually no hazard to the skin. Diffuse reflections usually safe</td>
<td>Ocular MPE with naked eye and optical instruments may be exceeded more than 5 times. Skin MPE usually not exceeded.</td>
<td>Hazard area for the eye (NOHA), no hazard area for the skin</td>
<td>500 mW</td>
</tr>
<tr>
<td>Class 4</td>
<td>High power lasers</td>
<td>Hazardous to eye and skin, also diffuse reflection may be hazardous. Protect Eye and skin. Fire hazard.</td>
<td>Ocular and skin MPE exceeded, diffuse reflections exceed ocular MPE</td>
<td>Hazard area for the eye and skin, hazard area for diffuse reflections</td>
<td>No limit</td>
</tr>
</tbody>
</table>

*Information below is derived from the Laser Safety Classification guide “ANSI Z-136.1-1993”*
Appendix C

Air Conformity Applicability Model Report
1. General Information

- **Action Location**
  - Installation: Fort Sill
  - County(s): Comanche
  - Regulatory Area(s): NOT IN A REGULATORY AREA

- **Action Title:** Demonstrations of Various Electric Fires and Loitering Aerial Munitions Systems at Fort Sill, Oklahoma

- **Project Number/s (if applicable):**

- **Projected Action Start Date:** 1/2015

- **Action Purpose and Need:**
  Completion of these demonstrations would help establish the foundation for future training of Electric Fires and loitering aerial munition systems at Fort Sill. Electric Fires systems are revolutionary technologies that show promise to reduce costs and hazards, and achieve enormous gains in flexibility and mobility versus present day gun powder-based systems.

- **Action Description:**
  Alternative 1: Utilize the West Range. Under this Alternative, the various Electric Fires and LAM systems would be demonstrated on the West Range. Implementation of Alternative 1 also includes improvements to Firing Point 240E in the West Range area. Firing Point 240E is an existing improved artillery firing point with a gravel access road, gravel and concrete firing pads, and earth berms. Improvements at this location would include construction of a concrete pad (100 x 100 feet), conversion of 1,500 feet of utility line from aboveground to below ground, construction of one building (a 20 x 30 foot building with an observation deck), earth work to remove and flatten existing man-made berms (less than 0.2 acres), and construction of a gravel parking area (100 x 100 feet).

  Alternative 2: Utilize the East Range. Implementation of this alternative would be the same as that described for Alternative 1, with the exception of the improvements described for Firing Point 240E. No improvements would be required at any location in the East Ranges area.

- **Point of Contact**
  - Name: Brad Boykin
  - Title: CTR
  - Organization: Leidos
  - Email: boykinb@leidos.com
  - Phone Number: 850-609-3450

- **Activity List:**

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>Activity Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Construction / Demolition</td>
</tr>
<tr>
<td>3.</td>
<td>Construction / Demolition</td>
</tr>
<tr>
<td>4.</td>
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</tr>
<tr>
<td>5.</td>
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</tr>
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<td>6.</td>
<td>Construction / Demolition</td>
</tr>
<tr>
<td>7.</td>
<td>Construction / Demolition</td>
</tr>
</tbody>
</table>
2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
  County: Comanche
  Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Grading

- Activity Description:
  Grading of up to 29,312 sq ft.

- Activity Start Date
  Start Month: 1
  Start Year: 2015

- Activity End Date
  Indefinite: False
  End Month: 6
  End Year: 2015

- Activity Emissions:

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<tr>
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<tr>
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<tr>
<td>SO₂</td>
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<tr>
<td>NO₃</td>
<td>1.777607</td>
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<tr>
<td>CO</td>
<td>1.113662</td>
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<tr>
<td>PM₁₀</td>
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<table>
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</tr>
<tr>
<td>Pb</td>
<td>0.000000</td>
</tr>
<tr>
<td>NH₃</td>
<td>0.001442</td>
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</table>

2.2 Site Grading Phase

2.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
  Start Month: 1
  Start Quarter: 1
  Start Year: 2015

- Phase Duration
  Number of Month: 6
  Number of Days: 0

2.2.2 Site Grading Phase Assumptions

- General Site Grading Information
  Area of Site to be Graded (ft²): 29312
  Amount of Material to be Hauled On-Site (yd³): 0
  Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings
  Default Settings Used: Yes
  Average Day(s) worked per week: 5 (default)
### Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma

#### - Construction Exhaust (default)

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Number Of Equipment</th>
<th>Hours Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graders Composite</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Other Construction Equipment Composite</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Rubber Tired Dozers Composite</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Tractors / Loaders / Backhoes Composite</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

#### - Vehicle Exhaust

| Average Hauling Truck Capacity (yd³): | 20 (default) |
| Average Hauling Truck Round Trip Commute (mile): | 20 (default) |

#### - Vehicle Exhaust Vehicle Mixture (%)

<table>
<thead>
<tr>
<th>POVs</th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
</tr>
</tbody>
</table>

#### - Worker Trips

| Average Worker Round Trip Commute (mile): | 20 (default) |

#### - Worker Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th>POVs</th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
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<td>0</td>
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</tbody>
</table>

#### 2.2.3 Site Grading Phase Emission Factor(s)

#### - Construction Exhaust Emission Factors (lb/hour) (default)

<table>
<thead>
<tr>
<th>Graders Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₁₅</th>
<th>CH₄</th>
<th>CO₂</th>
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</thead>
<tbody>
<tr>
<td>Emission Factors</td>
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<td>0.9794</td>
<td>0.5930</td>
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<td>0.0488</td>
<td>0.0115</td>
<td>132.74</td>
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<table>
<thead>
<tr>
<th>Other Construction Equipment Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₁₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.0768</td>
<td>0.0012</td>
<td>0.6391</td>
<td>0.3645</td>
<td>0.0263</td>
<td>0.0263</td>
<td>0.0069</td>
<td>122.59</td>
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<table>
<thead>
<tr>
<th>Rubber Tired Dozers Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₁₅</th>
<th>CH₄</th>
<th>CO₂</th>
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<tbody>
<tr>
<td>Emission Factors</td>
<td>0.2721</td>
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<td>2.2344</td>
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<td>0.0924</td>
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<table>
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<tr>
<th>Tractors / Loaders / Backhoes Composite</th>
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<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₁₅</th>
<th>CH₄</th>
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</thead>
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<tr>
<td>Emission Factors</td>
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<td>0.0297</td>
<td>0.0060</td>
<td>66.799</td>
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</tr>
</tbody>
</table>

#### - Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

<table>
<thead>
<tr>
<th>POVs</th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
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</thead>
<tbody>
<tr>
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<td>0.083200</td>
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<td>0.00095</td>
<td>0.05880</td>
<td>0.098000</td>
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<td>0.00113</td>
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<td>HDGV</td>
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<td>0.00165</td>
<td>0.01660</td>
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<td>0.00432</td>
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<td>0.01370</td>
<td>0.074800</td>
<td>0.00447</td>
<td>0.00295</td>
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<tr>
<td>LDDT</td>
<td>0.003450</td>
<td>0.00056</td>
<td>0.03830</td>
<td>0.061400</td>
<td>0.00533</td>
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<tr>
<td>HDDV</td>
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<td>0.024520</td>
<td>0.072400</td>
<td>0.00970</td>
<td>0.00707</td>
<td>NA</td>
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<tr>
<td>MC</td>
<td>0.026100</td>
<td>0.00033</td>
<td>0.01700</td>
<td>0.147900</td>
<td>0.00372</td>
<td>0.00207</td>
<td>NA</td>
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</tbody>
</table>
2.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
  \[ \text{PM10}_{FD} = \frac{(20 \times \text{ACRE} \times \text{WD})}{2000} \]
  \[ \text{PM10}_{FD} \]: Fugitive Dust PM 10 Emissions (TONs)
  20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
  ACRE: Total acres (acres)
  WD: Number of Total Work Days (days)
  2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
  \[ \text{CEE}_{POL} = \frac{(\text{NE} \times \text{WD} \times \text{H} \times \text{EF}_{POL})}{2000} \]
  \[ \text{CEE}_{POL} \]: Construction Exhaust Emissions (TONs)
  NE: Number of Equipment
  WD: Number of Total Work Days (days)
  H: Hours Worked per Day (hours)
  \[ \text{EF}_{POL} \]: Emission Factor for Pollutant (lb/hour)
  2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
  \[ \text{VMT}_{VE} = \text{HA}_{OnSite} + \text{HA}_{OffSite} \times (1 / \text{HC}) \times \text{HT} \]
  \[ \text{VMT}_{VE} \]: Vehicle Exhaust Vehicle Miles Travel (miles)
  \[ \text{HA}_{OnSite} \]: Amount of Material to be Hauled On-Site (yd³)
  \[ \text{HA}_{OffSite} \]: Amount of Material to be Hauled Off-Site (yd³)
  HC: Average Hauling Truck Capacity (yd³)
  (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
  HT: Average Hauling Truck Round Trip Commute (mile/trip)

  \[ \text{V}_{POL} = \frac{(\text{VMT}_{VE} \times 0.002205 \times \text{EF}_{POL} \times \text{VM})}{2000} \]
  \[ \text{V}_{POL} \]: Vehicle Emissions (TONs)
  \[ \text{VMT}_{VE} \]: Vehicle Exhaust Vehicle Miles Travel (miles)
  0.002205: Conversion Factor grams to pounds
  \[ \text{EF}_{POL} \]: Emission Factor for Pollutant (grams/mile)
  VM: Vehicle Exhaust On Road Vehicle Mixture (%)
  2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
  \[ \text{VMT}_{WT} = \text{WD} \times \text{WT} \times 1.25 \times \text{NE} \]
  \[ \text{VMT}_{WT} \]: Worker Trips Vehicle Miles Travel (miles)
  WD: Number of Total Work Days (days)
  WT: Average Worker Round Trip Commute (mile)
  1.25: Conversion Factor Number of Construction Equipment to Number of Works
  NE: Number of Construction Equipment

  \[ \text{V}_{POL} = \frac{(\text{VMT}_{WT} \times 0.002205 \times \text{EF}_{POL} \times \text{VM})}{2000} \]
  \[ \text{V}_{POL} \]: Vehicle Emissions (TONs)
  \[ \text{VMT}_{WT} \]: Worker Trips Vehicle Miles Travel (miles)
  0.002205: Conversion Factor grams to pounds
  \[ \text{EF}_{POL} \]: Emission Factor for Pollutant (grams/mile)
  VM: Worker Trips On Road Vehicle Mixture (%)
  2000: Conversion Factor pounds to tons
3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- **Activity Location**
  
  **County:** Comanche
  
  **Regulatory Area(s):** NOT IN A REGULATORY AREA

- **Activity Title:** Building

- **Activity Description:**
  Construction of a 20' x 30' building.

