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Environmental Assessment

Environmental Assessment for Electromagnetic Pulse Test Facility Joint Base San Antonio-Lackland, Texas

June 2025

Contract Number: W912BV-22-D-0003
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DRAFT

ENVIROMENTAL ASSESSMENT

Environmental Assessment for Electromagnetic Pulse Test Facility, Joint Base San Antonio-Lackland, Texas

Prepared By:

Joint Base San Antonio

with

Auxilio Management Services

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EXECUTIVE SUMMARY

Joint Base San Antonio (JBSA)-Lackland, located in the southwest part of San Antonio, Texas, proposes to construct and operate a new Electromagnetic Pulse (EMP) test site at JBSA-Lackland, Kelly Field Annex, Texas.

The purpose of the Proposed Action is to ensure the VC-25B aircraft meets EMP exposure performance criteria as defined in military standards and Department of Defense (DoD) instructions.

The Proposed Action is needed because existing EMP testing facilities cannot accommodate the VC-25B aircraft. As the lead agency responsible for EMP testing, the Air Force Materiel Command (AFMC) must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

This Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321 et seq.), the White House Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the Department of the Air Force (DAF) Environmental Impact Analysis Process (EIAP) (32 CFR Part 989), to evaluate the potential environmental impacts associated with implementation of the Proposed Action.

The DAF is aware of the November 12, 2024, decision in *Marin Audubon Society v. Federal Aviation Administration*, No. 23-1067 (D.C. Cir. November 12, 2024). To the extent that a court may conclude that the CEQ regulations implementing NEPA are not judicially enforceable or binding on this agency action, the DAF has nonetheless elected to follow those regulations at 40 CFR Parts 1500–1508, in addition to the DAF's procedures and regulations implementing NEPA at 32 CFR 989, to meet the agency's obligations under NEPA, 42 U.S.C §§ 4321 et seq.

The EA provides sufficient evidence and analysis for determining whether an action would cause significant environmental impacts. If significant impacts are identified, an Environmental Impact Statement (EIS) would then be required. If no significant impacts are identified, then the agency may issue a Finding of No Significant Impact (FONSI) (40 CFR 1501.6). A FONSI is a decision document that briefly presents the reasons why an action would not have a significant effect on the human environment (40 CFR 1508.1(l)). As required by NEPA and the implementing regulations from CEQ and DAF, the alternative of taking no action is evaluated, providing a baseline for comparison of potential impacts from the action alternatives.

Table ES-1 summarizes the anticipated environmental impacts associated with implementation of the Proposed Action. Based on the information and analysis presented in this EA, JBSA has determined that there would be no significant environmental impacts associated with implementing the Proposed Action. Therefore, this EA concludes that a FONSI is appropriate, and that an EIS is not required.

A Notice of Availability (NOA) was published in the San Antonio Express and News on June 20-21, 2025, in the La Prensa on June 20, 2025, and in the San Antonio Observer on June 18, 2025, to initiate the 30-day public review period. The Draft EA was made available from June 18, 2025, to July 21, 2025, at the San Antonio Central Library and online on the Joint Base San Antonio Environmental Information website (https://www.jbsa.mil/Resources/Environmental/).

Table ES-1. Summary of Environmental Effects of the Alternatives

Resource Area	Proposed Action	Action Alternative	No Action Alternative
Airspace	No Impact	No Impact	No Impact
Air Quality	Negligible Impact	Negligible Impact	No Impact
Cultural Resources	No Impact	No Impact	No Impact
Biological and Natural Resources	No Adverse Effects	No Adverse Effects	No Effect
Water Resources	No Impact	No Impact	No Impact
Floodplains, Wetlands, and Coastal Zone Management	No Impact	No Impact	No Impact
Geology and Soils	No Impact	No Impact	No Impact
Noise and Vibration/Acoustic Environment	Minor, Not Significant	Minor, Not Significant	No Impact
Land Use and Aesthetics	No Impact	No Impact	No Impact
Infrastructure and Utilities	Minor, Not Significant	Minor, Not Significant	No Impact
Solid and Hazardous Materials/Waste	Minor, Not Significant	Minor, Not Significant	No Impact
Transportation and Parking	Negligible Impact	Negligible Impact	No Impact
Electromagnetic Field	Minor, Not Significant	Minor, Not Significant	No Impact
Safety and Occupational Health	Minor, Not Significant	Minor, Not Significant	No Impact
Socioeconomics	Minor, Not Significant	Minor, Not Significant	No Impact
Community Services	Minor, Not Significant	Minor, Not Significant	No Impact
Environmental Justice	No Disproportionate Impact	No Disproportionate Impact	No Impact

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DRAFT ENVIRONMENTAL ASSESSMENT

ELECTROMAGNETIC PULSE TEST FACILITY, JOINT BASE SAN ANTONIO-LACKLAND, TEXAS

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CHAPTER 1
INTRODUCTION

Joint Base San Antonio (JBSA)-Lackland, located in the southwest part of San Antonio, Texas (see Figure 1-1**)**, proposes to construct and operate a new Electromagnetic Pulse (EMP) test site at JBSA-Lackland, Kelly Field Annex, Texas.

This section provides a description of the Proposed Action, a statement of the purpose and need for the Proposed Action, and an overview of the scope of the environmental analysis, regulatory framework, public involvement activities, and other analyses relevant to the action.

This Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321 et seq.), the White House Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the Department of the Air Force (DAF) Environmental Impact Analysis Process (EIAP) (32 CFR Part 989), to evaluate the potential environmental impacts associated with implementation of the Proposed Action.

The EA provides sufficient evidence and analysis for determining whether an action would cause significant environmental impacts. If significant impacts are identified, an Environmental Impact Statement (EIS) would then be required. If no significant impacts are identified, then the agency may issue a Finding of No Significant Impact (FONSI) (40 CFR 1501.6). A FONSI is a decision document that briefly presents the reasons why an action would not have a significant effect on the human environment (40 CFR 1508.1(l)). As required by NEPA and the implementing regulations from CEQ and DAF, the alternative of taking no action is evaluated, providing a baseline for comparison of potential impacts from the action alternatives.

1.1 PROJECT BACKGROUND AND EXISTING SITE

1.1.1 Project Background

An EMP is a high-intensity, extremely rapid, and short duration burst of electromagnetic energy that occurs over a wide frequency range which, when coupled to metallic conductors associated with electrical and electronic systems, produces damaging current and voltage surges that may render such systems inoperable. An EMP is caused by either a naturally occurring event involving solar interference or a thermonuclear device detonated several hundred miles above the Earth's surface (known as a High-Altitude EMP [HEMP]). In the case of a man-made thermonuclear device being set off in the upper atmosphere, the resulting explosion emits gamma rays. The gamma rays rapidly accelerate and energize (or ionize) particles found in the environment as they fall back to earth. The charged particles disrupt electronic systems by sending an unregulated amount of voltage through circuits, essentially overcharging and frying conduits, micro-processors, and capacitors not built to withstand such conditions (Reardon, 2014).

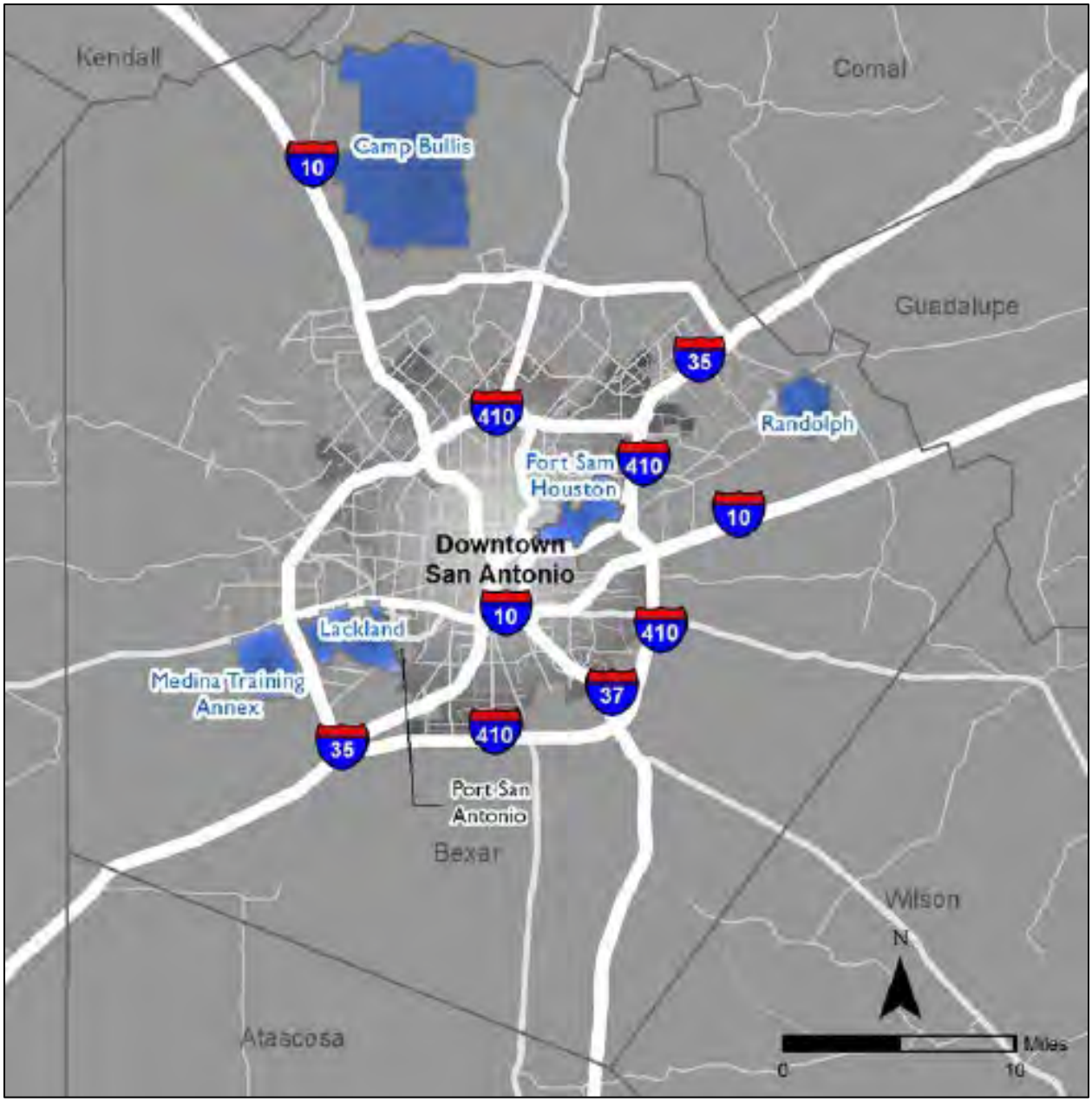

Figure 1-1. Regional Location of JBSA-Lackland

Objects such as aircraft without proper shielding or countermeasures may suffer catastrophic effects from an EMP. Military Standard (MIL-STD) 3023, *High-Altitude Electromagnetic Pulse (HEMP) Protection for Military Aircraft*, defines the performance criteria for protection against HEMP threat environments as defined in MIL-STD-2169[1], *High-Altitude Electromagnetic Pulse Environment*[1]. In addition, Department of Defense (DoD) Instruction 3150.09, *The Chemical, Biological, Radiological, and Nuclear (CBRN)*

[1] Classified document not available for public review.