- **Activity Start Date**
  
  **Start Month:** 7
  
  **Start Year:** 2015

- **Activity End Date**
  
  **Indefinite:** False
  
  **End Month:** 12
  
  **End Year:** 2015

- **Activity Emissions:**

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<tr>
<th>Pollutant</th>
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<tbody>
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<tr>
<td>PM_10</td>
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</table>

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- **Phase Start Date**
  
  **Start Month:** 7
  
  **Start Quarter:** 3
  
  **Start Year:** 2015

- **Phase Duration**
  
  **Number of Month:** 6
  
  **Number of Days:** 0

3.2.2 Building Construction Phase Assumptions

- **General Building Construction Information**
  
  **Building Category:** Office or Industrial
  
  **Area of Building (ft²):** 600
  
  **Height of Building (ft):** 30
  
  **Number of Units:** N/A

- **Building Construction Default Settings**
  
  **Default Settings Used:** Yes
  
  **Average Day(s) worked per week:** 5 (default)
- Construction Exhaust (default)

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<thead>
<tr>
<th>Equipment Name</th>
<th>Number Of Equipment</th>
<th>Hours Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranes Composite</td>
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<td>4</td>
</tr>
<tr>
<td>Forklifts Composite</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Tractors / Loaders / Backhoes Composite</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
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<tbody>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
</tr>
</tbody>
</table>

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
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</table>

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
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<tbody>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
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</table>

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

<table>
<thead>
<tr>
<th>Cranes Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO\textsubscript{2}</th>
<th>NO\textsubscript{x}</th>
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<th>PM\textsubscript{2.5}</th>
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<th>CO\textsubscript{2}</th>
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</thead>
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</table>

<table>
<thead>
<tr>
<th>Forklifts Composite</th>
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<th>VOC</th>
<th>SO\textsubscript{2}</th>
<th>NO\textsubscript{x}</th>
<th>CO</th>
<th>PM\textsubscript{10}</th>
<th>PM\textsubscript{2.5}</th>
<th>CH\textsubscript{4}</th>
<th>CO\textsubscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.0155</td>
<td>0.0041</td>
<td>54.395</td>
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<table>
<thead>
<tr>
<th>Tractors / Loaders / Backhoes Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO\textsubscript{2}</th>
<th>NO\textsubscript{x}</th>
<th>CO</th>
<th>PM\textsubscript{10}</th>
<th>PM\textsubscript{2.5}</th>
<th>CH\textsubscript{4}</th>
<th>CO\textsubscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.0666</td>
<td>0.0007</td>
<td>0.4500</td>
<td>0.3715</td>
<td>0.0297</td>
<td>0.0297</td>
<td>0.0060</td>
<td>66.799</td>
<td></td>
</tr>
</tbody>
</table>

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
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</thead>
<tbody>
<tr>
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<td>0.05190</td>
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<td>0.58809</td>
<td>0.98000</td>
<td>0.00249</td>
<td>0.00113</td>
<td>NA</td>
</tr>
<tr>
<td>HDGV</td>
<td>0.07620</td>
<td>0.01660</td>
<td>0.10640</td>
<td>0.84000</td>
<td>0.00432</td>
<td>0.00275</td>
<td>NA</td>
</tr>
<tr>
<td>LDDV</td>
<td>0.01110</td>
<td>0.00298</td>
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<td>0.74800</td>
<td>0.00447</td>
<td>0.00295</td>
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<td>0.00533</td>
<td>0.00375</td>
<td>NA</td>
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<td>HDDV</td>
<td>0.03090</td>
<td>0.01163</td>
<td>0.24520</td>
<td>0.72400</td>
<td>0.00970</td>
<td>0.00707</td>
<td>NA</td>
</tr>
<tr>
<td>MC</td>
<td>0.26100</td>
<td>0.00333</td>
<td>0.17000</td>
<td>14.79000</td>
<td>0.03720</td>
<td>0.02070</td>
<td>NA</td>
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</table>
3.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

\[ \text{CEE}_\text{POL} = \frac{\text{NE} \times \text{WD} \times \text{H} \times \text{EF}_\text{POL}}{2000} \]

CEE\text{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF\text{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

\[ \text{VMT}_\text{VE} = \text{BA} \times \text{BH} \times \left(\frac{0.42}{1000}\right) \times \text{HT} \]

VMT\text{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft\(^2\))
BH: Height of Building (ft)
\(0.42 / 1000\): Conversion Factor ft\(^3\) to trips (0.42 trip / 1000 ft\(^3\))
HT: Average Hauling Truck Round Trip Commute (mile/trip)

\[ \text{V}_\text{POL} = \frac{(\text{VMT}_\text{VE} \times 0.002205 \times \text{EF}_\text{POL} \times \text{VM})}{2000} \]

V\text{POL}: Vehicle Emissions (TONs)
VMT\text{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF\text{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

\[ \text{VMT}_\text{WT} = \text{WD} \times \text{WT} \times 1.25 \times \text{NE} \]

VMT\text{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

\[ \text{V}_\text{POL} = \frac{(\text{VMT}_\text{WT} \times 0.002205 \times \text{EF}_\text{POL} \times \text{VM})}{2000} \]

V\text{POL}: Vehicle Emissions (TONs)
VMT\text{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF\text{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vendor Trips Emissions per Phase

\[ \text{VMT}_\text{VT} = \text{BA} \times \text{BH} \times \left(\frac{0.38}{1000}\right) \times \text{HT} \]

VMT\text{VT}: Vendor Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft\(^2\))
BH: Height of Building (ft)
\(0.38 / 1000\): Conversion Factor ft\(^3\) to trips (0.38 trip / 1000 ft\(^3\))
HT: Average Hauling Truck Round Trip Commute (mile/trip)
Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma

\[ V_{POL} = \frac{(VMT_{VT} \times 0.002205 \times EF_{POL} \times VM)}{2000} \]

- **V_{POL}**: Vehicle Emissions (TONs)
- **VMT_{VT}**: Vender Trips Vehicle Miles Travel (miles)
- **0.002205**: Conversion Factor grams to pounds
- **EF_{POL}**: Emission Factor for Pollutant (grams/mile)
- **VM**: Worker Trips On Road Vehicle Mixture (%)
- **2000**: Conversion Factor pounds to tons

### 3.3 Architectural Coatings Phase

#### 3.3.1 Architectural Coatings Phase Timeline Assumptions

- **Phase Start Date**
  - Start Month: 11
  - Start Quarter: 4
  - Start Year: 2015

- **Phase Duration**
  - Number of Month: 2
  - Number of Days: 0

#### 3.3.2 Architectural Coatings Phase Assumptions

- **General Architectural Coatings Information**
  - Building Category:
  - Total Square Footage \( (ft^2) \): 600
  - Number of Units: N/A

- **Architectural Coatings Default Settings**
  - Default Settings Used: Yes
  - Average Day(s) worked per week: 5 (default)

- **Worker Trips**
  - Average Worker Round Trip Commute (mile): 20 (default)

- **Worker Trips Vehicle Mixture (%)**

<table>
<thead>
<tr>
<th>POVs</th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.00</td>
<td>50.00</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 3.3.3 Architectural Coatings Phase Emission Factor(s)

- **Worker Trips Emission Factors (grams/mile)**

<table>
<thead>
<tr>
<th>VOC</th>
<th>SO(_2)</th>
<th>NO(_x)</th>
<th>CO</th>
<th>PM(_{10})</th>
<th>PM(_{2.5})</th>
<th>Pb</th>
<th>NH(_3)</th>
<th>CO(_2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDGV</td>
<td>0.05190</td>
<td>0.00068</td>
<td>0.3740</td>
<td>08.3200</td>
<td>00.0248</td>
<td>00.0113</td>
<td>NA</td>
<td>00.1017</td>
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<tr>
<td>LDGT</td>
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<td>0.00095</td>
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<td>00.0249</td>
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<td>0.0165</td>
<td>0.0640</td>
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<td>00.0432</td>
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<td>00.0447</td>
<td>00.0295</td>
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<td>00.0068</td>
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<td>00.6140</td>
<td>00.0533</td>
<td>00.0375</td>
<td>NA</td>
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<tr>
<td>HDDV</td>
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<td>00.0970</td>
<td>00.0707</td>
<td>NA</td>
<td>00.0270</td>
</tr>
<tr>
<td>MC</td>
<td>02.6100</td>
<td>00.0033</td>
<td>01.1700</td>
<td>14.7900</td>
<td>00.0372</td>
<td>00.0207</td>
<td>NA</td>
<td>00.0113</td>
</tr>
</tbody>
</table>
3.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
  \[ V_{MT_{WT}} = \frac{(1 \times WT \times PA)}{800} \]
  
  \( V_{MT_{WT}} \): Worker Trips Vehicle Miles Travel (miles)
  \( 1 \): Conversion Factor man days to trips (1 trip / 1 man * day)
  \( WT \): Average Worker Round Trip Commute (mile)
  \( PA \): Paint Area (ft\(^2\))
  \( 800 \): Conversion Factor square feet to man days (1 ft\(^2\) / 1 man * day)

  \[ V_{POL} = \frac{(V_{MT_{WT}} \times 0.002205 \times EF_{POL} \times VM)}{2000} \]
  
  \( V_{POL} \): Vehicle Emissions (TONs)
  \( V_{MT_{WT}} \): Worker Trips Vehicle Miles Travel (miles)
  \( 0.002205 \): Conversion Factor grams to pounds
  \( EF_{POL} \): Emission Factor for Pollutant (grams/mile)
  \( VM \): Worker Trips On Road Vehicle Mixture (%) 
  \( 2000 \): Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
  \[ VOC_{AC} = \frac{(AB \times 2.0 \times 0.0116)}{2000.0} \]
  
  \( VOC_{AC} \): Architectural Coating VOC Emissions (TONs)
  \( AB \): Area of Building (ft\(^2\))
  \( 2.0 \): Conversion Factor total area to coated area (2.0 ft\(^2\) coated area / total area)
  \( 0.0116 \): Emission Factor (lb/ft\(^2\))
  \( 2000 \): Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location
  County: Comanche
  Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Concrete Pad

- Activity Description:
  Construction of a 100' x 100' concrete pad.

- Activity Start Date
  Start Month: 7
  Start Year: 2015

- Activity End Date
  Indefinite: False
  End Month: 12
  End Year: 2015
- Activity Emissions:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
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<tr>
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<td>Pb</td>
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<tr>
<td>NO$_x$</td>
<td>2.236124</td>
<td>NH$_3$</td>
<td>0.004353</td>
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<tr>
<td>CO</td>
<td>1.807400</td>
<td>PM$_{10}$</td>
<td>0.115639</td>
</tr>
</tbody>
</table>

4.2 Building Construction Phase

4.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
  - Start Month: 7
  - Start Quarter: 3
  - Start Year: 2015

- Phase Duration
  - Number of Month: 6
  - Number of Days: 0

4.2.2 Building Construction Phase Assumptions

- General Building Construction Information
  - Building Category: Office or Industrial
  - Area of Building (ft$^2$): 10000
  - Height of Building (ft): 2
  - Number of Units: N/A

- Building Construction Default Settings
  - Default Settings Used: Yes
  - Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Number Of Equipment</th>
<th>Hours Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranes Composite</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Forklifts Composite</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Tractors / Loaders / Backhoes Composite</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

- Vehicle Exhaust
  - Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

<table>
<thead>
<tr>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
</tr>
</tbody>
</table>

- Worker Trips
  - Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
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<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
- Vendor Trips
  Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th>POVs</th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
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</table>

4.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

<table>
<thead>
<tr>
<th>Cranes Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
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<tbody>
<tr>
<td>Emission Factors</td>
<td>0.1203</td>
<td>0.0013</td>
<td>1.0199</td>
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<td>0.0425</td>
<td>0.0425</td>
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<table>
<thead>
<tr>
<th>Forklifts Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.0458</td>
<td>0.0006</td>
<td>0.3163</td>
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<td>54.395</td>
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</table>

<table>
<thead>
<tr>
<th>Tractors / Loaders / Backhoes Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
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<tbody>
<tr>
<td>Emission Factors</td>
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<td>0.0297</td>
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</tbody>
</table>

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>Pb</th>
<th>NH₃</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDGV</td>
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<td>0.3740</td>
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<td>0.5880</td>
<td>0.9800</td>
<td>0.00249</td>
<td>0.00113</td>
<td>NA</td>
<td>0.001017</td>
<td>0.005162</td>
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<tr>
<td>HDGV</td>
<td>0.0762</td>
<td>0.0165</td>
<td>0.10640</td>
<td>0.84000</td>
<td>0.00432</td>
<td>0.00275</td>
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<td>LDDV</td>
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<td>0.13700</td>
<td>0.7480</td>
<td>0.00447</td>
<td>0.00295</td>
<td>NA</td>
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<td>LDDT</td>
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<td>0.00707</td>
<td>NA</td>
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<td>0.012434</td>
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</table>

4.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

\[
CEE_{POL} = \frac{(NE \times WD \times H \times EF_{POL})}{2000}
\]

Where:
- \(CEE_{POL}\): Construction Exhaust Emissions (TONs)
- \(NE\): Number of Equipment
- \(WD\): Number of Total Work Days (days)
- \(H\): Hours Worked per Day (hours)
- \(EF_{POL}\): Emission Factor for Pollutant (lb/hour)
- 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

\[
VMT_{VE} = BA \times BH \times (0.42 / 1000) \times HT
\]

Where:
- \(VMT_{VE}\): Vehicle Exhaust Vehicle Miles Travel (miles)
- \(BA\): Area of Building (ft²)
- \(BH\): Height of Building (ft)
- \((0.42 / 1000)\): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
- \(HT\): Average Hauling Truck Round Trip Commute (mile/trip)
Environmental Assessment for Demonstrations of Various Electric Fires and Loitering Aerial Munition Systems at Fort Sill, Oklahoma

\[ V_{POL} = \frac{(VMT_{VE} * 0.002205 * EF_{POL} * VM)}{2000} \]

- **VMT_{VE}**: Vehicle Emissions (TONs)
- **VMT_{VE}**: Vehicle Exhaust Vehicle Miles Travel (miles)
- **0.002205**: Conversion Factor grams to pounds
- **EF_{POL}**: Emission Factor for Pollutant (grams/mile)
- **VM**: Worker Trips On Road Vehicle Mixture (%)
- **2000**: Conversion Factor pounds to tons

**Worker Trips Emissions per Phase**

\[ VMT_{WT} = WD * WT * 1.25 * NE \]

- **VMT_{WT}**: Worker Trips Vehicle Miles Travel (miles)
- **WD**: Number of Total Work Days (days)
- **WT**: Average Worker Round Trip Commute (mile)
- **1.25**: Conversion Factor Number of Construction Equipment to Number of Works
- **NE**: Number of Construction Equipment

\[ V_{POL} = \frac{(VMT_{WT} * 0.002205 * EF_{POL} * VM)}{2000} \]

- **V_{POL}**: Vehicle Emissions (TONs)
- **VMT_{WT}**: Worker Trips Vehicle Miles Travel (miles)
- **0.002205**: Conversion Factor grams to pounds
- **EF_{POL}**: Emission Factor for Pollutant (grams/mile)
- **VM**: Worker Trips On Road Vehicle Mixture (%)
- **2000**: Conversion Factor pounds to tons

**Vendor Trips Emissions per Phase**

\[ VMT_{VT} = BA * BH * (0.38 / 1000) * HT \]

- **VMT_{VT}**: Vendor Trips Vehicle Miles Travel (miles)
- **BA**: Area of Building (ft\(^2\))
- **BH**: Height of Building (ft)
- **(0.38 / 1000)**: Conversion Factor ft\(^3\) to trips (0.38 trip / 1000 ft\(^3\))
- **HT**: Average Hauling Truck Round Trip Commute (mile/trip)

\[ V_{POL} = \frac{(VMT_{VT} * 0.002205 * EF_{POL} * VM)}{2000} \]

- **V_{POL}**: Vehicle Emissions (TONs)
- **VMT_{VT}**: Vendor Trips Vehicle Miles Travel (miles)
- **0.002205**: Conversion Factor grams to pounds
- **EF_{POL}**: Emission Factor for Pollutant (grams/mile)
- **VM**: Worker Trips On Road Vehicle Mixture (%)
- **2000**: Conversion Factor pounds to tons

5. **Construction / Demolition**

5.1 **General Information & Timeline Assumptions**

- **Activity Location**
  - **County**: Comanche
  - **Regulatory Area(s)**: NOT IN A REGULATORY AREA

- **Activity Title**: Utility lines
- **Activity Description:**
  Conversion of 1,500 feet of utility lines

- **Activity Start Date**
  - Start Month: 4
  - Start Year: 2015

- **Activity End Date**
  - Indefinite: False
  - End Month: 6
  - End Year: 2015

- **Activity Emissions:**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>0.111116</td>
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<tr>
<td>NOₓ</td>
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</tr>
<tr>
<td>CO</td>
<td>0.554096</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>0.233144</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM₂.₅</td>
<td>0.039423</td>
</tr>
<tr>
<td>Pb</td>
<td>0.000000</td>
</tr>
<tr>
<td>NH₃</td>
<td>0.000721</td>
</tr>
</tbody>
</table>

5.2 Trenching / Excavating Phase

5.2.1 Trenching / Excavating Phase Timeline Assumptions

- **Phase Start Date**
  - Start Month: 4
  - Start Quarter: 2
  - Start Year: 2015

- **Phase Duration**
  - Number of Month: 3
  - Number of Days: 0

5.2.2 Trenching / Excavating Phase Assumptions

- **General Trenching / Excavating Information**
  - Area of Site to be Trenched / Excavated (ft²): 6560
  - Amount of Material to be Hauled On-Site (yd³): 0
  - Amount of Material to be Hauled Off-Site (yd³): 0

- **Trenching Default Settings**
  - Default Settings Used: Yes
  - Average Day(s) worked per week: 5 (default)

- **Construction Exhaust (default)**

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Number Of Equipment</th>
<th>Hours Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavators Composite</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Other General Industrial Equipmen Composite</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Tractors / Loaders / Backhoes Composite</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

- **Vehicle Exhaust**
  - Average Hauling Truck Capacity (yd³): 20 (default)
  - Average Hauling Truck Round Trip Commute (mile): 20 (default)
- **Vehicle Exhaust Vehicle Mixture (%)**

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>POVs</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Worker Trips**

  Average Worker Round Trip Commute (mile): 20 (default)

- **Worker Trips Vehicle Mixture (%)**

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>POVs</td>
<td>50.00</td>
<td>50.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

5.2.3 **Trenching / Excavating Phase Emission Factor(s)**

- **Construction Exhaust Emission Factors (lb/hour) (default)**

- **Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

<table>
<thead>
<tr>
<th></th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>Pb</th>
<th>NH₃</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDGV</td>
<td>0.0067</td>
<td>0.00066</td>
<td>0.04460</td>
<td>0.85000</td>
<td>0.00248</td>
<td>0.00113</td>
<td>NA</td>
<td>0.01017</td>
<td>0.03168</td>
</tr>
<tr>
<td>LDGT</td>
<td>0.00838</td>
<td>0.00095</td>
<td>0.06830</td>
<td>1.54000</td>
<td>0.00249</td>
<td>0.00114</td>
<td>NA</td>
<td>0.01017</td>
<td>0.03181</td>
</tr>
<tr>
<td>HDGV</td>
<td>0.00960</td>
<td>0.00165</td>
<td>0.14500</td>
<td>0.87000</td>
<td>0.00485</td>
<td>0.00321</td>
<td>NA</td>
<td>0.00451</td>
<td>0.00905</td>
</tr>
<tr>
<td>LDDV</td>
<td>0.01320</td>
<td>0.00029</td>
<td>0.02000</td>
<td>0.80800</td>
<td>0.00532</td>
<td>0.00374</td>
<td>NA</td>
<td>0.00068</td>
<td>0.00314</td>
</tr>
<tr>
<td>LDDT</td>
<td>0.03870</td>
<td>0.00056</td>
<td>0.46000</td>
<td>0.65700</td>
<td>0.00601</td>
<td>0.00438</td>
<td>NA</td>
<td>0.00068</td>
<td>0.00599</td>
</tr>
<tr>
<td>HDDV</td>
<td>0.03430</td>
<td>0.00116</td>
<td>0.32960</td>
<td>0.94100</td>
<td>0.1285</td>
<td>0.0996</td>
<td>NA</td>
<td>0.00270</td>
<td>0.01245</td>
</tr>
<tr>
<td>MC</td>
<td>0.26100</td>
<td>0.00033</td>
<td>0.17600</td>
<td>1.47900</td>
<td>0.00372</td>
<td>0.00207</td>
<td>NA</td>
<td>0.00113</td>
<td>0.00177</td>
</tr>
</tbody>
</table>

5.2.4 **Trenching / Excavating Phase Formula(s)**

- **Fugitive Dust Emissions per Phase**

  \[ \text{PM}_{10FD} = \left( 20 \times \text{ACRE} \times \text{WD} \right) / 2000 \]

  \( \text{PM}_{10FD} \): Fugitive Dust PM 10 Emissions (TONs)

  20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

  ACRE: Total acres (acres)

  WD: Number of Total Work Days (days)

  2000: Conversion Factor pounds to tons

- **Construction Exhaust Emissions per Phase**

  \[ \text{CEE}_{POL} = \left( \text{NE} \times \text{WD} \times \text{H} \times \text{EF}_{POL} \right) / 2000 \]

  \( \text{CEE}_{POL} \): Construction Exhaust Emissions (TONs)

  NE: Number of Equipment

  WD: Number of Total Work Days (days)

  H: Hours Worked per Day (hours)

  EF_{POL}: Emission Factor for Pollutant (lb/hour)

  2000: Conversion Factor pounds to tons

- **Vehicle Exhaust Emissions per Phase**

  \[ \text{VMT}_{VE} = \left( \text{HA}_{\text{OnSite}} + \text{HA}_{\text{OffSite}} \right) \times \left( 1 / \text{HC} \right) \times \text{HT} \]

  \( \text{VMT}_{VE} \): Vehicle Exhaust Vehicle Miles Travel (miles)

  \( \text{HA}_{\text{OnSite}} \): Amount of Material to be Hauled On-Site (yd³)

  \( \text{HA}_{\text{OffSite}} \): Amount of Material to be Hauled Off-Site (yd³)

  HC: Average Hauling Truck Capacity (yd³)

  (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

  HT: Average Hauling Truck Round Trip Commute (mile/trip)
\[ V_{\text{POL}} = \frac{(VMT_{VE} \times 0.002205 \times EF_{\text{POL}} \times VM)}{2000} \]

- **Vehicle Emissions (TONs)**
- **Vehicle Exhaust Vehicle Miles Travel (miles)**
- **Conversion Factor grams to pounds**
- **Emission Factor for Pollutant (grams/mile)**
- **Vehicle Exhaust On Road Vehicle Mixture (%)**
- **Conversion Factor pounds to tons**

### 6. Construction / Demolition

#### 6.1 General Information & Timeline Assumptions

- **Activity Location**
  - County: Comanche
  - Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title**: Parking Area

- **Activity Description**: Construct a 100' x 100' gravel parking area. Estimate 200 cubic yards of gravel at 3,000 lbs/yd³

- **Activity Start Date**
  - Start Month: 7
  - Start Year: 2015

- **Activity End Date**
  - Indefinite: False
  - End Month: 9
  - End Year: 2015

- **Activity Emissions**:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>0.116385</td>
</tr>
<tr>
<td>SO₂</td>
<td>0.001259</td>
</tr>
<tr>
<td>NOₓ</td>
<td>0.889344</td>
</tr>
<tr>
<td>CO</td>
<td>0.556991</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>0.336034</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM₂.₅</td>
<td>0.040772</td>
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<tr>
<td>Pb</td>
<td>0.000000</td>
</tr>
<tr>
<td>NH₃</td>
<td>0.000727</td>
</tr>
</tbody>
</table>
6.2 Site Grading Phase