Survivability Policy, establishes policy, assigns responsibilities, and establishes procedures for the execution of the DoD CBRN Survivability Policy (including EMP radiation) (DoD, 2022).

The Boeing VC-25 is a military version of the Boeing 747 airliner, modified for presidential transport and commonly operated by the DAF as Air Force One, the call sign of any U.S. Air Force aircraft carrying the President of the United States. Only two variations of this aircraft type are in service. One is the highly modified Boeing 747-200Bs, designated VC-25A. Two new aircraft, based on the Boeing 747-8I and designated VC-25B, have been ordered by the USAF to replace the aging VC-25A.

Since at least the 1970s, engineers have designed and built EMP simulators, which are used in designing and evaluating the shielding present on aircraft and other test objects. The Air Force Materiel Command (AFMC) currently has the capability to conduct EMP testing on aircraft at other installations. However, these existing test systems cannot accommodate larger aircraft, and in particular, the VC-25B. The VC-25B must undergo testing over its lifetime to verify the airframe and associated components are properly configured to resist the potential effects of an EMP. Existing EMP testing sites across the country are unable to meet the criteria necessary for testing aircraft at the scale of the VC-25B.

1.1.2 Existing Site

JBSA-Lackland Kelly Field is home to the USAF 433rd Airlift Wing, the 149th Fighter Wing of the Air National Guard, Port San Antonio, and one of Boeing's largest maintenance operations for civilian and military aircraft, including the VC-25B (see Figure 1-2). The proposed project area is located at the southwestern end of Kelly Field Annex at an area referred to as "The Bubble", shown enclosed by the orange square on Figure 1-3.

1.2 PURPOSE AND NEED

The **purpose** of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and DoD instructions.

The Proposed Action is **needed** because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

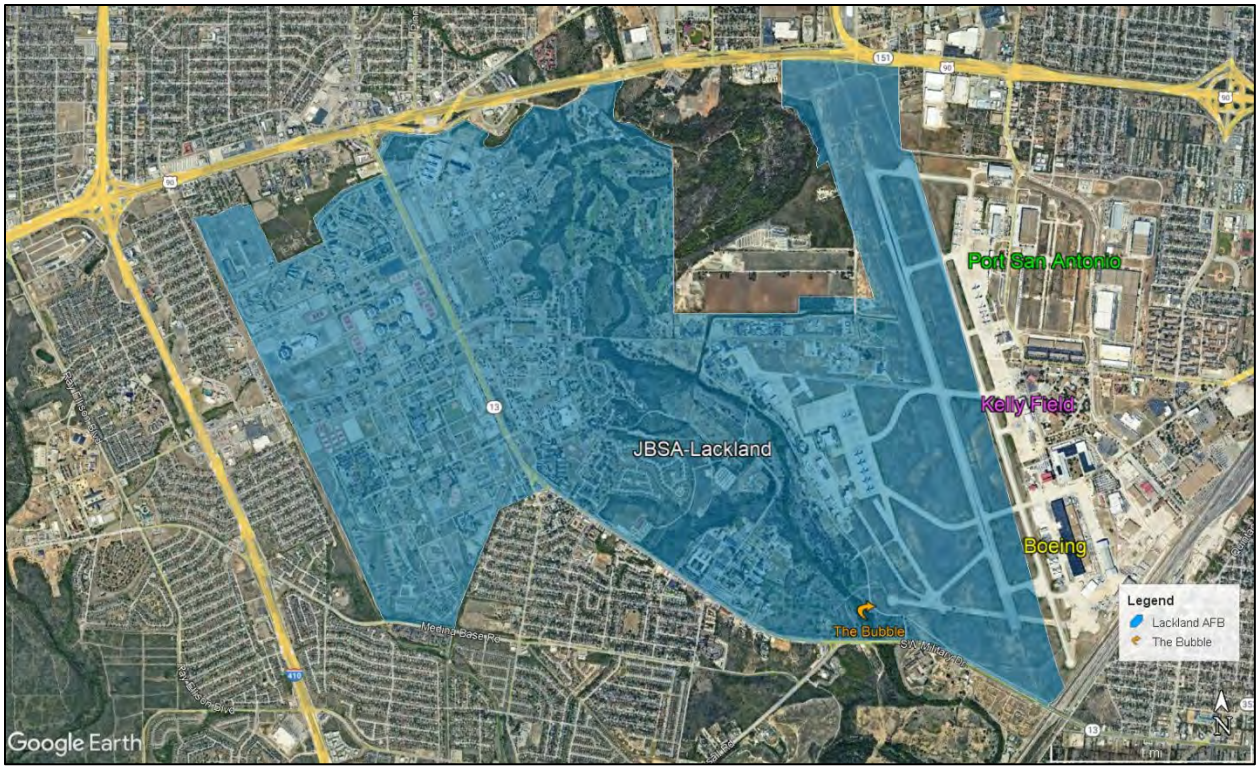

Figure 1-2. JBSA-Lackland Kelly Field Annex and Proposed Project Area

Figure 1-3. The Bubble Proposed Project Area Detail

1.3 SCOPE OF ASSESSMENT

The scope of the EA includes an evaluation of alternatives, including the No Action Alternative, and an evaluation of the reasonably foreseeable effects on the natural and human environment from the proposed construction and operation of the EMP test site at the JBSA-Lackland Kelly Field Annex.

The DAF has prepared this EA, acting as the lead agency, in accordance with the NEPA (42 USC 4321 et seq.), the White House CEQ Regulations Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508, as amended), and DAF EIAP (32 CFR Part 989). The purpose of this EA is to provide an environmental analysis of the Proposed Action in sufficient detail to allow the DAF to determine whether it is necessary to prepare an EIS, or to prepare a FONSI for the Proposed Action. As required by NEPA and the implementing regulations from DAF, the alternative of taking no action is evaluated, providing a baseline for comparison of potential impacts from the action alternatives.

This EA evaluates the reasonably foreseeable effects on the human and natural environment resulting from implementation of the Proposed Action. Resource areas examined in this EA include aesthetics; air quality and climate change; cultural resources; biological and natural resources; water resources; floodplains, wetlands, and coastal zone management; geology and soils; noise and vibration; land use; infrastructure and utilities; solid and hazardous materials/waste; transportation and parking; electromagnetic force, safety and occupational health; socioeconomics; community services; and environmental justice.

1.4 COOPERATING AGENCY AND INTERGOVERNMENTAL COORDINATION/ CONSULTATION

Federal, state, and local agencies with jurisdiction that could be affected by the Proposed/Action Alternatives were notified and consulted during the development of this EA. Appendix A provides a summary of the outreach and return correspondence received to date.

DAF, as the responsible agency, is accountable for implementing the Interagency and Intergovernmental Coordination process. Through this process, DAF notifies relevant federal, state, and local agencies about the Proposed Action and alternatives. This coordination process provides DAF the opportunity to cooperate with and consider state and local views in implementing the Proposed Action or alternatives. There are no cooperating agencies involved in the preparation of this EA.

Under EO 13175, *Consultation and Coordination with Indian Tribal Governments* (6 November 2000), Federal agencies are directed to coordinate and consult with Federally Recognized Native American tribal governments whose interests might be directly and substantially affected by activities on federally administered lands. To comply with legal mandates, federally recognized tribes that are affiliated historically with the project's geographic region are invited to consult on all proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal coordination process is distinct from NEPA consultation or the Interagency/Intergovernmental Coordination for Environmental Planning (IICEP) processes and requires separate notification of all relevant tribes. The timelines for tribal consultation are also distinct from those of intergovernmental consultations.

The Wichita and Affiliated Tribes does not include Bexar, Comal, and Guadalupe counties (home counties to JBSA) as counties of interest for historical, cultural, and archaeological importance. Other potentially affected tribes were consulted with.

1.5 APPLICABLE LAWS AND ENVIRONMENTAL REGULATIONS

Implementation of the Proposed Action would involve coordination with several federal and state agencies. Adherence to the requirements of specific laws, regulations, best management practices (BMPs), and necessary permits are detailed in each resource section.

1.5.1 National Environmental Policy Act

NEPA requires that federal agencies consider potential environmental consequences of Proposed Actions. The law's intent is to protect, restore, or enhance the environment through well-informed federal decisions. The CEQ was established under NEPA for the purpose of implementing and overseeing federal policies as they relate to this process. In 1978, the CEQ issued Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR §1500-1508 [CEQ 1978]). These regulations specify that an EA be prepared to:

- briefly provide sufficient analysis and evidence for determining whether to prepare an EIS or a FONSI;
- aid in an agency's compliance with NEPA when no EIS is necessary; and
- facilitate preparation of an EIS when one is necessary.

Further, to comply with other relevant environmental requirements (e.g., the Endangered Species Act [ESA] and the National Historic Preservation Act [NHPA]) in addition to NEPA and to assess potential environmental impacts, the EIAP and decision-making process for the proposed and Action Alternatives involves a thorough examination of environmental issues potentially affected by government actions subject to NEPA.

1.5.2 The Environmental Impact Analysis Process

The EIAP facilitates DAF compliance with environmental regulations (32 CFR Part 989, *Environmental Impact Analysis Process*), including NEPA, which is the primary legislation affecting the agency's decision-making process.