6.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
  
  Start Month: 7  
  Start Quarter: 3  
  Start Year: 2015

- Phase Duration
  
  Number of Month: 3  
  Number of Days: 0

6.2.2 Site Grading Phase Assumptions

- General Site Grading Information
  
  Area of Site to be Graded (ft\(^2\)): 10000  
  Amount of Material to be Hauled On-Site (yd\(^3\)): 200  
  Amount of Material to be Hauled Off-Site (yd\(^3\)): 0

- Site Grading Default Settings
  
  Default Settings Used: Yes  
  Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Number Of Equipment</th>
<th>Hours Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graders Composite</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Other Construction Equipment Composite</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Rubber Tired Dozers Composite</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Tractors / Loaders / Backhoes Composite</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

- Vehicle Exhaust
  
  Average Hauling Truck Capacity (yd\(^3\)): 20 (default)  
  Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>POVs</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
</tr>
</tbody>
</table>

- Worker Trips
  
  Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
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<tbody>
<tr>
<td>POVs</td>
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<td>50.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
6.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

<table>
<thead>
<tr>
<th>Graders Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
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</thead>
<tbody>
<tr>
<td>Emission Factors</td>
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<td>0.1277</td>
<td>0.0014</td>
<td>0.9794</td>
<td>0.5930</td>
<td>0.0488</td>
<td>0.0488</td>
<td>0.0115</td>
<td>132.74</td>
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<table>
<thead>
<tr>
<th>Other Construction Equipment Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td></td>
<td>0.0768</td>
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<td>0.0488</td>
<td>0.0488</td>
<td>0.0069</td>
<td>122.59</td>
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</table>

<table>
<thead>
<tr>
<th>Rubber Tired Dozers Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
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<td>0.2721</td>
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<td>0.0924</td>
<td>0.0245</td>
<td>239.09</td>
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</table>

<table>
<thead>
<tr>
<th>Tractors / Loaders / Backhoes Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
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</thead>
<tbody>
<tr>
<td>Emission Factors</td>
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<td>66.799</td>
</tr>
</tbody>
</table>

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>Pb</th>
<th>NH₃</th>
<th>CO₂</th>
</tr>
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<tbody>
<tr>
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<td>0.03740</td>
<td>0.083200</td>
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<td>NA</td>
<td>0.01017</td>
<td>0.003680</td>
</tr>
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<td>LDGT</td>
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<td>0.00095</td>
<td>0.05880</td>
<td>0.098000</td>
<td>0.00249</td>
<td>0.0113</td>
<td>NA</td>
<td>0.01017</td>
<td>0.005162</td>
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<tr>
<td>HDGV</td>
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<td>0.00165</td>
<td>0.06060</td>
<td>0.084000</td>
<td>0.00432</td>
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<td>0.005986</td>
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<td>0.072400</td>
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<td>0.0707</td>
<td>NA</td>
<td>0.00270</td>
<td>0.012434</td>
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<tr>
<td>MC</td>
<td>0.26100</td>
<td>0.00033</td>
<td>0.11700</td>
<td>0.147900</td>
<td>0.00372</td>
<td>0.0207</td>
<td>NA</td>
<td>0.00113</td>
<td>0.001774</td>
</tr>
</tbody>
</table>

6.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

\[ \text{PM}_{10,\text{FD}} = \left( 20 \times \text{ACRE} \times \text{WD} \right) / 2000 \]

\( \text{PM}_{10,\text{FD}} \): Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

\[ \text{CEE}_{\text{POL}} = \left( \text{NE} \times \text{WD} \times \text{H} \times \text{EF}_{\text{POL}} \right) / 2000 \]

\( \text{CEE}_{\text{POL}} \): Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

\[ \text{VMT}_{\text{VE}} = \left( \text{HA}_{\text{OnSite}} + \text{HA}_{\text{OffSite}} \right) \times \left( 1 / \text{HC} \right) \times \text{HT} \]

\( \text{VMT}_{\text{VE}} \): Vehicle Exhaust Vehicle Miles Travel (miles)
\( \text{HA}_{\text{OnSite}} \): Amount of Material to be Hauled On-Site (yd³)
\( \text{HA}_{\text{OffSite}} \): Amount of Material to be Hauled Off-Site (yd³)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)
V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location
  County: Comanche
  Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Earth Work

- Activity Description:
  Estimate an area approximately 9,000 square feet to remove and flatten existing berms.

- Activity Start Date
  Start Month: 7
  Start Year: 2015

- Activity End Date
  Indefinite: False
  End Month: 9
  End Year: 2015

- Activity Emissions:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Total Emissions (TONs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>0.116351</td>
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<td>CO</td>
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<td>Pb</td>
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<tr>
<td>NH\textsubscript{3}</td>
<td>0.000724</td>
</tr>
</tbody>
</table>
7.2 Site Grading Phase

7.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
  - Start Month: 7
  - Start Quarter: 3
  - Start Year: 2015

- Phase Duration
  - Number of Month: 3
  - Number of Days: 0

7.2.2 Site Grading Phase Assumptions

- General Site Grading Information
  - Area of Site to be Graded (ft$^2$): 9000
  - Amount of Material to be Hauled On-Site (yd$^3$): 0
  - Amount of Material to be Hauled Off-Site (yd$^3$): 100

- Site Grading Default Settings
  - Default Settings Used: Yes
  - Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Number Of Equipment</th>
<th>Hours Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graders Composite</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Other Construction Equipment Composite</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Rubber Tired Dozers Composite</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Tractors / Loaders / Backhoes Composite</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

- Vehicle Exhaust
  - Average Hauling Truck Capacity (yd$^3$): 20 (default)
  - Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>POVs</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
</tr>
</tbody>
</table>

- Worker Trips
  - Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

<table>
<thead>
<tr>
<th></th>
<th>LDGV</th>
<th>LDGT</th>
<th>HDGV</th>
<th>LDDV</th>
<th>LDDT</th>
<th>HDDV</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>POVs</td>
<td>50.00</td>
<td>50.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
7.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

<table>
<thead>
<tr>
<th>Graders Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.1277</td>
<td>0.0014</td>
<td>0.9794</td>
<td>0.5930</td>
<td>0.0488</td>
<td>0.0488</td>
<td>0.0115</td>
<td>132.74</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Construction Equipment Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.0768</td>
<td>0.0012</td>
<td>0.6391</td>
<td>0.3645</td>
<td>0.0263</td>
<td>0.0263</td>
<td>0.0069</td>
<td>122.59</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rubber Tired Dozers Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.2721</td>
<td>0.0024</td>
<td>2.2344</td>
<td>1.0419</td>
<td>0.0924</td>
<td>0.0924</td>
<td>0.0245</td>
<td>239.09</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tractors / Loaders / Backhoes Composite</th>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>CH₄</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factors</td>
<td>0.0666</td>
<td>0.0007</td>
<td>0.4500</td>
<td>0.3715</td>
<td>0.0297</td>
<td>0.0297</td>
<td>0.0060</td>
<td>66.799</td>
<td></td>
</tr>
</tbody>
</table>

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>Pb</th>
<th>NH₃</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDGV</td>
<td>0.005190</td>
<td>0.00068</td>
<td>0.03740</td>
<td>0.08320</td>
<td>0.00248</td>
<td>0.00113</td>
<td>NA</td>
<td>0.01017</td>
<td>0.003680</td>
</tr>
<tr>
<td>LDGT</td>
<td>0.007450</td>
<td>0.00095</td>
<td>0.05880</td>
<td>0.09800</td>
<td>0.00249</td>
<td>0.00113</td>
<td>NA</td>
<td>0.01017</td>
<td>0.005162</td>
</tr>
<tr>
<td>HDGV</td>
<td>0.007620</td>
<td>0.00165</td>
<td>0.06040</td>
<td>0.08400</td>
<td>0.00432</td>
<td>0.00275</td>
<td>NA</td>
<td>0.01451</td>
<td>0.009048</td>
</tr>
<tr>
<td>LDDV</td>
<td>0.01110</td>
<td>0.00029</td>
<td>0.01370</td>
<td>0.07480</td>
<td>0.00447</td>
<td>0.00295</td>
<td>NA</td>
<td>0.0068</td>
<td>0.003141</td>
</tr>
<tr>
<td>LDDT</td>
<td>0.003450</td>
<td>0.00056</td>
<td>0.03830</td>
<td>0.06140</td>
<td>0.00533</td>
<td>0.00375</td>
<td>NA</td>
<td>0.0068</td>
<td>0.005986</td>
</tr>
<tr>
<td>HDDV</td>
<td>0.003090</td>
<td>0.00116</td>
<td>0.02450</td>
<td>0.07240</td>
<td>0.00970</td>
<td>0.00707</td>
<td>NA</td>
<td>0.00270</td>
<td>0.012434</td>
</tr>
<tr>
<td>MC</td>
<td>0.026100</td>
<td>0.00033</td>
<td>0.11700</td>
<td>14.7900</td>
<td>0.00372</td>
<td>0.0207</td>
<td>NA</td>
<td>0.0113</td>
<td>0.001774</td>
</tr>
</tbody>
</table>

7.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

\[
PM_{10\text{FD}} = \frac{(20 \times \text{ACRE} \times \text{WD})}{2000}
\]

- Construction Exhaust Emissions per Phase

\[
\text{CEE}_{\text{POL}} = \frac{(\text{NE} \times \text{WD} \times \text{H} \times \text{EF}_{\text{POL}})}{2000}
\]

- Vehicle Exhaust Emissions per Phase

\[
\text{VMT}_{\text{VE}} = \frac{(\text{HA}_{\text{OnSite}} + \text{HA}_{\text{OffSite}}) \times (1 / \text{HC}) \times \text{HT}}{2000}
\]
V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Vehicle Emissions

Vehicle emissions were calculated for 6 HMMVs (Heavy Duty Gas Vehicle [HDGV]), 12 LMTVs / Strykers (Heavy Duty Diesel Vehicle [HDDV]), 6 General trucks (Light Duty Gas Truck [LDGT]), and 10 UTVs (Motorcycles [MC]). The table below provides the emission factors used to calculate annual emissions. Each was presumed to operate 16 hours per day for 232 days annually at an average speed of 15 miles per hour.

- Emission Factors (grams/mile)

<table>
<thead>
<tr>
<th></th>
<th>VOC</th>
<th>SO_x</th>
<th>NO_x</th>
<th>CO</th>
<th>PM_{10}</th>
<th>PM_{2.5}</th>
<th>CO_2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDGT</td>
<td>0.731</td>
<td>0.0095</td>
<td>0.574</td>
<td>8.96</td>
<td>0.0249</td>
<td>0.0113</td>
<td>516.2</td>
</tr>
<tr>
<td>HDGV</td>
<td>0.764</td>
<td>0.0165</td>
<td>1.056</td>
<td>8.17</td>
<td>0.0432</td>
<td>0.0275</td>
<td>904.8</td>
</tr>
<tr>
<td>HDDV</td>
<td>0.309</td>
<td>0.0116</td>
<td>2.452</td>
<td>0.724</td>
<td>0.097</td>
<td>0.0707</td>
<td>1,243.4</td>
</tr>
<tr>
<td>MC</td>
<td>2.39</td>
<td>0.0033</td>
<td>1.15</td>
<td>14.25</td>
<td>0.372</td>
<td>0.207</td>
<td>177.4</td>
</tr>
</tbody>
</table>

CO = carbon monoxide; NO_x = nitrogen dioxide; NO_y = nitrogen oxides; VOC = volatile organic compound; Pb = lead; PM_{10} = particulate matter with a diameter less than or equal to 2.5 microns; PM_{2.5} = particulate matter with a diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; HDGV = Heavy Duty Gas Vehicle, HDDV = Heavy Duty Diesel Vehicle, LDGT = Light Duty Gas Truck, MC = Motorcycles

The table below provides the calculated annual emissions for each vehicle type and the annual total emissions.

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>VOC (g)</th>
<th>SO_x (g)</th>
<th>NO_x (g)</th>
<th>CO (g)</th>
<th>PM_{10} (g)</th>
<th>PM_{2.5} (g)</th>
<th>CO_2 (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen Truck</td>
<td>8,421.12</td>
<td>109.44</td>
<td>6,612.48</td>
<td>103,219.2</td>
<td>286.85</td>
<td>130.18</td>
<td>5,946,624.00</td>
</tr>
<tr>
<td>HMMWV</td>
<td>8,801.28</td>
<td>190.08</td>
<td>12,165.12</td>
<td>94,118.40</td>
<td>497.66</td>
<td>316.80</td>
<td>10,423,296.00</td>
</tr>
<tr>
<td>LMTVs / Strykers</td>
<td>3,559.68</td>
<td>133.63</td>
<td>28,247.04</td>
<td>8,340.48</td>
<td>1,117.44</td>
<td>814.46</td>
<td>14,323,968.00</td>
</tr>
<tr>
<td>UTVs</td>
<td>26,878.50</td>
<td>37.13</td>
<td>12,937.50</td>
<td>160,312.5</td>
<td>418.50</td>
<td>232.88</td>
<td>1,995,750.00</td>
</tr>
<tr>
<td>Total (g)</td>
<td>47,669.58</td>
<td>470.28</td>
<td>59,962.14</td>
<td>365,990.5</td>
<td>2,320.45</td>
<td>1,494.32</td>
<td>32,689,638.00</td>
</tr>
<tr>
<td>Total (lbs)</td>
<td>105.09</td>
<td>1.04</td>
<td>132.19</td>
<td>806.87</td>
<td>5.12</td>
<td>3.29</td>
<td>72,068.23</td>
</tr>
<tr>
<td>Total (tons)</td>
<td>0.05</td>
<td>0.00</td>
<td>0.07</td>
<td>0.40</td>
<td>0.00</td>
<td>0.00</td>
<td>36.03</td>
</tr>
</tbody>
</table>

CO = carbon monoxide; NO_x = nitrogen dioxide; NO_y = nitrogen oxides; VOC = volatile organic compound; Pb = lead; PM_{10} = particulate matter with a diameter less than or equal to 2.5 microns; PM_{2.5} = particulate matter with a diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; HDGV = Heavy Duty Gas Vehicle, HDDV = Heavy Duty Diesel Vehicle, LDGT = Light Duty Gas Truck, MC = Motorcycles
Generator Emissions

Generator emissions were calculated for nine 2MW diesel generators, one each for powering EM Launch, Combustion Light Gas Gun, Electrothermal-Chemical, Acoustic, High Power Microwave, Radio Frequency, Laser, Particle Beam, and Laser Induced Plasma Channel systems. Emission factors were obtained from the USEPA’s AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines. The table below provides the emission factors used to calculate annual emissions. Each was presumed to operate during six events annually of 12 days per event and 8 hours per day.

- Emission Factors (lbs/hp-hr)

<table>
<thead>
<tr>
<th></th>
<th>VOC</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂,₅</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI Emissions</td>
<td>0.000705</td>
<td>0.00809</td>
<td>0.024</td>
<td>0.0055</td>
<td>0.0007</td>
<td>0.0007</td>
<td>1.16</td>
</tr>
</tbody>
</table>

CO = carbon monoxide; NOₓ = nitrogen oxides; VOC = volatile organic compound; Pb = lead; PM₁₀ = particulate matter with a diameter less than or equal to 10 microns; PM₂,₅ = particulate matter with a diameter less than or equal to 2.5 microns; SO₂ = sulfur dioxide

The table below provides the calculated annual total emissions for operation of generators.

- Emissions (tons/year)

<table>
<thead>
<tr>
<th></th>
<th>CO</th>
<th>NOₓ</th>
<th>PM₁₀</th>
<th>PM₂,₅</th>
<th>SOₓ</th>
<th>VOCₚ</th>
<th>CO₂ₑ</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI Emissions</td>
<td>45,118</td>
<td>6,718</td>
<td>29,163</td>
<td>5,989</td>
<td>385</td>
<td>23,151</td>
<td>1,182,212</td>
</tr>
<tr>
<td>Generator emissions</td>
<td>4.25</td>
<td>18.54</td>
<td>0.54</td>
<td>0.00</td>
<td>0.31</td>
<td>0.54</td>
<td>910</td>
</tr>
</tbody>
</table>

CO = carbon monoxide; CO₂ₑ = carbon dioxide equivalents; NOₓ = nitrogen oxides; PM₁₀ and PM₂,₅ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SOₓ = sulfur oxides; VOC = volatile organic compound
Appendix B
R-5602A and R-5602B Description
Proposed R-5602A Fort Sill, OK [New]

Boundaries:

Beginning at lat. 34°46’06"N., long. 98°17’01"W.;
to lat. 34°38’15"N., long. 98°17’01"W.;
to lat. 34°38’15"N., long. 98°37’57"W.;
to lat. 34°40’54"N., long. 98°37’54"W.;
to lat. 34°42’07"N., long. 98°37’20"W.;
to lat. 34°43’21"N., long. 98°36’02"W.;
to lat. 34°43’30"N., long. 98°35’40"W.;
to lat. 34°45’03"N., long. 98°29’46"W.;
to lat. 34°46’15"N., long. 98°25’01"W.;
to lat. 34°47’00"N., long. 98°17’46"W.;
to the point of beginning.

Designated altitudes: 40,000 feet MSL to 60,000 feet MSL;

Time of designation: Activated by NOTAM;

Expected usage (actual): 8.0 hours per day; 200 days per year;

Expected times of use (typical): Primary: 0830-1630L; Monday –Friday, Other times by NOTAM;

Controlling agency: FAA, Fort Worth (ZFW) Air Route Traffic Control Center (ARTCC)

Using agency: Commanding General, U.S. Army Fires Center of Excellence, Fort Sill, OK.

Proposed R-5602B Fort Sill, OK [New]

Boundaries:

Beginning at lat. 34°49’30"N., long. 98°08’43"W.;
to lat. 34°36’36"N., long. 98°08’43"W.;
to lat. 34°38’15"N., long. 98°17’01"W.;
to lat. 34°46’06"N., long. 98°17’01"W.;
to the point of beginning.

Designated altitudes: 40,000 feet MSL to 60,000 feet MSL;

Time of designation: Activated by NOTAM;

Expected usage (actual): 8.0 hours per day; 25 days per year;

Expected times of use (typical): Primary: 0830-1630L; Monday –Friday, Other times by NOTAM;

Controlling agency: FAA, Fort Worth (ZFW) Air Route Traffic Control Center (ARTCC)

Using agency: Commanding General, U.S. Army Fires Center of Excellence, Fort Sill, OK.
Appendix C
Cooperating Agency Letter
MEMORANDUM FOR AJV-11, Airspace Policy Group (Attention: Leslie Swann, Acting Manager), 800 Independence Ave, SW #423, Washington D.C. 20591

SUBJECT: Cooperating Agency Request for Fort Sill Supplemental Environmental Assessment

1. Fort Sill requests FAA formal participation as a cooperating agency in a supplemental environmental assessment (SEA) addressing proposed changes to Fort Sill’s training airspace. This request is made IAW guidance presented in the President’s Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR 1501.6, Cooperating Agencies and the 2005 Memorandum of Understanding between the FAA and the Department of Defense concerning Special Use Airspace Environmental Actions.

2. This airspace training initiative proposes additional Restricted Airspace near Fort Sill, Oklahoma. The proposal is to establish R5602A and R5602B. As a cooperating agency, Fort Sill specifically requests your participation in various portions of the SEA development as required, including (1) participating in the coordination process, (2) assuming responsibility, upon Fort Sill’s request, for developing information and preparing analyses on issues for which you have special expertise, and (3) making staff support available to enhance interdisciplinary review capability.

3. We respectfully ask that you respond in writing to this request and look forward to working closely with the FAA Central Region to produce an environmental analysis that meets the needs of both organizations. Our staff point of contact is Ms. Sarah Sminkey, NEPA Coordinator, (580) 442-2849, sarah.e.sminkey.civ@mail.mil.

CURTIS.SAMUEL.WA
LTHER.1127459475

SAMUEL W. CURTIS
Colonel, SF
Commanding
Appendix D
Public Involvement
DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 73


Proposed Establishment of Restricted Areas R–5602A and R–5602B; Fort Sill, OK

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This action proposes to establish two restricted areas, R–5602A and R–5602B, over a portion of the Fort Sill restricted area complex in support of an emerging kinetic and directed energy weapons training mission. The proposed R–5602A and R–5602B restricted areas would extend upward to 60,000 feet MSL and the proposed R–5602A before the specified closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRMs

An electronic copy of this document may be downloaded through the Internet at www.regulations.gov. Recently published rulemaking documents can also be accessed through the FAA’s Web page at http://www.faa.gov/air_traffic/publications/airspace_amendments/.

You may review the public docket containing the proposal, any comments received and any final disposition in person at the Dockets Office (see ADDRESSES section for address and phone number) between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. An informal docket may also be examined during normal business hours at the office of the Operations Support Group, Central Service Center, Federal Aviation Administration, 10101 Hillwood Blvd., Fort Worth, TX 76177.

Background

As the U.S. Army’s Center of Excellence for Fires, Fort Sill has submitted a proposal to the FAA to establish two restricted areas overlying a portion of the Fort Sill R–5601 restricted area complex, and extending slightly eastward, to support an emerging kinetic and directed energy weapons training mission. The designated altitudes of the proposed restricted areas would extend upward from 40,000 feet mean sea level (MSL) to 60,000 feet MSL.

Fort Sill has long been the U.S. Army’s schoolhouse for traditional field artillery training and it has now been tasked to field advanced technology weapons, and train soldiers in their use for both field artillery and air defense artillery missions. Railguns, hypervelocity projectiles, and lasers being introduced at Fort Sill represent a technological leap in capability, and require additional high altitude segregated airspace to contain the hazardous activities and protect non-participating air traffic from those hazardous activities.

The primary activities associated with the proposed R–5602A would include high trajectory surface-to-surface kinetic weapons employment using existing firing points and impact areas, with occasional laser fires passing through R–5601 complex restricted area airspace and the proposed R–5602A before entering the proposed R–5602B restricted area. The proposed R–5602B
would be established solely to contain directed energy laser fires intended to destroy adversary UAS. Target UAS would only operate in the lower R–5601 restricted areas since the proposed R–5602A and R–5602B restricted areas would not be approved for aviation activity. For directed energy laser fires that extend beyond the ceiling of the proposed R–5602B restricted area, Fort Sill would follow existing interagency procedures to ensure protection of both manned aircraft and space assets operating above 60,000 feet MSL.

To leverage advanced technology weapons capabilities for training soldiers in emerging field artillery and air defense artillery missions, Fort Sill requires additional restricted area airspace. Through extensive safety analysis, the U.S. Army has determined that the volume of restricted area airspace proposed in R–5602A and R–5602B is the minimum amount required to contain the planned hazardous activities and protect non-participant air traffic in the area.

Minimal aeronautical impact is anticipated since the proposed restricted areas would be located above a portion of the existing R–5601 complex, which extends from the surface to 40,000 feet MSL, and the designated altitudes of the proposed restricted areas would extend upward from 40,000 feet MSL to 60,000 feet MSL.