1.5.3 Endangered Species Act

The ESA (16 United States Code [USC] §§1531–1544, as amended) established measures for the protection of plant and wildlife species that are federally listed as threatened or endangered, and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the effects of their actions through a set of defined procedures, which can include the preparation of a Biological Assessment and can require consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA.

1.5.4 Cultural Resources Regulatory Requirements

The NHPA (54 USC §§30010 et seq.) established the National Register of Historic Places (NRHP) and the Advisory Council on Historic Preservation (ACHP) which outlined procedures for the management of cultural resources on Federal property. Cultural resources can include archaeological remains, architectural structures, and traditional cultural properties such as ancestral settlements, historic trails, and places where significant historic events occurred. The NHPA requires Federal agencies to consider potential impacts to

cultural resources that are listed, nominated to, or eligible for listing on the NRHP; designated a National Historic Landmark; or valued by modern Native Americans for maintaining their traditional culture. Section 106 of NHPA requires Federal agencies to consult with the appropriate State Historic Preservation Office (SHPO) if their undertaking might affect such resources. Protection of Historic and Cultural Properties (36 CFR Part 800) provides an explicit set of procedures for Federal agencies to meet their obligations under the NHPA, which includes inventorying of resources and consultation with SHPO. JBSA has a Programmatic Agreement with the Texas SHPO, which guides program management and interaction with SHPO (JBSA, 2020).

Executive Order (EO) 13007, *Indian Sacred Sites*, directs Federal land management agencies to accommodate access to, and ceremonial use of, Native American sacred sites including any specific, discrete, narrowly delineated location on Federal land provided that the Native American tribe or appropriately authoritative representative of a Native American religion has informed the agency of the existence of such a site.

The American Indian Religious Freedom Act (AIRFA) (42 USC §1996) established Federal policy to protect and preserve the rights of Native Americans to believe, express, and exercise their traditional religions, including providing access to sacred sites. The Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC §§3001–3013) requires consultation with Native American tribes prior to excavation or removal of human remains and certain objects of cultural importance. The tribal consultation process is distinct from NEPA consultation or the interagency coordination process, and it requires separate notification of all relevant tribes.

1.5.5 Intergovernmental Review of Federal Programs

EO 12372, *Intergovernmental Review of Federal Programs*, structures the U.S. Government's system of consultation with other Federal, state, and local governments on its decisions involving grants, other forms of financial assistance, and direct development. As detailed in 40 CFR 1501.8, CEQ regulations require intragovernmental notifications prior to making any detailed statement of environmental impacts. Through the coordination and consultation under EO 12372, the USAF notifies relevant Federal, state, and local agencies and allows them sufficient time to make known their environmental concerns specific to a proposed Federal action. Relevant comments and concerns submitted by these agencies are subsequently incorporated into the analysis of potential environmental impacts conducted as part of this EA.

CHAPTER 2
ALTERNATIVES

2.1 DEVELOPMENT OF ALTERNATIVES

This chapter provides information on the Proposed Action, the Action Alternative, and the No Action Alternative. The No Action Alternative serves as the baseline for identifying the impacts from the Proposed Action. NEPA, and the CEQ and DAF regulations for implementing NEPA, require all reasonable alternatives to be rigorously explored and objectively evaluated. To identify alternatives for the Proposed Action, DAF explored and considered other reasonable alternatives to the Proposed Action. Through this screening process, marginal or unsuitable alternatives were eliminated from further consideration.

2.1.1 Selection Standards

In an effort to satisfy the purpose and need for the project, the DAF developed criteria to compare and contrast alternative ways of fulfilling the objectives in accordance with 32 CFR 989.8.

The DAF identified the following criteria for this project. First, a potential site must:

1. Have an existing shelter of sufficient size to house the VC-25B aircraft.
2. Not have airfield scheduling issues (i.e., have airfield flexibility to quickly schedule and implement an EMP test).
3. Have adequate pavement condition and space to accommodate the EMP antenna and test aircraft.

Given these site selection standards, JBSA-Lackland was first identified as a suitable installation for meeting the purport and need for the project and the selection standards. Furthermore, after evaluating potential locations for the project at JBSA-Lackland, “The Bubble” at JBSA-Lackland was identified as the most practical location for the EMP project.

Two EMP testing systems are evaluated in this EA for installation at The Bubble: a Mobile Continuous Wave Measurement System and a Fixed 30-Meter Extended Ellipticus Antenna System. Each system is described in the following sections. At the onset of the project, both EMP testing systems appear viable; environmental impacts of each are examined in detail throughout the EA. However, criteria considered in selecting the Proposed Action include manpower requirements, construction and operational logistics, and ability to support the purpose and need for the project.

2.1.2 Proposed Action: Mobile Continuous Wave Measurement System

Under the Proposed Action, AFMC would receive and operate a mobile antenna at The Bubble to support EMP testing on the VC-25B and similar aircraft. The antenna would be a portable Continuous Wave Measurement System (CWMS) antenna. The CWMS would provide Low-Level Continuous Wave (LLCW) testing of the VC-25B and similar aircraft and would create a low-intensity electromagnetic field which would approximate EMP effects in a controlled setting.

The CWMS would be used to measure the integrity of the shielding on an EMP hardened aircraft. It would illuminate the aircraft with an side and overhead-incident, uniform field of approximately 1-volt per meter and wave impedance of 377 ohms. The test system would consist of a transmitter and antennas that would

illuminate the aircraft over the frequency range of 100 kilohertz (kHz) to 1 gigahertz (GHz), and a receiver that would measure the aircraft's responses to the radiated energy.

For the required 100 kHz – 1 GHz frequency range, there would be at most approximately 3,000 discrete frequency points, with a dwell time of 0.3 seconds and a 50% duty cycle, requiring a total sweep time of approximately 30 minutes.

The portable CWMS antenna would be erected by a crew of approximately seven personnel using supporting equipment such as boom lifts and trucks. Once erected, the mobile CWMS would remain for approximately one week for testing operations, after which it would be dismantled and returned to storage. A portable generator would be used during the one-week test period to provide power and area lighting while the system is in use.

The portable CWMS would be oriented to the side of the aircraft for testing. Only one aircraft would be tested at a time. Figure 2-1 presents a schematic of the mobile CWMS system and associated components. Figure 2-2 presents a photograph of a typical CWMS in use.

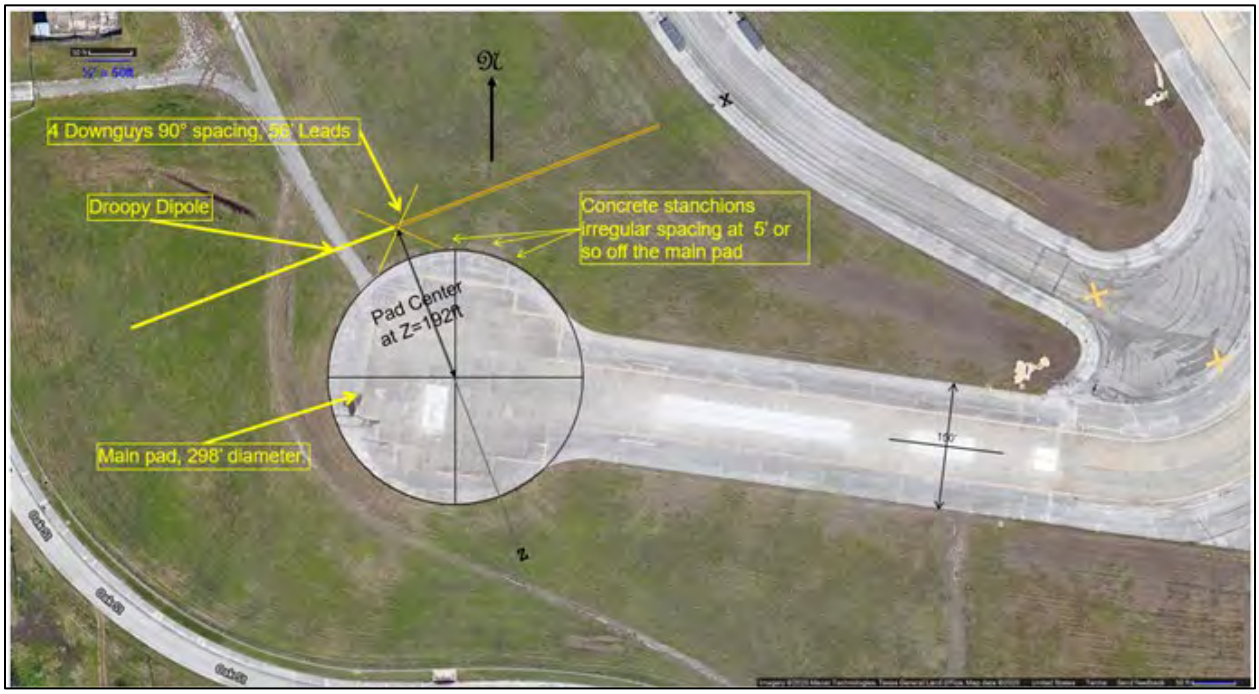

Figure 2-1. Schematic of CWMS Antenna at The Bubble

The Proposed Action would result in a permanent increase of approximately 20 personnel at JBSA-Lackland, as well as an increase in flight sorties by one per quarter (four per year).

This EA identifies and analyzes a potential maximum testing scenario of 50 tests per year. A test is defined as a single aircraft completing the full range of EMP testing. Multiple aircraft may be tested in one day or within the approximate 1-week period the portable CWMS antenna is erected. This EA also establishes a maximum periodicity of testing of up to ten 1-week periods.

While the primary purpose of the project is to support EMP resiliency testing of the VC-25B, this EA anticipates that other aircraft may opportunistically use the site and antenna for their EMP testing/recertification.