The Proposal

The FAA is proposing an amendment to 14 CFR part 73 to establish two new restricted areas, R–5602A and R–5602B, overlying a portion of the R–5601 complex located at Fort Sill, OK. The new restricted areas would support the U.S. Army fielding advanced technology weapons and training for emerging field artillery and air defense artillery missions. To effectively segregate non-participant air traffic from the hazardous activities associated with the use of the advanced technology weapons at Fort Sill, the proposed R–5602A and R–5602B restricted areas would extend upward from 40,000 feet MSL to 60,000 feet MSL and be activated by a Notice to Airman (NOTAM).

The proposed lateral boundaries for R–5602A would overlie and extend upward over the ceilings of the R–5601A, R–5601B, and a portion of R–5601F restricted areas. The proposed lateral boundaries for R–5602B would extend a shelf of restricted area airspace approximately 8 nautical miles (NM) east beyond the R–5601A and R–5601F eastern boundaries. Collectively, the proposed R–5602A and R–5602B restricted areas and the existing R–5601 complex would fully contain planned hazardous activities within restricted area airspace from the surface to 60,000 feet MSL. Existing interagency procedures would be followed to further segregate hazardous activities from manned aircraft and space assets operating above 60,000 feet MSL.

The proposed designated altitudes for the proposed R–5602A and R–5602B restricted areas would extend upward from 40,000 feet MSL to 60,000 feet MSL. The altitudes are defined relative to MSL to highlight that the proposed area would be used for other than aircraft operations. From an air traffic perspective, establishing the proposed restricted areas for other than aircraft operations reduces the radar separation requirements for circumnavigating the proposed restricted areas and contributes to minimizing impacts to aviation.

The proposed time of designation for the proposed R–5602A and R–5602B restricted areas would be, “By NOTAM 0830–1630, Monday–Friday; other times by NOTAM.” The expected usage for the proposed R–5602A would be approximately 8 hours per day on most weekdays, consistent with in-garrison syllabus training. However, the expected usage for the proposed R–5602B would be much lower to approximately 25 days per year. Due to the heavy dependency on favorable weather and unpredictability of seasonal weather patterns, NOTAM activation is considered an operational necessity for both proposed restricted areas.

Regulatory Notices and Analyses

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore: (1) Is not a “significant regulatory action” under Executive Order 12866; (2) is not a “significant rule” under Department of Transportation (DOT) Regulatory Polices and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this proposed rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

Environmental Review

This proposal will be subjected to an environmental analysis in accordance with FAA Order 1050.1F, “Environmental Impacts: Policies and Procedures,” prior to any FAA final regulatory action.

List of Subjects in 14 CFR Part 73

Airspace, Prohibited areas, Restricted areas.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 73 as follows:

PART 73—SPECIAL USE AIRSPACE

1. The authority citation for part 73 continues to read as follows:


§ 73.56 Oklahoma (Amended)

2. § 73.56 is amended as follows:

R–5602A Fort Sill, OK [New]

Boundaries. Beginning at lat. 34°46′45″ N., long. 98°17′01″ W.; to lat. 34°38′15″ N., long. 98°17′01″ W.; to lat. 34°38′15″ N., long. 98°37′57″ W.; to lat. 34°40′34″ N., long. 98°37′56″ W.; to lat. 34°42′07″ N., long. 98°37′20″ W.; to lat. 34°45′21″ N., long. 98°36′02″ W.; to lat. 34°45′30″ N., long. 98°35′40″ W.; to lat. 34°45′03″ N., long. 98°29′46″ W.; to lat. 34°46′15″ N., long. 98°25′01″ W.; to lat. 34°47′00″ N., long. 98°17′46″ W.; to the point of beginning.

Designated altitudes. 40,000 feet MSL to 60,000 feet MSL.

Time of designation. By NOTAM 0830–1630, Monday–Friday; other times by NOTAM.

Controlling agency. FAA, Fort Worth ARTCC.

Using agency. U.S. Army, Commanding General, U.S. Army Fires Center of Excellence (USAFCOE) and Fort Sill, Fort Sill, OK.

R–5602B Fort Sill, OK [New]

Boundaries. Beginning at lat. 34°49′30″ N., long. 98°08′43″ W.; to lat. 34°36′36″ N., long. 98°08′43″ W.; to lat. 34°38′15″ N., long. 98°17′01″ W.; to lat. 34°46′06″ N., long. 98°17′01″ W.; to the point of beginning.

Designated altitudes. 40,000 feet MSL to 60,000 feet MSL.

Time of designation. By NOTAM 0830–1630, Monday–Friday; other times by NOTAM.

Controlling agency. FAA, Fort Worth ARTCC.

Using agency. U.S. Army, Commanding General, U.S. Army Fires Center of Excellence (USAFCOE) and Fort Sill, Fort Sill, OK.
Issued in Washington, DC, on June 26, 2017.
Rodger A. Dean Jr.,
Manager, Airspace Policy Group.
[FR Doc. 2017–13990 Filed 6–30–17; 8:45 am]
BILLING CODE 4910–13–P

DEPARTMENT OF HOMELAND SECURITY

U.S. Customs and Border Protection
19 CFR Part 101

[Docket No. USCBP–2017–0017]

Extension of Port Limits of Savannah, GA


ACTION: Notice of proposed rulemaking.

SUMMARY: U.S. Customs and Border Protection (CBP) is proposing to extend the geographical limits of the port of entry of Savannah, Georgia. The proposed extension will make the boundaries more easily identifiable to the public and will allow for uniform and continuous service to the extended area of Savannah, Georgia. The proposed change is part of CBP’s continuing program to use its personnel, facilities, and resources more efficiently and to provide better service to carriers, importers, and the general public.

DATES: Comments must be received on or before September 1, 2017.

ADDRESSES: Please submit comments, identified by docket number, by one of the following methods:


Instructions: All submissions received must include the agency name and docket number for this rulemaking. All comments received will be posted without change to http://www.regulations.gov, including any personal information provided.

Docket: For access to the docket to read background documents or comments received, go to http://www.regulations.gov. Submitted comments may be inspected during regular business days between the hours of 8 a.m. and 4:20 p.m. at the Trade and Commercial Regulations Branch, Regulations and Rulings, Office of Trade, Customs and Border Protection, 90 K Street NE., 10th Floor, Washington, DC 20229–1177. Arrangements to inspect submitted comments should be made in advance by calling Mr. Joseph Clark at (202) 325–0118.

FOR FURTHER INFORMATION CONTACT: Roger Kaplan, Office of Field Operations, U.S. Customs and Border Protection, (202) 325–1543, or by email at Roger.Kaplan@dhs.gov.

SUPPLEMENTARY INFORMATION:

I. Public Participation

Interested persons are invited to participate in this rulemaking by submitting written data, views, or arguments on all aspects of the proposed rule. U.S. Customs and Border Protection (CBP) also invites comments that relate to the economic, environmental, or national security effects that might result from this proposed rule. Comments that provide the most assistance to CBP will reference a specific portion of the proposed rule, explain the reason for any recommended change, and include data, information, or authority that support such recommended change.

II. Background

As part of its continuing efforts to use CBP’s personnel, facilities, and resources more efficiently and to provide better service to carriers, importers, and the general public, CBP is proposing to extend the limits of the Savannah, Georgia port of entry. The CBP ports of entry are locations where CBP officers and employees are assigned to accept entries of merchandise, clear passengers, collect duties, and enforce the various provisions of customs, immigration, agriculture, and related U.S. laws at the border. The term “port of entry” is used in the Code of Federal Regulations (CFR) in title 19 for immigration purposes and in title 10 for customs purposes. For immigration purposes, Savannah, Georgia port of entry is classified as a Class A port in title 19 CFR 101.3(b)(1).

Savannah, Georgia was designated as a customs port of entry by the President’s message of March 2, 1913, concerning a reorganization of the U.S. Customs Service pursuant to the Act of August 24, 1912 (37 Stat. 334; 19 U.S.C. 1). Executive Order 8367, dated March 5, 1940, established specific geographical boundaries for the port of entry of Savannah, Georgia.

The current boundaries of the Savannah port of entry begin at the intersection of US Highway 17 and Little Back River on the line between South Carolina and Georgia; thence in a general southwesterly direction through the Little Back River, Back River, Savannah River and South Channel to the mouth of St. Augustine Creek, a distance of 11.6 miles; thence in a straight line in a southwesterly direction to the intersection of Moore Avenue and DeRenne Avenue, a distance of 5.8 miles; thence in a straight line in a westerly direction to the intersection of Middle Ground Road and DeRenne Avenue, a distance of 2.7 miles; thence in a straight line in a westerly direction to the intersection of Carrard Avenue and Ogeechee Road, a distance of 2.4 miles; thence in a straight line in a northwesterly direction to the intersection of Louisville Road and Bourne Avenue, a distance of 6.2 miles; thence in a straight line in a northwesterly direction to the intersection of Augusta Road and Augustine Creek, a distance of 4.8 miles; thence in a general easterly direction along Augustine Creek to the Savannah River, a distance of 2.4 miles; thence in a straight line in an easterly direction to the Chatham County line on Coastal Highway and Little Back River (the point of the beginning), a distance of 1.4 miles. CBP has included a map of the current port limits in the docket as “Attachment: Port of Entry of Savannah (blue lines).”

Travel modes, trade volume, and transportation infrastructure have expanded greatly since 1940. For example, much of Savannah Hilton Head International Airport is located beyond the current port limits, including the site of the proposed replacement Federal Inspection Service facility for arriving international travelers. Similarly, distribution centers and cold storage agricultural facilities that support the port are located outside existing port limits. As a result, the greater Savannah area’s trade and travel communities do not know with certainty if they will be able to receive CBP services if they build facilities on the region’s remaining undeveloped properties, almost all outside the boundaries of the port of entry.

To address these concerns regarding the geographic limits of the port, CBP is proposing to amend 19 CFR 101.3(b)(1) to extend the boundaries of the port of entry of Savannah, Georgia, to include the majority of Chatham County, Georgia, as well as a small portion of Jasper County, South Carolina. The
Comment from [Redacted]

The is a Comment on the Federal Aviation Administration (FAA) Proposed Rule: Restricted Areas: Establishments: R-5602A and R-5602B; Fort Sill, OK

For related information, Open Docket Folder.

Comment

As the years go by and the growth of new and advanced weapons jumps forward in leaps and bounds, the need for safe and secure areas to test these weapons is a necessity. Without these safe havens, the United States military would put millions of citizens in harms way before the weapons are even be implemented against our enemies. The government and rule makers try and find solutions to these problems and we have one of those right here. The proposition is to add two new restricted areas over the already implemented restricted area overlying Fort Sill to allow for the creation and testing of advanced weapons including the support for an emerging kinetic and directed energy weapons training mission. This is to allow for more space and a safety net around Fort Sill to keep non-participating aircraft away and safe.

Although this would indeed allow for more safety net, the way that it is proposed is not efficient in my personal opinion. I believe that adding onto the already existing restricted area and making two new ones named R-5602A and R-5602B is the incorrect way in my eyes. I feel that instead of having these restricted areas all topped onto each other, it would be easier for lawmakers and pilots if they were all combined into one restricted area. This would allow for all pilots, both participating and non-participating aircraft, to easier identify the area on sectional and other diagrams. It also seems more efficient in my eyes because all that is really happening is the restricted area is going to grow up and a little to the east.