Figure 2-2. Photograph of a Mobile CWMS Antenna (typical)

2.1.3 Action Alternative

Under the Action Alternative, JBSA-Lackland would install and operate a permanently affixed 30-meter Extended Ellipticus Antenna to support LLCW testing on aircraft. Because this would be a permanent test site, the following site improvement activities would occur:

- Site preparation and foundation work: This includes constructing a personnel support structure, winch foundations, and pouring a concrete pad for a climate controlled, 8’ x 10’ personnel shelter.
- Site preparation: This shall also include preparation of the vertical-launch ground plane surface from the edge of the pad to one of the Ellipticus supporting poles. The existing sloped soil grade in this area shall be raised to approximately 6 inches below the elevation of The Bubble. A ground plane of 2-inch x 2-inch welded hardware cloth shall be placed in contact with the soil and tied to 5-foot rebar grounding rods spaced every 8 feet around its perimeter. One foot of the grounding rods will remain above grade. A protective concrete pavement Will be poured over the mesh; the elevation of the top of this pavement will be roughly level with the elevation of The Bubble. A protective barrier or barriers will be emplaced for the exposed grounding rods.
- Amplifier structure: An 8’ x 10’ metal, climate-controlled structure would be constructed to house the amplifier. It would be placed on a pad and anchored in place at the base of the northwest antenna pole.
- Power supply: Dedicated power would be installed for the amplifier structure (for lighting, climate control, additional 110-volt outlets, 220-volt 30-amp for the amplifier) and the support structures

(for the winches and emergency lighting system). All power would be installed underground from the nearest point of connection.

- Antenna emplacement: The two support structures would be erected and secured with down-guys and cross-guys between the structures, followed by installing powered winches to raise/lower the antenna and lightning protection system. The antenna and ground plane would then be installed.
- Lighting and lighting protection: An Aircraft Warning Light System, Aerial Markers, and a Lightning Protection System for the antenna and supporting shelter would be installed.
- Coordination with airfield operations for any waivers or approvals for permanent structures would be completed.

The antenna would be a center fed, resistively loaded dipole with each end of the dipole terminated to earth ground. This configuration would focus the energy on the aircraft with the required intensity. Figure 2-3 depicts the antenna with an aircraft, and Figure 2-4 provides additional dimensional detail of the antenna.

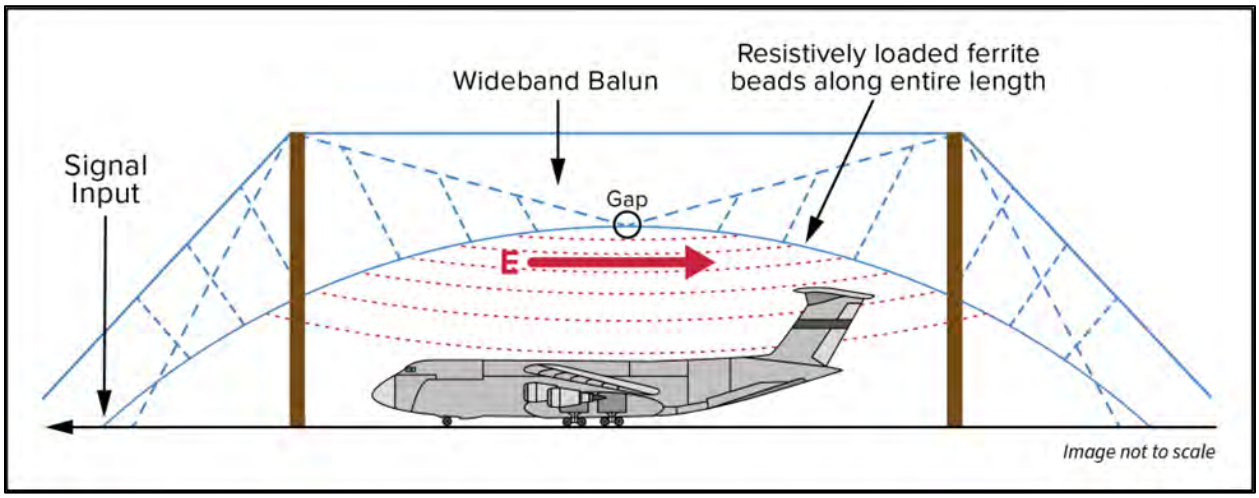

Figure 2-3. 30-meter Ellipticus Fixed Antenna System with Aircraft (typical)

The permanently affixed 30-meter Extended Ellipticus Antenna would have similar electromagnetic characteristics and test durations as described for the Proposed Action. In addition, the same maximum testing tempo and personnel requirements as described under the Proposed Action would also occur under the Action Alternative.

2.1.4 No Action Alternative

The No Action Alternative serves as a benchmark against which the effects of the Proposed Action can be evaluated. For this project, the No Action Alternative is defined as not implementing and operating an EMP test facility at JBSA-Lackland. The No Action Alternative would limit AFMC's ability to test the resiliency of VC-25B and other aircraft to simulated EMP events. The No Action Alternative is not considered a reasonable alternative because it does not meet the purpose of and need for the Proposed Action. However, the No Action Alternative does provide a description of the baseline conditions against which the impacts of the Proposed Action can be compared.

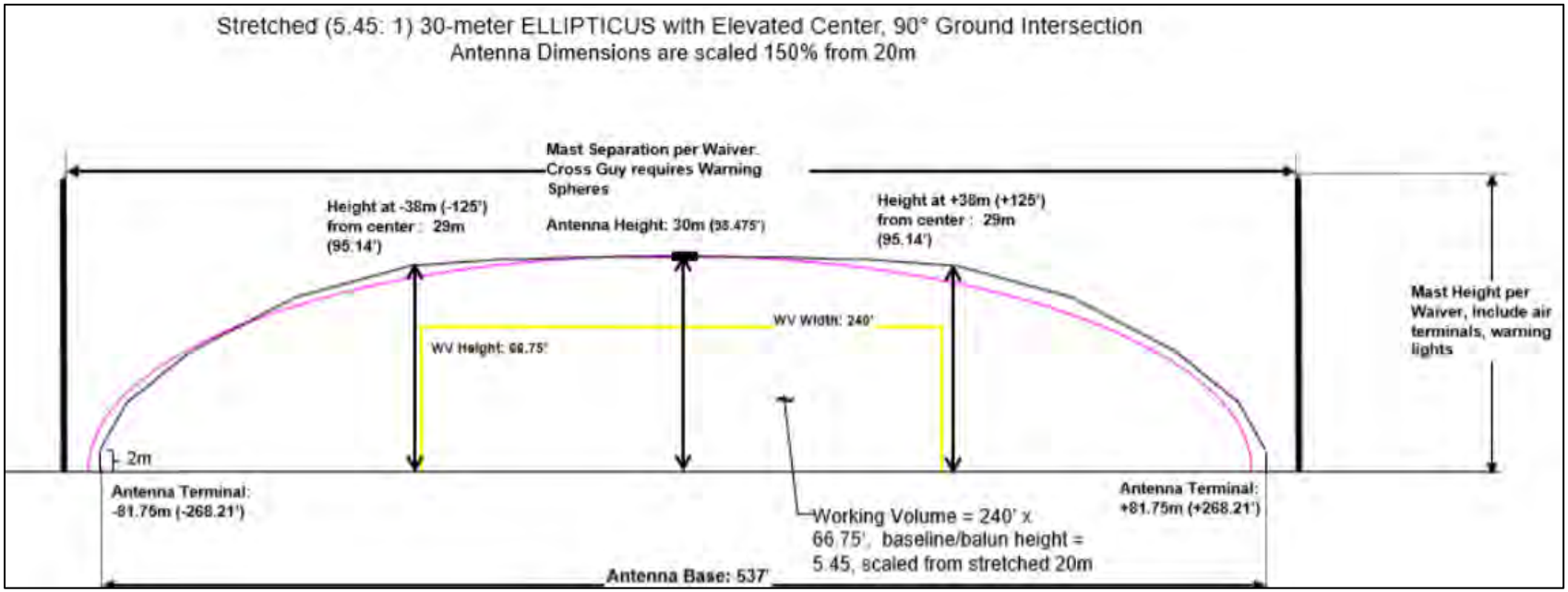

Figure 2-4. 30-meter Ellipticus Fixed Antenna System Schematic (typical)

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2.1.5 Alternatives Considered but Eliminated from Further Consideration

The DAF considered other potential locations for the Proposed Action. However, based on their respective characteristics, each alternative was determined to not meet some of the selection criteria and/or the purpose and need for the Proposed Action. These potential alternatives considered but eliminated from further consideration are described in the following sections.

2.1.5.1 Tinker Air Force Base, Oklahoma

This potential alternative considered utilizing the 30-meter fixed Ellipticus facility at Tinker Air Force Base (AFB), Oklahoma. However, Tinker Air Force Base (TAFB) does not have an aircraft shelter that could accommodate the VC-25B. In addition, TAFB is a busy facility and proposed EMP testing may negatively impact the existing operations tempo. Furthermore, the existing pavement conditions are unsuitable to support the VC-25B. Therefore, the DAF eliminated this potential alternative from further consideration.

2.1.5.2 Greeneville, Texas

This potential alternative considered upgrading the existing 20-meter fixed antenna with a 30-meter fixed antenna. While this potential location does not present any scheduling issues, the location does not currently have a shelter that would accommodate the VC-25B. As in the case of TAFB, the existing pavement conditions are unsuitable to support the VC-25B. Therefore, the DAF eliminated this potential alternative from further consideration.

2.1.5.3 Other Locations at JBSA-Lackland

This potential alternative considered placing the 30-meter fixed antenna at other locations at JBSA-Lackland. A review of other potential locations at JBSA-Lackland did not identify any potential locations that would not present scheduling issues and/or have sufficient pavement to support the proposed project. Therefore, the DAF eliminated this potential alternative from further consideration.

2.2 RESOURCE AREAS ELIMINATED FROM DETAILED ANALYSIS

The determination of environmental resource areas to be analyzed versus those not carried forward for detailed analysis is part of the EA scoping process. CEQ and DAF regulations (40 CFR §1501.9(a) and 32 CFR 989.18) 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.

The following environmental resource areas were found to have no applicability to the proposed action, Action Alternative, or the No Action Alternative, because there would be no potential for direct, indirect, or cumulative impacts. Therefore, these environmental resource areas were not carried forward for detailed analysis in this EA.

2.2.1 Airspace

The Proposed/Action Alternative does not bring a new flying mission to JBSA-Lackland. Construction of a new EMP test facility would not involve changes to, or use of, airspace. Therefore, the airspace resource area is not carried forward for detailed analysis in this EA.