I am not stating that the idea is completely flawed because I do in fact like the concept but feel that it could be carried out in a different manner than what is being proposed here.

https://www.federalregister.gov/documents/2017/07/03/2017-13990/proposed-establishment-of-restricted-areas-r-5602a-and-r-5602b-fort-sill-ok
Appendix E
Agency Correspondence
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SUBJECT: Coordination Letter for the Supplemental Environmental Assessment (SEA) to create Restricted Areas (RAs) R-5602A and R-5602B above and near U.S. Army Garrison Fort Sill, Oklahoma (Comanche County)

Michael Merritt
Emergency Management Director
315 SW 5th St.
Suite 107
Lawton, OK 73501

Dear Mr. Merritt:

The U.S. Army Garrison Fort Sill is preparing a supplemental Environmental Assessment (EA) to evaluate the potential impacts associated with creating two new Restricted Area (RA) airspaces (R-5602A and R-5602B) above and near Fort Sill. This letter requests agency and public stakeholder comment on the potential impacts of establishing the new RA as described in the enclosed Description of Proposed Action and Alternatives (DOPAA).

The proposed action is to create R-5602A and R-5602B. The proposed lateral boundaries for R-5602A would overlie and extend upward over the ceilings of R-5601A, R-5601B, R-5601H, and a portion of R-5601F. R-5602A would extend from 40,000 to 60,000 feet above Mean Sea Level (MSL). R-5602B would extend approximately 8 nautical miles (NM) east beyond the R-5601A and R-5601F eastern boundaries. R-5602B would also extend from 40,000 to 60,000 feet MSL. The proposed time of designation for R-5602A is by Notice to Airmen (NOTAM), with an expected usage of approximately 8 hours per day and up to 200 days per calendar year. The proposed time of designation for R-5602B is by NOTAM, with an expected usage of approximately 8 hours per day and up to 25 days per calendar year. The activation period for both R-5602A and R-5602B is planned for 8:30 A.M. to 4:30 P.M. Monday through Friday, other times by NOTAM.

The proposed RAs were configured to avoid sensitive areas and minimize conflicts to private and commercial aviation while establishing expanded RA necessary to use new, advanced weapon systems to conduct high-angle shots above the horizon. Commercial aviation, private aviation, and non-participating military aircraft would be excluded from transiting the active RA.
We are requesting your office provide information concerning known environmental and land use constraints, upcoming projects near Fort Sill, or other issues that should be addressed within the Draft EA. The Draft EA will be publicly noticed and will be available for a 30-day public comment period. We encourage you to monitor public notices for more information and provide comments when the Draft EA is released. Thank you for input on this important project. If you have any questions or need additional information to respond, please contact the Environmental Quality Division at sarah.e.sminkey.civ@mail.mil or by mail at USAG-Fort Sill, DPW-Environmental Quality Div., 2515 Ringgold Rd., Fort Sill, OK 73503. Your earliest reply is appreciated.

Sincerely,

[Signature]

Samuel W. Curtis
Colonel, US Army
Commanding

Enclosure
December 28, 2017

THPO ID # 1407

Department of the Army
Samuel W. Curtis
2515 Ringgold Road
Fort Sill, OK 73503

RE: Coordination Letter for the Supplemental Environmental Assessment to create Restricted Areas R-5602A and R-5602B above and near US Army Garrison Fort Sill, Oklahoma

On behalf of the Tribal Historic Preservation Office of the Cheyenne and Arapaho Tribes, thank you for the notice of the referenced project. I have reviewed your Consultation request under Section 106 of the National Historic Preservation Act regarding the project proposal and comment as follows:

At this time, it is determined to be categorized as No Properties; however, if at any time during the project implementation inadvertent discoveries are made that reflect evidence of traditional cultural properties (TCP) such as: ceremonial or celebration objects, stone rings, villages, burial mounds, battlefield artifacts, or human remains please cease work immediately, in area of discovery and notify the Cheyenne Arapaho THPO Office within 72 hours. Also, we recommend consultation with the Comanche Nation.

In addition, if inadvertent discoveries are made; pursuant to Title 36 Code of Federal Regulation Part 800.13, as amended; you will also be required to make arrangements for a professional archaeologist to visit the site of discovery and assess the potential significance of any artifacts or features that were unearthed. If human remains are discovered State and Tribal NAGPRA representatives will be contacted and protocols will be executed.

Please contact me at (405) 422-7416 or mdemery@c-a-tribes.org, if you have any questions or concerns. Alternate contact is Virginia Richey, THPO; she can be reached directly at (405) 422-7484 or vrichey@c-a-tribes.org. Thank you again for your notification!

Best Regards,

Micah Looper
Research Analyst

CC: Virginia Richey
Tribal Historic Preservation Office/THPO
Max Bear, Director
Samuel W. Curtis, Colonel, U.S. Army
USAG-Fort Sill
DPW-Environmental Quality Division
2515 Ringgold Road
Fort Sill, OK 73503

Dear Colonel Curtis:

We have reviewed the Description of Proposed Action and Alternatives (DOPAA) which describes the proposed establishment of two new Restricted Area (RA) airspaces above and in the vicinity of Fort Sill. It is our understanding that the new RA airspace is needed to test laser weapon systems and that these tests will occur at altitudes from 40,000 to 60,000 feet Mean Sea Level to avoid general aviation and commercial air traffic and that the potential impacts associated with the proposed action will be evaluated in an Environmental Assessment (EA). Our office is unaware of any environmental/land use constraints or other issues outside of those identified in the DOPAA that would need to be specifically addressed in the EA. We look forward to the opportunity to comment on the Draft EA when it becomes available.

If any additional information is required, please contact David Anderson, Regional Environmental Scientist at 405-247-1532.

Sincerely,

[Signature]

ACTING Regional Director
January 3, 2018

Mr. Kevin Christopher  
Environmental Support Branch  
DPW-EQD ATTN: IMSI-PWE/K.Christopher  
2515 Ringgold Road  
Fort Sill, OK 73503  

RE: File #0527-18: Fort Sill Proposed Creation of Permanent Restricted Airspace Areas #R-5602A & #R-5602B; Comanche County (including Supplemental Environmental Assessment)

Dear Mr. Christopher:

We have received and reviewed the materials for the referenced undertaking submitted with your letters dated December 11th, 2017 (received December 12th and December 28th, 2017). We concur with the defined area of potential effect (APE) with respect to both direct and indirect impacts for this project and consider it appropriate for the scope of work.

We have no additional agencies or organizations to suggest as possible consulting parties for the proposed undertaking other than those noted in your letter.

Based on the information you have provided about this project and in keeping with your request per expedited consultation, unless you receive conflicting comments from the Oklahoma Archeological Survey, we find no historic properties affected by the undertaking.

Thank you for the opportunity to review this project. If you have any questions, please call Catharine M. Wood, Historical Archaeologist, at 405/521-6381. Please reference the above underlined file number when responding. Thank you.

Sincerely,

Lynda Ozan  
Deputy State Historic Preservation Officer

LO:pm
Response from ODEQ regarding Permanent Restricted Airspace

Sarah E. Smiskey
National Environmental Policy Act Coordinator
Environmental Quality Division, Support Branch
USAG, Fort Sill, OK
DESK: 580-442-2849
ALT: 580-442-4455
DSN: 639 2849
"We are the Army's Home"
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----Original Message-----

From: Jon Roberts [mailto:jon.roberts@deo.ok.gov] On Behalf Of DEQ EnvReviews
Sent: Friday, January 05, 2018 10:26 AM
To: Smiskey, Sarah E CIV USARMY USAG (US) <sarah.e.sminkey.civ@mail.mil>
Subject: [Non-DoD Source] Environmental Review

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

Dear Ms. Smiskey:

In response to your request, we have completed an environmental review of air, land and water records for the project listed below.

Project
Letter dated December 11, 2017 - Coordination letter for the Supplemental Environmental Assessment to create Restricted Areas R-5602A and R-5602B.

Comments
No environmental concerns under DEQ jurisdiction are anticipated.

Future requests may be submitted electronically to EnvReviews@deo.ok.gov < Caution: mailto:EnvReviews@deo.ok.gov > by attaching a single pdf file containing your request and any attachments.

If you have any questions or need clarification, please contact me.

Regards,
Jon A. Roberts, Senior Manager; Office of External Affairs, Oklahoma Department of Environmental Quality
P. O. Box 1677
707 N. Robinson Ave.
Oklahoma City, OK 73101-1677
Ph: (405) 702-7111; Cell: (405) 694-3401
January 8, 2018

Re: Coordination Letter for the Supplemental Environmental Assessment (SEA) to Create Restricted Areas (RAs) R-5602A and R-5602B above and near U.S. Army Garrison Fort Sill, Oklahoma (Comanche County)

Dear Ms. Sminkey:

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of “No Properties” have been identified (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 595-9960/9618 if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana, Technician
#6 SW “D” Avenue, Suite C
Lawton, OK 73502
January 11, 2018

Samuel W. Curtis
Colonel, US Army
Commanding
Department of the Army
2515 Ringgold Road
Fort Sill, Oklahoma 73503

Dear Colonel Curtis,

The City of Lawton is not aware of any environmental issues or land use conflicts related to the proposed restricted areas designated as R-5602A and R-5602B. While there are upcoming projects within our municipal boundaries that are near Fort Sill, we do not anticipate these to have any direct or indirect interaction with the proposed restricted areas.

These projects are located within the Rogers Lane corridor—including the Rogers Lane interchange with I-44 (ODOT) and the widening of Northeast Rogers Lane between I-44 and Flower Mound Road (City of Lawton). These projects are anticipated to be completed within the 2018 to 2025 time frame. The City of Lawton, therefore, has no issues or conflicts with regards to the Supplemental Environmental Assessment for the proposed restricted areas.

Sincerely,

[Signature]

Jerry Ihler
City Manager

cc: Fred L. Fitch, Mayor
    Richard Rogalski, Planning Director

Providing efficient, effective, and responsive service. Promoting a quality of life based on harmony and cooperation. Creating leadership and opportunity for southwest Oklahoma.
DEPARTMENT OF THE ARMY  
US ARMY INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT SILL  
2515 Ringgold Road  
FORT SILL, OKLAHOMA 73503

REPLY TO: ENVIRONMENTAL QUALITY DIVISION  

DEC 11 2017

SUBJECT: Coordination Letter for the Supplemental Environmental Assessment (SEA) to create Restricted Areas (RAs) R-5602A and R-5602B above and near U.S. Army Garrison Fort Sill, Oklahoma (Comanche County)

Jerry Ihler  
City Manager  
212 NW 9th St.  
Lawton, OK 73501

Dear Mr. Ihler:

The U.S. Army Garrison Fort Sill is preparing a supplemental Environmental Assessment (EA) to evaluate the potential impacts associated with creating two new Restricted Area (RA) airspaces (R-5602A and R-5602B) above and near Fort Sill. This letter requests agency and public stakeholder comment on the potential impacts of establishing the new RA as described in the enclosed Description of Proposed Action and Alternatives (DOPAA).

The proposed action is to create R-5602A and R-5602B. The proposed lateral boundaries for R-5602A would overlie and extend upward over the ceilings of R-5601A, R-5601B, R-5601H, and a portion of R-5601F. R-5602A would extend from 40,000 to 60,000 feet above Mean Sea Level (MSL). R-5602B would extend approximately 8 nautical miles (NM) east beyond the R-5601A and R-5601F eastern boundaries. R-5602B would also extend from 40,000 to 60,000 feet MSL. The proposed time of designation for R-5602A is by Notice to Airmen (NOTAM), with an expected usage of approximately 8 hours per day and up to 200 days per calendar year. The proposed time of designation for R-5602B is by NOTAM, with an expected usage of approximately 8 hours per day and up to 25 days per calendar year. The activation period for both R-5602A and R-5602B is planned for 8:30 A.M. to 4:30 P.M. Monday through Friday, other times by NOTAM.