2.2.2 Water Resources

Water resources include groundwater and surface water. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes. The Proposed/Action Alternative is not anticipated to result in changes to water demand at the installation. Additionally, wastewater will not be generated by the Proposed/Action Alternative. Finally, impervious surfaces will not be appreciably altered from current conditions, and stormwater runoff conditions will not change. As such, the quantity and quality of water resources will not be affected by the Proposed/Action Alternative. Therefore, the water resources area is not carried forward for detailed analysis in this EA.

2.2.3 Geology and Soils

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating the potential impacts of a proposed action on geological resources. The Proposed/Action Alternative is not anticipated to result in import or removal of area soils or changes to geologic conditions at the installation. As such, geology and soils will not be affected by the Proposed/Action Alternative. Therefore, the geology and soils resource area is not carried forward for detailed analysis in this EA.

2.2.4 Land Use and Aesthetics

Land use is defined by the physical and functional arrangement of and interrelationships between structures, transportation systems, utilities, uses, and open lands. Human decisions and actions create, influence, and are subject to these physical and functional systems. Current land uses at The Bubble are consistent with future land uses proposed under the Proposed/Action Alternative, and land use designations would not change. The introduction of the EMF test facility at The Bubble would not introduce significant changes in area aesthetics and the area would remain consistent with an airfield supported by industrial activities. As such, land use and aesthetics will not be affected by the Proposed/Action Alternative. Therefore, the land use and aesthetics resource area is not carried forward for detailed analysis in this EA.

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

3.1 INTRODUCTION

The following sections of this chapter describe the current conditions of the environmental resources, either man-made or natural, that would be affected by implementing the Proposed Action, Action Alternative or the No Action Alternative. The existing conditions for relevant resources are defined to provide a meaningful baseline from which to compare potential future effects. Additionally, the potential environmental consequences that are likely to occur as a result of implementation of alternatives that are being considered and analyzed are described.

Section 3.15 presents the environmental permits that may be required when implementing the Proposed Action or the Action Alternative.

3.2 AIR QUALITY

3.2.1 Affected Environment

The General Conformity Regulation (40 Code of Federal Regulations [CFR] Part 93, Subpart B) mandates federal agencies prepare written Conformity Determinations for federal actions in or affecting National Ambient Air Quality Standards (NAAQS) in nonattainment areas, except when the action is covered under the Transportation Conformity Rule, or when the action is exempted because the total increase in emissions would be insignificant, or *de minimis*.

Bexar County is designated by the United States Environmental Protection Agency (USEPA) as Serious Nonattainment area for the 2015 Eight-Hour Ozone (O_3) Standard (89 Federal Register 51829). For ozone, the CAA establishes nonattainment area classifications ranked according to the severity of the area's air pollution problem. These classifications of marginal, moderate, serious, severe, and extreme translate to varying requirements with which areas must comply to meet the ozone standard. (TCEQ, 2024). Bexar County is in attainment or unclassified for all other criteria pollutant standards (Bexar County, 2024).

Prior to July 2024, Bexar County was classified by the USEPA as being in moderate nonattainment for the 2015 Eight-Hour Ozone Standard, effective November 7, 2022. In 2018, the USEPA designated Bexar County as being in nonattainment with a marginal classification (TCEQ, 2024; USEPA, 2025). Bexar County is part of the Metropolitan San Antonio Air Quality Control Region. 40 CFR 81.344 lists the NAAQS Section 107 designation for all NAAQS.

Ozone is formed through the reaction of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). The USEPA has assigned *de minimis* levels for ozone expressed as an amount emitted in tons per year (tpy), depending on the nonattainment status. 40 CFR 93 153 defines *de minimis* levels, that is, the minimum threshold for which a conformity determination must be performed, for various criteria pollutants in various areas.

The corresponding de minimis threshold is 50 tons per year for NO_x and 50 tpy for VOCs. If estimated annual emissions from an action would be below the *de minimus* threshold, no formal Conformity Determination is required per the General Conformity Regulation (40 CFR Part 93, Subpart B).

The primary stationary emissions sources at JBSA-Lackland are the combustion sources, including emergency generators, boilers, and storage tanks (AEIR, 2019). In addition, as a federal installation that is considered a "major source" contributor for air pollution, JBSA maintains a Title V Operating Permit, issued by the Texas Commission on Environmental Quality (TCEQ), which requires monitoring emissions and reporting the findings (JBSA, 2023a). All emergency generators operate under Permit by Rule (PBR) 106.511 and must comply with the requirements of New Source Performance Standard IIII (40 CFR 60 Subpart IIII) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) ZZZZ (40 CFR 63 Subpart ZZZZ). Operational records must be kept to document engine run time and operation type (emergency, non-emergency, test/maintenance).

3.2.2 Environmental Consequences

The environmental consequences are evaluated by completing a quantitative air quality analysis. The estimated emissions from the Proposed Action and Action Alternative are calculated based on the proposed activities reasonably expected to emit pollutants. USAF's Air Conformity Applicability Model (ACAM) Version 5.0.23a is used to model the action alternatives and calculate the estimated emissions. ACAM estimates the emissions by year based on the assumed construction and operational activities for the Proposed Action and Action Alternative. Any potential estimated emissions for either the short-term construction or long-term operations that exceed the *de minimis* thresholds would be an indicator of potential air quality impact that needs additional consideration. Potential estimated emissions below the insignificance indicators of de minimis thresholds would be considered an insignificant, negligible impact.

3.2.2.1 Proposed Action

Under the Proposed Action, the portable CWMS antenna would be erected by a crew using supporting equipment such as boom lifts and trucks. A portable generator would be used during the one-week test period to provide power and area lighting while the system is in use. Boom lifts and trucks and generators would produce emissions; however, these emissions would be minor and temporary. The Proposed Action includes the following assumed activities:

- The activity is completed 10 times each year, indefinitely. The activity is considered indefinite operational emissions, expected to occur each year the activity continues. The emissions are intermittent based on testing schedule but are modeled to estimate the total annual number of emissions.
- Assumed start year of 2027 in model, which is necessary for the software to run. Start date does not influence modeled estimated emissions for the Proposed Action. A full year (January to December) is modeled in ACAM for estimating the upper reasonable number of emissions in a year. The 2028 full year operations are used for the quantitative analyses.
- No construction period. All activities are considered operational activities.
- The CWMS antenna would be erected by a crew of seven people using boom lifts and trucks.
- Portable generators are used for eight days per activity, for a total of 80 days per year, 10 hours per day, resulting in a total of 800 hours per year. Estimate two 150 kilowatt generators.
- Aircraft VC-25B modeled by its surrogate, VC-25A. Assumed additional maximum take-off and landings as 50 times per year, equal to the number of tests.
- Twenty additional staff for JBSA that would have an average commute of 20 miles round-trip.

- Four additional flight sorties per year.
- Operations are assumed to go in indefinitely and emissions remain the same for each year.

Further details about the assumed activities used to estimate the maximum annual emissions from the Proposed Action can be found in Appendix B.

The estimated emissions from the Proposed Action are provided in Table 3-1 by estimated year of activity and compared to *de minimis* thresholds.

Table 3-1. Proposed Action Estimated Emissions Summary Table and Insignificance Indicators Comparison

Activity or Value	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM10 (tpy)	PM2.5 (tpy)
Emissions from Any Operational Year	5.9	1.1	9.7	1.0	0.6	0.6
Insignificance Indicators (*de minimis*)	NA	50	50	NA	NA	NA
Does the Activity exceed insignificance thresholds?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

The estimated emissions in Table 3-1 are for operations that would occur each year related to the Proposed Action indefinitely. The emissions do not exceed the insignificance indicators. Thus, the erection of the portable antenna would generate negligible pollutants from the equipment and generator. A Record of Conformity Analysis (ROCA) for the Proposed Action is available in Appendix B. No further analysis is needed to complete requirements under GCR.

As the portable generator would be used during the test week, it may be exempt from the inclusion in the Title V Operating Permit, provided all other regulatory requirements are met.

3.2.2.2 Action Alternative

Under the Action Alternative, the construction of the permanent antenna and supporting infrastructure would generate short-term and minor emissions during construction. Operational emissions would be different from the Proposed Action because a generator would not be used during testing.

Emissions from the Action Alternative are calculated to include a maximum year with the construction and the operational emissions as well as steady-state operational emissions. The Action Alternative includes the following assumed activities:

- The activity is completed 10 times each year, indefinitely.
- Assumed start year of 2027 in model, which is necessary for the software to run. Start date does not influence modeled estimated emissions for the Proposed Action. A full year (January to December) is modeled in ACAM for estimating the upper reasonable number of emissions in a year. The 2028 full year operations are used for the quantitative analyses.
- There would be a construction period for the Action Alternative. Construction includes all elements listed in Section 2.1.3 and is assumed to be completed within one calendar quarter.
- Operations would begin and complete the full 10 rounds of testing that same year of the construction to evaluate an upper bound scenario for potential emissions.

- Aircraft VC-25B modeled by its surrogate, VC-25A. Assumed additional maximum take-off and landings as 50 times per year, equal to the number of tests.
- Twenty additional staff for JBSA that would have an average commute of 20 miles round-trip.
- Four additional flight sorties per year.

Further details about the assumed activities used to estimate the maximum annual emissions from the Proposed Action can be found in Appendix B.

The estimated emissions from the Action Alternative are provided in Table 3-2 by estimated year of activity and compared to *de minimis* thresholds.

Table 3-2. Action Alternative Estimated Emissions Summary Table and Insignificance Indicators Comparison

Activity or Value	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM10 (tpy)	PM2.5 (tpy)
Emissions from Construction Plus Operations Year (assume full operations)	5.0	0.7	8.0	0.6	0.2	0.2
Emissions from Any Operational Year	4.7	0.7	7.8	0.6	0.2	0.2
Insignificance Indicators (*de minimis*)	NA	50	50	NA	NA	NA
Does the Activity exceed insignificance thresholds?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

The estimated emissions in Table 3-2 are for construction of the CWMS and operations that would occur each year related to the Action Alternative indefinitely. The emissions do not exceed the insignificance indicators. Thus, construction and operation of the antenna would generate negligible pollutants from the equipment and generator. A ROCA for the Action Alternative is available in Appendix B. No further analysis is needed to complete requirements under GCR.

There would be no stationary sources in the Action Alternative that need consideration under the Title V Operating Permit.

3.2.2.3 No Action Alternative

Under the No Action Alternative, there would be no antenna use or activity. No impacts to air quality would occur.

3.2.3 Cumulative Effects

Due to the small increase in air emissions attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.3 CULTURAL RESOURCES

3.3.1 Affected Environment

The Area of Potential Effect (APE) for cultural resources includes The Bubble located at the southwestern end of Kelly Field Annex (Figure 1-3). No currently identified cultural resources are located at The Bubble or would be affected by installation of the EMF test facility at The Bubble. Additionally, no Native American sacred sites or traditional properties have been identified at The Bubble or at JBSA-Lackland as a whole.

3.3.2 Environmental Consequences

3.3.2.1 Proposed/Action Alternative

As there are no cultural resources identified in the APE, the Proposed/Action Alternative would have no effect on historic properties (i.e., sites or structures either listed on or officially determined eligible for inclusion in the NRHP) or other cultural resources. JBSA-Lackland will communicate with SHPO presenting this position, satisfying NHPA Section 106 consultation requirements..

At present, no archaeological remains are recorded at The Bubble and no effects to archaeological sites or isolated artifacts or features have been identified within the APE.

In the event of an unanticipated archaeological discovery during construction activities related to the Proposed/Action Alternative, the USAF would implement the following standard procedures: (1) construction activities within 50 feet of the discovery shall cease (work may continue in other areas); (2) the Project Manager shall notify the JBSA-Lackland Cultural Resources Manager (CRM); and (3) the CRM shall make a field evaluation of the context of the deposit and its probable age and significance and document as appropriate. If disturbance of the archaeological deposits is minimal and the project excavation can be relocated to avoid the remains, the CRM would clear the undertaking at the installation level. If the project excavation cannot be relocated, the CRM shall notify the office of the Texas Historical Commission (SHPO) to report the discovery and to initiate consultation under Section 306108 of the NHPA (formally Section 106) (USF, 2020: 38).

No Native American sacred sites or traditional properties have been identified within The Bubble to date. However, consultation with concerned tribes is ongoing and would be completed before any ground-disturbing activities related to the Proposed/Action Alternative are initiated.

Implementation of the Proposed/Action Alternative would result in less than significant impacts to cultural resources.

3.3.2.2 No Action Alternative

Under the No Action Alternative, no direct physical or visual impacts to the APE would occur. Therefore, implementation of the No Action Alternative would result in less than significant impacts to cultural resources.

3.3.3 Cumulative Effects

No cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.4 BIOLOGICAL AND NATURAL RESOURCES

3.4.1 Affected Environment

3.4.1.1 Wildlife and Habitat

Wildlife and Vegetation. The JBSA-Lackland Kelly Field Annex is located within the Blackland Prairie, South Texas Plains, and Edwards Plateau Ecosystems. The base is comprised of three general vegetative cover types including deciduous shrublands and woodlands, riparian woodlands, and grasslands (Weston Solutions, Inc., 2014). Two habitat types occur within the EMP project area within the JBSA-Lackland Kelly Field Annex. These habitat types include grasslands and riparian woodlands. These habitat types were distinguished and characterized by their associated vegetation communities and dominant species as well as their location on the landscape.

Grasslands: The grassland habitat occurs across most of the project area in and around the airfield and runways. The vast majority of the Kelly Field Annex has been developed. Dominant species include Bermuda grass (*Cynodon dactylon*), silver bluestem (*Bothriochloa laguroides*), silverleaf nightshade (*Solanum elaeagnifolium*), clover species, oldfield threeawn (*Aristida oligantha*), and thistle species (GMI, 2011). The managed grasslands are mowed frequently and perpetually to keep the vegetation low to the ground. Additionally, the native species composition is limited (Weston Solutions, Inc., 2014).

This vegetation community provides little to no habitat for wildlife due to the lack of vertical cover which is kept short by frequent mowing. Additionally, this community is located within and adjacent to a busy airfield which discourages wildlife from traveling, perching, foraging, resting, and occupying the space. JBSA-Lackland frequently manages the vegetation by removing trees and shrubs except for the Leon Creek riparian corridor, which is very narrow, and the very outer fringes of the base property.

Riparian Woodlands: The riparian woodland habitat type occurs in a small portion of the project area and is associated with Leon Creek. This habitat type is dominated by cedar elm (*Ulmus crassifolia*), pecan (*Carya illinoensis*), hackberry (*Celtis occidentalis*), and live oak (*Quercus virginiana*). Wetter areas within the riparian corridor support Eastern cottonwood (*Populus deltoides*) and black willow (*Salix nigra*). Canada wildrye (*Elymus canadensis*), poison ivy (*Rhus radicans*), greenbrier (*Smilax sp.*), and giant ragweed (*Ambrosia trifida*) are found in the herbaceous strata in this habitat type (GMI, 2011).

A wide variety of wildlife utilizes this habitat type due to the presence of surface water, vegetative species diversity, and vegetative cover. Common birds in this habitat type include the mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), Carolina chickadee (*Poecile carolinensis*), Eastern bluebird (*Sialia sialis*), and tufted titmouse (*Baeolophus bicolor*). Large mammals that occupy this habitat type include white-tailed deer (*Odocoileus virginianus*) and feral hog (*Sus scrofa*). Commonly found medium-sized mammals within this community type include raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and nine-banded armadillo (*Dasypus novemcinctus*). Small mammals that occupy this habitat type include the white-ankled mouse (*Peromyscus pectorialis*) and eastern woodrat (*Neotoma floridana*). A variety of amphibian species may also utilize this habitat type.

3.4.1.2 Federally Sensitive Species

The list of Endangered and Threatened Species that may occur within and directly around the proposed project area at JBSA-Lackland Kelly Field Annex in Bexar County, Texas is presented below. This list was obtained from the U. S. Fish and Wildlife Services' (2024a) Information for Planning and Consultation

(IPaC) database mapper for the project area. Designated critical habitat for these federally listed species is not indicated as being present within, or in the immediate vicinity of, the proposed project area. Additionally, a list of Birds of Conservation Concern and Special Attention was provided through the IPaC database mapper for the project area. These species, their habitat requirements, and their potential presence within the project area are presented in Table 3-3 below.

Table 3-3. Federally Listed Species and Birds of Conservation Concern and Special Attention Species for the EMP Project Area

Common Name	Scientific Name	Federal Status	Habitat Requirements	Potential Presence within the Proposed Project Area
Golden-cheeked warbler	*Dendroica chryoparia*	Endangered	Breeding habitat consists of old-growth and mature regrowth Ashe juniper-oak woodlands in limestone hills and canyons at 180-520 meters in elevation.	Suitable habitat is not present within or adjacent to the proposed project area.
Piping plover	*Charadrius melodus*	Threatened	Suitable breeding habitats are wide beaches with highly clumped vegetation and less than 5% overall vegetation cover and/or with extensive gravel.	Suitable habitat is not present within or adjacent to the proposed project area.
Red knot	*Calidris canutus rufa*	Threatened	Breeding habitat is elevated and sparsely vegetated slopes or ridges, often adjacent to wetlands and lake edges.	Suitable habitat is not present within or adjacent to the proposed project area.
San Marcos salamander	*Eurycea nana*	Threatened	Shallow alkaline springs carved out of limestone, with sand and gravel substrate. Associated with water plants and algal mat covering spring pool.	Suitable habitat is not present within or adjacent to the proposed project area.
Texas blind salamander	*Eurycea* [=Typhlomolge] *rathbuni*	Endangered	Water filled caves of the Edwards Aquifer	Suitable habitat is not present within or adjacent to the proposed project area.
Fountain darter	*Etheostoma fonticola*	Endangered	Vegetated springs, pools, and runs of effluent rivers with dense beds of aquatic plants growing close to the bottom, which is normally mucky.	Suitable habitat is not present within or adjacent to the proposed project area.
Beetle	*Rhadine exilis*	Endangered	Subterrestrial species known from 49 to 55 caves in Bexar County, TX.	Suitable habitat is not present within or adjacent to the proposed project area.
Beetle	*Rhadine infernalis*	Endangered	Subterrestrial species known from 36 to 39 caves in Bexar County, TX.	Suitable habitat is not present within or adjacent to the proposed project area.

Common Name	Scientific Name	Federal Status	Habitat Requirements	Potential Presence within the Proposed Project Area
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Endangered	Subterranean species occurring in flowing, uncontaminated waters.	Suitable habitat is not present within or adjacent to the proposed project area.
Comal Springs riffle beetle	*Heterelmis comalensis*	Endangered	Not a subterranean species. It occurs in the gravel substrate and shallow riffles in spring runs.	Suitable habitat is not present within or adjacent to the proposed project area.
Helotes mold beetle	*Batrisodes venyivi*	Endangered	Subterrestrial species known from 8 caves in Bexar County, TX.	Suitable habitat is not present within or adjacent to the proposed project area.
Monarch butterfly	*Danaus plexippus*	Candidate*	Breeding habitat must contain milkweeds.	Suitable habitat is not present within or adjacent to the proposed project area.
Cokendolpher Cave harvestman	*Texella cokendolpheri*	Endangered	Subterrestrial species known from a single locality, Robber Baron Cave.	Suitable habitat is not present within or adjacent to the proposed project area.
Government Canyon bat cave meshweaver	*Cicurina vespera*	Endangered	Subterrestrial species known from a single locality in Bexar County, TX.	Suitable habitat is not present within or adjacent to the proposed project area.
Madla Cave meshweaver	*Cicurina madla*	Endangered	Subterrestrial species known from 8 caves in Bexar County, TX.	Suitable habitat is not present within or adjacent to the proposed project area.
Robber Baron Cave meshweaver	*Cicurina baronia*	Endangered	Subterrestrial species known from a single locality, Robber Baron Cave.	Suitable habitat is not present within or adjacent to the proposed project area.
Peck's Cave amphipod	*Stygobromus* (=Stygonectes) *pecki*	Endangered	Primary habitat is a zone of permanent darkness in the underground Edwards Aquifer feeding the springs.	Suitable habitat is not present within or adjacent to the proposed project area.
Texas wild-rice	*Zizania texana*	Endangered	Gravel shallows near the middle of the river.	Suitable habitat is not present within or adjacent to the proposed project area.