The proposed RAs were configured to avoid sensitive areas and minimize conflicts to private and commercial aviation while establishing expanded RA necessary to use new, advanced weapon systems to conduct high-angle shots above the horizon. Commercial aviation, private aviation, and non-participating military aircraft would be excluded from transiting the active RA.

RECEIVED BY  
Mayor - City Manager’s Office  

Date 12/27/19  
Time

Signature
We are requesting your office provide information concerning known environmental and land use constraints, upcoming projects near Fort Sill, or other issues that should be addressed within the Draft EA. The Draft EA will be publicly noticed and will be available for a 30-day public comment period. We encourage you to monitor public notices for more information and provide comments when the Draft EA is released. Thank you for input on this important project. If you have any questions or need additional information to respond, please contact the Environmental Quality Division at sarah.e.sminkey.civ@mail.mil or by mail at USAG-Fort Sill, DPW-Environmental Quality Div., 2515 Ringgold Rd., Fort Sill, OK 73503. Your earliest reply is appreciated.

Sincerely,

[Signature]

Samuel W. Curtis
Colonel, US Army
Commanding

Enclosure
Subject: FW: [Non-DoD Source] RE: SEA to create RAs R-5602A and R-5602B / Fort Sill, Comanche County, Oklahoma

-----Original Message-----
From: Kimberly Penrod [mailto:kpenrod@delawarenation.com]
Sent: Tuesday, January 23, 2018 10:46 AM
To: Sminkkey, Sarah E CIV USARMY USAG (US) <sarah.e.sminkey.civ@mail.mil>
Subject: [Non-DoD Source] RE: SEA to create RAs R-5602A and R-5602B / Fort Sill, Comanche County, Oklahoma

Sarah,

The protection of our tribal cultural resources and tribal trust resources will take all of us working together. We look forward to working with you and your agency. With the information you have submitted we can concur at present with this proposed plan.

As with any new project, we never know what may come to light until work begins. The Delaware Nation asks that you keep us up to date on the progress of this project and if any discoveries arise please contact us immediately. Our department is trying to go as paper free as possible. If it is at all feasible for your office to send email correspondence we would greatly appreciate.

If you need anything additional from me please do not hesitate to contact me.

Respectfully,

Kim Penrod
Delaware Nation
Director, Cultural Resources/106 Archives, Library and Museum
31064 State Highway 281
PO Box 825
Anadarko, OK 73005
(405)-247-2448 Ext. 1403 Office
(405)-924-9485 Cell
kpenrod@delawarenation.com

CONFIDENTIALITY NOTE:
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Appendix F

Biological Resources Supporting Information
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as trust resources) under the U.S. Fish and Wildlife Service’s (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Comanche County, Oklahoma

Local office

Oklahoma Ecological Services Field Office

https://ecos.fws.gov/ipac/location/VL7VZC77VVBNPCT3PMEJOAAM/resources 5/23/2017
Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species
are managed by the Endangered Species Program of the U.S. Fish and Wildlife Service.

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.

The following species are potentially affected by activities in this location:

**Birds**

<table>
<thead>
<tr>
<th>NAME</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-capped Vireo</td>
<td>Endangered</td>
</tr>
<tr>
<td>Vireo atricapilla</td>
<td></td>
</tr>
<tr>
<td>No critical habitat has been designated for this species.</td>
<td></td>
</tr>
<tr>
<td><a href="https://ecos.fws.gov/ecp/species/5716">https://ecos.fws.gov/ecp/species/5716</a></td>
<td></td>
</tr>
</tbody>
</table>

| Least Tern            | Endangered |
| Sterna antillarum     |           |
| This species only needs to be considered if any of the following conditions apply: |           |
| • Wind Turbines and Wind Farms |           |
| • Towers (i.e. radio, television, cellular, microwave, meteorological) |           |
| No critical habitat has been designated for this species. |           |
| [https://ecos.fws.gov/ecp/species/8505](https://ecos.fws.gov/ecp/species/8505) |           |

| Piping Plover         | Threatened |
| Charadrius melodus    |            |
| There is a final critical habitat designated for this species. Your location is outside the designated critical habitat. | |
| [https://ecos.fws.gov/ecp/species/6039](https://ecos.fws.gov/ecp/species/6039) | |

| Red Knot              | Threatened |
| Calidris canutus rufa |            |
| No critical habitat has been designated for this species. |   |
| [https://ecos.fws.gov/ecp/species/1864](https://ecos.fws.gov/ecp/species/1864) | |

| Whooping Crane        | Endangered |
| Grus americana       |            |
| There is a final critical habitat designated for this species. Your location is outside the designated critical habitat. | |
| [https://ecos.fws.gov/ecp/species/758](https://ecos.fws.gov/ecp/species/758) | |
Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act\(^1\) and the Bald and Golden Eagle Protection Act\(^2\).

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service\(^3\). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Year-round bird occurrence data [http://www.birdscanada.org/birdmon/default/datasummaries.jsp](http://www.birdscanada.org/birdmon/default/datasummaries.jsp)
The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location. It is not a list of every bird species you may find in this location, nor a guarantee that all of the bird species on this list will be found on or near this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

<table>
<thead>
<tr>
<th>NAME</th>
<th>SEASON(S)</th>
<th>LINK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald Eagle</td>
<td>Wintering</td>
<td><a href="https://ecos.fws.gov/ecp/species/1626">https://ecos.fws.gov/ecp/species/1626</a></td>
</tr>
<tr>
<td>Bell's Vireo</td>
<td>Breeding</td>
<td><a href="https://ecos.fws.gov/ecp/species/9507">https://ecos.fws.gov/ecp/species/9507</a></td>
</tr>
<tr>
<td>Burrowing Owl</td>
<td>Breeding</td>
<td><a href="https://ecos.fws.gov/ecp/species/9737">https://ecos.fws.gov/ecp/species/9737</a></td>
</tr>
<tr>
<td>Cassin's Sparrow</td>
<td>Breeding</td>
<td><a href="https://ecos.fws.gov/ecp/species/9512">https://ecos.fws.gov/ecp/species/9512</a></td>
</tr>
<tr>
<td>Chestnut collared Longspur</td>
<td>Wintering</td>
<td></td>
</tr>
<tr>
<td>Dickcissel</td>
<td>Breeding</td>
<td></td>
</tr>
<tr>
<td>Fox Sparrow</td>
<td>Wintering</td>
<td></td>
</tr>
<tr>
<td>Golden Eagle</td>
<td>Wintering</td>
<td><a href="https://ecos.fws.gov/ecp/species/1680">https://ecos.fws.gov/ecp/species/1680</a></td>
</tr>
<tr>
<td>Harris's Sparrow</td>
<td>Wintering</td>
<td></td>
</tr>
<tr>
<td>Hudsonian Godwit</td>
<td>Migrating</td>
<td></td>
</tr>
<tr>
<td>Bird Name</td>
<td>Scientific Name</td>
<td>Status</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Lark Bunting</td>
<td>Calamospiza melanocorys</td>
<td>Wintering</td>
</tr>
<tr>
<td>Lewis's Woodpecker</td>
<td>Melanerpes lewis</td>
<td>Wintering</td>
</tr>
<tr>
<td></td>
<td><a href="https://ecos.fws.gov/ecp/species/9408">https://ecos.fws.gov/ecp/species/9408</a></td>
<td></td>
</tr>
<tr>
<td>Little Blue Heron</td>
<td>Egretta caerulea</td>
<td>Breeding</td>
</tr>
<tr>
<td>Loggerhead Shrike</td>
<td>Lanius ludovicianus</td>
<td>Year-round</td>
</tr>
<tr>
<td></td>
<td><a href="https://ecos.fws.gov/ecp/species/8833">https://ecos.fws.gov/ecp/species/8833</a></td>
<td></td>
</tr>
<tr>
<td>McCown's Longspur</td>
<td>Calcarius mccownii</td>
<td>Wintering</td>
</tr>
<tr>
<td></td>
<td><a href="https://ecos.fws.gov/ecp/species/9292">https://ecos.fws.gov/ecp/species/9292</a></td>
<td></td>
</tr>
<tr>
<td>Mississippi Kite</td>
<td>Ictinia mississippiensis</td>
<td>Breeding</td>
</tr>
<tr>
<td>Orchard Oriole</td>
<td>Icterus spurius</td>
<td>Breeding</td>
</tr>
<tr>
<td>Painted Bunting</td>
<td>Passerina ciris</td>
<td>Breeding</td>
</tr>
<tr>
<td>Red-headed Woodpecker</td>
<td>Melanerpes erythrocephalus</td>
<td>Year-round</td>
</tr>
<tr>
<td>Rufous-crowned Sparrow</td>
<td>Aimophila ruficeps</td>
<td>Year-round</td>
</tr>
<tr>
<td></td>
<td><a href="https://ecos.fws.gov/ecp/species/9748">https://ecos.fws.gov/ecp/species/9748</a></td>
<td></td>
</tr>
<tr>
<td>Scissor-tailed Flycatcher</td>
<td>Tyrannus forficatus</td>
<td>Breeding</td>
</tr>
<tr>
<td>Short-eared Owl</td>
<td>Asio flammeus</td>
<td>Wintering</td>
</tr>
<tr>
<td></td>
<td><a href="https://ecos.fws.gov/ecp/species/9295">https://ecos.fws.gov/ecp/species/9295</a></td>
<td></td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>Charadrius alexandrinus</td>
<td>Breeding</td>
</tr>
<tr>
<td>Sprague's Pipit</td>
<td>Anthus spragueii</td>
<td>Wintering</td>
</tr>
<tr>
<td></td>
<td><a href="https://ecos.fws.gov/ecp/species/8964">https://ecos.fws.gov/ecp/species/8964</a></td>
<td></td>
</tr>
</tbody>
</table>
What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

**Landbirds:**

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, *Birds of North America* (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

**Atlantic Seabirds:**

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the Northeast Ocean Data Portal, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?
Landbirds:

The [Avian Knowledge Network (AKN)](https://akn.fws.gov) provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest, survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the [Migratory Bird Programs AKN Histogram Tools](https://migratorybirdprograms.fws.gov/histogram-tools) webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

Atlantic Seabirds:

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](https://ecos.fws.gov/ipac/). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project](https://ecos.fws.gov/ipac/) webpage.

Facilities

Wildlife refuges

Any activity proposed on [National Wildlife Refuge](https://www.fws.gov/refuges) lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuges:
Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

<table>
<thead>
<tr>
<th>FRESHWATER EMERGENT WETLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEM1C</td>
</tr>
<tr>
<td>PEM1Fh</td>
</tr>
<tr>
<td>PEM1F</td>
</tr>
<tr>
<td>PEM1/UBFh</td>
</tr>
</tbody>
</table>

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.
PEM1Ch
PEM1A
PEM1Ah
PEM1Cx
PEM1Ax

FRESHWATER FORESTED/SHRUB WETLAND
PFO1A
PFO1Ch
PFO5/UBHh
PFO1Ah
PFO1Fh
PSS1Ch
PFO1F
PSS1Ah
PSS1A
PSS1F

FRESHWATER POND
PUSCh
PUBHh
PUBFh
PUBHx
PUBF
PUSCx
PUSAh
PUBFx
PUSAx
PUSC
PUBH

LAKE
L1UB/AB3Hh
L1UBHh
L2AB3Hh

RIVERINE
R4SBA
R4USC
R4USA
R2UBH
A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service’s objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.