Common Name	Scientific Name	Federal Status	Habitat Requirements	Potential Presence within the Proposed Project Area
American golden-plover	*Pluvialis dominica*	Bird of Conservation Concern	Summer on arctic tundra, winter on plowed fields, shortgrass fields, and mudflats.	Suitable habitat is not present within or adjacent to the proposed project area.
Bald eagle	*Haliaeetus leucocephalus*	Special Attention Species	Reservoirs and rivers.	Suitable habitat is not present within or adjacent to the proposed project area.
Chimney swift	*Chaetura pelagica*	Bird of Conservation Concern	Towns and cities, rarely over riparian areas away from towns.	Suitable habitat is not present within or adjacent to the proposed project area.
Kentucky warbler	*Geothlypis formosa*	Bird of Conservation Concern	Lowland riparian areas, especially in thickets.	Suitable habitat is not present within or adjacent to the proposed project area.
Least tern	*Sternula antillarum antillarum*	Bird of Conservation Concern	Breeding on bare sandy shorelines of islands of reservoirs.	Suitable habitat is not present within or adjacent to the proposed project area.
Lesser yellowlegs	*Tringa flavipes*	Bird of Conservation Concern	Reservoir and lake shorelines and wet grassy meadows.	Suitable habitat is not present within or adjacent to the proposed project area.
Little blue heron	*Egretta caerulea*	Bird of Conservation Concern	Reservoirs, edges of marshes, grassy meadows, and rivers.	Suitable habitat is not present within or adjacent to the proposed project area.
Long-billed curlew	*Numenius americanus*	Bird of Conservation Concern	Short-grass grasslands and sometimes wheatfields or fallow fields.	Suitable habitat is not present within or adjacent to the proposed project area.
Mountain plover	*Charadrius montanus*	Bird of Conservation Concern	Short-grass grassland, occurring primarily on level areas with very short grass and scattered cactus and avoiding taller grass and hillsides.	Suitable habitat is not present within or adjacent to the proposed project area.
Pectoral sandpiper	*Calidris melanotos*	Bird of Conservation Concern	Shorelines of reservoirs and lakes and wet meadows.	Suitable habitat is not present within or adjacent to the proposed project area.

Common Name	Scientific Name	Federal Status	Habitat Requirements	Potential Presence within the Proposed Project Area
Prairie loggerhead shrike	*Lanius ludovicianus*	Bird of Conservation Concern	Open riparian areas, agricultural areas, grasslands, and shrublands, especially semidesert shrublands, and sometimes open pinyon-juniper woodlands.	Suitable habitat is not present within or adjacent to the proposed project area.
Sprague's pipit	*Anthus spragueii*	Bird of Conservation Concern	In sprouting winter wheat, volunteer wheat, and fallow wheat fields.	Suitable habitat is not present within or adjacent to the proposed project area.

* Candidate species receive no statutory protection under the Endangered Species Act. The USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the Endangered Species Act.

A Biological Assessment (BA) is included in Appendix C, presenting each species and their habitat requirements as well as their potential to occur within the proposed project area. Additionally, the BA determines if any of the listed species will be impacted by the proposed project.

3.4.1.3 State Sensitive Species

The list of state sensitive species that may occur within or directly adjacent to the proposed project area at the JBSA-Lackland Kelly Field Annex is presented below. The list was obtained from the Texas Parks and Wildlife Database (2024) for Bexar County. These species, their habitat requirements, and their potential presence within the project area are presented in Table 3-4 below.

Table 3-4. State Listed Species and Birds of Conservation Concern and Special Attention Species for the EMP Project Area

Common Name	Scientific Name	State Status	Habitat Requirements	Potential Presence within the Proposed Project Area
Texas horned lizard	*Phrynosoma cornutum*	Threatened	Plains grasslands.	Suitable habitat is not present within or adjacent to the proposed project area.
Texas tortoise	*Gopherus berlandieri*	Threatened	Semi-desert areas and scrub forests in humid, subtropical areas, preferring open scrub woods and well-drained, sandy soils.	Suitable habitat is not present within or adjacent to the proposed project area.
Cascade Caverns salamander	*Eurycea latitans*	Threatened	Subterrestrial species that lives in groundwater-dependent ecosystems of the Edwards-Trinity Aquifer system.	Suitable habitat is not present within or adjacent to the proposed project area.

Common Name	Scientific Name	State Status	Habitat Requirements	Potential Presence within the Proposed Project Area
Comal blind salamander	*Eurycea tridentifera*	Threatened	Subterrestrial species that lives in clean, cool water from the Edwards Aquifer.	Suitable habitat is not present within or adjacent to the proposed project area.
San Marcos salamander	*Eurycea nana*	Threatened	Shallow alkaline springs carved out of limestone, with sand and gravel substrate. Associated with water plants and algal mat covering spring pool.	Suitable habitat is not present within or adjacent to the proposed project area.
Texas blind salamander	*Eurycea* [=Typhlomolge] *rathbuni*	Endangered	Water filled caves of the Edwards Aquifer	Suitable habitat is not present within or adjacent to the proposed project area.
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Endangered	Subterranean species occurring in flowing, uncontaminated waters.	Suitable habitat is not present within or adjacent to the proposed project area.
Comal Springs riffle beetle	*Heterelmis comalensis*	Endangered	Not a subterranean species. It occurs in the gravel substrate and shallow riffles in spring runs.	Suitable habitat is not present within or adjacent to the proposed project area.
Peck's Cave amphipod	*Stygobromus* (=Stygonectes) *pecki*	Endangered	Primary habitat is a zone of permanent darkness in the underground Edwards Aquifer feeding the springs.	Suitable habitat is not present within or adjacent to the proposed project area.
Peregrine falcon	*Falco peregrinus anatum*	Threatened	Open country near cliffs, urban areas, coast.	Suitable habitat is not present within or adjacent to the proposed project area.
White-faced ibis	*Plegadis chihi*	Threatened	Freshwater and brackish marshes.	Suitable habitat is not present within or adjacent to the proposed project area.
Piping plover	*Charadrius melodus*	Threatened	Suitable breeding habitats are wide beaches with highly clumped vegetation and less than 5% overall vegetation cover and/or with extensive gravel.	Suitable habitat is not present within or adjacent to the proposed project area.
Red knot	*Calidris canutus rufa*	Threatened	Breeding habitat is elevated and sparsely vegetated slopes or ridges, often adjacent to wetlands and lake edges.	Suitable habitat is not present within or adjacent to the proposed project area.

Common Name	Scientific Name	State Status	Habitat Requirements	Potential Presence within the Proposed Project Area
Wood stork	*Mycteria americana*	Threatened	Swamps, coastal shallows, ponds, and flooded pastures.	Suitable habitat is not present within or adjacent to the proposed project area.
Zone-tailed hawk	*Buteo albonotatus*	Threatened	In open rugged country near canyons and cliffs.	Suitable habitat is not present within or adjacent to the proposed project area.
Golden-cheeked warbler	*Dendroica chrysoparia*	Endangered	Found in the Texas Hill Country where it nests in juniper-oak woodlands	Suitable habitat is not present within or adjacent to the proposed project area.
Whooping crane	*Grus americana*	Endangered	Summers on freshwater marshes; winters on saltwater marshes.	Suitable habitat is not present within or adjacent to the proposed project area.
Black bear	*Ursus americanus*	Threatened	Forests (both coniferous and deciduous), mountains, swamps, open alpine areas, and rugged, high-elevation terrain.	Suitable habitat is not present within or adjacent to the proposed project area.

A Biological Evaluation is included in Appendix D, presenting each species and their habitat requirements as well as their potential to occur within the proposed project area and be affected by the proposed project.

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action

The existing JBSA-Lackland Kelly Field Annex has been in use for years and is comprised of buildings, paved parking lots, sidewalks, runways, as well as small areas of vegetation that are mowed and managed.

Direct Effects

Loss of Habitat and Vegetative Cover. An approximate 300 foot diameter of existing paved area would be used for the implementation of the Proposed Action. The project area is small, square, and aerially limited. Managed grassland and riparian woodland habitat associated with Leon Creek lie outside of the paved area and would not be directly affected by the mobile Electromagnetic Pulse Test Facility.

Wildlife. Displacement of wildlife species, including sensitive species, is already occurring due to the existence of airfields and runways at the Kelly Field Annex. Due to the populated buildings and roads within and around the Proposed Action project area, wildlife populations are not typically observed, although individual urban wildlife species, such as raccoons, are likely observed. Increased traffic and human activities at the Proposed Action project area may result in an increase in wildlife-vehicle collisions, however, the increase in wildlife mortality due to vehicle collisions would be unlikely to have a significant impact on local wildlife population.

The small area within the Proposed Action project area near Leon Creek may see fewer wildlife species using the space but the far side of the drainage and the up- and downstream areas of Leon Creek will be accessible to wildlife and no change to those areas availability will occur.

Birds may strike the cables securing the CWMS antennae within the project area, but the birds will adapt to the cables (as they do to transmission lines and telephone lines) and the antennae will be erected for only a short period of time for each testing period. However, since the antennae will be present infrequently, birds may strike the cables and/or antennae more frequently than under the Action Alternative. Restrictions to using the CWMS during bird migration seasons are not anticipated. Any impacts to wildlife in The Bubble proposed under the Proposed Action alternatives would be minimal and would not be adverse.

According to Malkemper et al. (2018), the magnetic orientation for migratory birds can be affected by radio frequency fields. The magnetic compass of migratory birds can be disrupted by the weak radio frequency background in larger cities, but it is currently unclear which exact frequencies are most effective. At this time, it is unclear whether disruption of a magnetic compass has real ecological consequences as animals and birds use a variety of mechanisms for orientation.

Due to the proximity of the project to the flightline, precautions must be taken to prevent Bird/Wildlife Aircraft Strike Hazard (BASH) issues and other wildlife attractants or entrances on or near the airfields. Any maintenance or construction activities on or near the airfields will follow the JBSA BASH Plan and AFPAM 91-212 to include but not limited to, the prevention of ruts, bare spots, wildlife entrances, or any other disturbance that could cause water to pool up or attract birds/wildlife.

Sensitive Species and Critical Habitat. No critical habitat for federally protected or state sensitive species occurs in the Proposed Action project area. No habitat for the state and federally sensitive species listed above occurs within the project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Therefore, implementation of the Proposed Action would have no adverse effects to federally listed or state listed species. JBSA-Lackland will communicate with USFWS presenting this position, satisfying Endangered Species Act Section 7 consultation requirements.

Indirect Effects

No indirect effects will occur to plants and their communities, wildlife, and sensitive species under the Proposed Action. Again, the area of use under the Proposed Action is small, aerially limited, and already disturbed by use as an airfield.

3.4.2.2 Action Alternative

Direct Effects

Loss of Habitat and Vegetative Cover. Under the Action Alternative, several structures will be constructed to support the permanent electromagnetic pulse test facility. Managed grassland vegetation would be permanently lost due to the construction of the structures if they cannot be constructed on the existing paved areas. The effects to vegetation and wildlife from the Action Alternative would be minor, because the project area is already disturbed and occupied by development of an airfield and runways. The Action Alternative may increase the area of hard, impervious surfaces via pavement which will reduce the surface area of bare or vegetated soils for wildlife to use for burrowing, travel, cover, and hunting. However, use by wildlife in The Bubble is limited due to the existing activity at the project area and the perpetual and frequent mowing of the vegetation within The Bubble. Since the antennae would be permanent on the

landscape under this alternative, birds will adapt to the cables and antennae faster and fewer strikes would be expected because they will adjust to it always being present and avoid it or fly around it.

Displacement of Wildlife. Just as the Proposed Action does, under this alternative, any impacts to wildlife in The Bubble proposed under the Action Alternative would be minimal and would not be adverse.

Similarly, due to the proximity of the project to the flightline, precautions must be taken to prevent BASH issues and other wildlife attractants or entrances on or near the airfields. Any maintenance or construction activities on or near the airfields will follow the JBSA BASH Plan and AFPAM 91-212 to include but not limited to, the prevention of ruts, bare spots, wildlife entrances, or any other disturbance that could cause water to pool up or attract birds/wildlife.

Sensitive Species and Critical Habitat. No critical habitat for federally protected or state sensitive species occurs in the Action Alternative project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Therefore, implementation of the Alternative Action would have no adverse effects to federally listed or state listed species.

Indirect Effects

No indirect effects will occur to plants and their communities, wildlife, and sensitive species under the Action Alternative. Again, the area of use under the Action Alternative is small, aerially limited, and already disturbed by use as an airfield.

3.4.2.3 No Action Alternative

No direct or indirect effects on vegetation, wildlife, or sensitive species would occur under this alternative as no impact to the vegetation communities within the proposed project area would be realized. No cumulative effects are expected from the No Action Alternative.

3.4.3 Cumulative Effects

No cumulative effects are expected from the Proposed/Action Alternative. The project would not increase the size of unusable areas for wildlife or sensitive species and vegetation management would continue as it is currently conducted. Generally, wildlife, including sensitive species, avoid human occupation areas due to increased activity, noise, and light pollution.

3.5 FLOODPLAINS, WETLANDS, AND COASTAL ZONE MANAGEMENT

3.5.1 Affected Environment

3.5.1.1 Floodplains

According to the Federal Emergency Management Agency's (FEMA) National Flood Hazard Map, a 100-year floodplain has been mapped within the Kelly Field Annex, particularly in association with Leon Creek. The associated map includes Flood Insurance Rate Map No. 48029C0555F, effective date 9/29/2010. Part of the project area lies in Zone X (unshaded) which is a minimal flood hazard area; and part of the project area lies in Zone X (shaded) which is a moderate risk area within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot; areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile; and areas protected from the 1-percent-annual-chance flood by a levee. The Bubble is located near but outside of Zone A-E

which is an area subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods.

3.5.1.2 Wetlands

According to the U.S. Fish and Wildlife Service's National Wetland Inventory Mapper, Leon Creek is mapped as a permanently flooded, lower perennial riverine system with an unconsolidated bottom (R2UBH) (USFWS, 2024b) adjacent to The Bubble. No wetlands occur within the proposed project area.

3.5.1.3 Coastal Zones

The Coastal Zone Management Act (CZMA) was promulgated to control nonpoint pollution sources that affect coastal water quality. The CZMA of 1990, as amended (16 USC 1451 et seq.) encourages States to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as fish and wildlife using those habitats.

According to the National Oceanic and Atmospheric Administration (NOAA) Coastal Flood Exposure Mapper Website, there are no coastal zones in or around San Antonio, Texas (NOAA, 2024).

3.5.2 Environmental Consequences

3.5.2.1 Proposed/Action Alternatives

Direct Effects

The Proposed/Action Alternative area lies outside the 100-year floodplain of Leon Creek. No buildings will be constructed within the 100-year flood plain of Leon Creek. The Proposed/Action Alternative will have no impact on floodplains, wetlands, or coastal zones.

Indirect Effects

No indirect effects to Waters of the United States, including wetlands, floodplains, or coastal zones will occur under the Proposed/Action Alternative as the project will occur on existing pavement.

3.5.2.2 No Action Alternative

No impacts to floodplains, wetlands, or coastal zones would occur under this alternative.

3.5.3 Cumulative Effects

No cumulative effects are expected under the Proposed/Action Alternative.

3.6 NOISE AND VIBRATION / ACOUSTIC ENVIRONMENT

Noise is defined as any sound that is undesired by the recipient and typically includes sounds not present in the natural environment, such as sounds emanating from aircraft; highways; and industrial, commercial, and residential sources. Noise generally interferes with normal activities or otherwise diminishes the quality of the natural environment. Noise may be intermittent or continuous, steady or impulsive, stationary or transient.

3.6.1 Affected Environment

Noise-sensitive land uses include:

- Nearby residential areas
- Schools
- Hospitals
- Hotels/motels
- Churches/cemeteries
- Libraries
- Public Parks

The Bubble project area is generally consistent with an urban or suburban setting. As such, the predominant noise sources in the area include mobile sources (such as aircraft and personal and commercial vehicles) and stationary sources (such as heating, ventilation, and air conditioning units attached to buildings). Vehicle traffic and associated noise is heaviest along SH 13 (S.W. Military Drive), which is near The Bubble to the south.

3.6.2 Environmental Consequences

In 2023, a much larger-scale EA was completed for Security Hill Campus, Joint Base San Antonio-Lackland, Texas. The EA detailed noise analysis demonstrated that there would be no significant impact to noise from implementing 90 short-term development actions and real-property improvements on JBSA from approximately 2023 to 2027 (JBSA, 2023a).

3.6.2.1 Proposed/Action Alternative

Construction activities for the Proposed/Action Alternative would be short-term and accompanied by a short-term increase in noise levels. The increase in noise levels in the vicinity of the construction activities would be short-term but noticeable. As the distance from the source is increased, the noise levels attributable to the demolition/construction activities continue to decrease as they approach existing background sound levels.

The perceived impacts from the increase in noise levels would depend on the receptor and site-specific conditions (including sound shielding). The predicted increases in noise levels would be consistent with typical urban construction projects, activities could be scheduled for normal daytime business hours, and proper equipment maintenance and noise shielding would minimize noise level increases from construction activities.

Operation-related noise impacts would be minor. Operation-related vibration impacts would not be expected.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the EMP test facility would not be constructed and operated. No significant changes to noise levels from current conditions would occur. Therefore, implementation of the No Action Alternative would result in less than significant impacts to noise and vibration.

3.6.3 Cumulative Effects

Due to the small and temporary increases in noise attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.7 INFRASTRUCTURE AND UTILITIES

3.7.1 Affected Environment

Utility infrastructure consists of water, wastewater, stormwater, electricity, and natural gas. Utilities have been privatized, with the exception of stormwater. The installation-wide utility usage is described below.

Water: JBSA-Lackland has a total of eight groundwater supply wells, with six on the main installation. All wells on the main installation are currently active, but one of the two Chapman Training Annex pumps is inactive. The wells draw from the Edwards Aquifer and are subject to its regulations. Approximately 750 million gallons (Mgal) per year are supplied from the pumps, and approximately 1.2 to 1.5 Mgal per day are used on the main installation.

Wastewater: The sewer systems at JBSA-Lackland are maintained by San Antonio Water System. The wastewater is routed to a 54-inch main line, which conveys the water to the city treatment facilities and is able to accommodate additional requirements.

Stormwater: Stormwater is conveyed primarily through an open ditch system, but there is also underground piping which is of insufficient capacity to serve the installation. The ditches also work as detention ponds.

Electric: Electricity is provided to JBSA-Lackland via three (two active) 169-kilovolt (kV) feeders that supply power from San Antonio's CPS Energy to a single substation (the Valley Hi Switch Station) located outside the Valley Hi Gate. Three three-phase, 40-megavolt-ampere transformers step the voltage down from 169 kV to 13.2 kV for distribution throughout the installation. Existing substation capacity is estimated at 60 megawatts (MW) (limited by the switchgear), which could be increased with switchgear upgrades. Although the substation has capacity to reach 60 MW, the current contractual limit that it can draw from the grid is 36 MW. JBSA-Lackland is using more than 36 MW (estimated at 45 MW), and the contract will likely have to be renegotiated to facilitate recent and expected future demand increases.

Natural Gas: Kinder Morgan provides natural gas to the JBSA-Lackland main installation. There are two points of entry into the main installation for natural gas. The main connection is southwest of the installation via an 8-in line, and an 8-in, 225-pounds-per-square-inch (psi) line runs along the north installation boundary to supply the hospital. There is also a redundant system within the installation. The main installation has a high-pressure, 48-psi distribution loop circling the western half of the installation, and a low-pressure, 18-psi distribution loop on the east side. The capacity of the natural gas system is considered to be adequate to meet existing needs.

3.7.2 Environmental Consequences

3.7.2.1 Proposed/Action Alternative

The Proposed/Action Alternative would require a relatively small increase in electricity demand for short durations during testing operations. Increases in other utility requirements, including water, sewer, and gas, are not anticipated. Installation of water/wastewater utilities at any permanent facilities are not anticipated

as testing activities are intermittent and other facilities in the general vicinity can provide these services. No significant adverse impacts to infrastructure and utilities are predicted.

3.7.2.2 No Action Alternative

Under the No Action Alternative, no change to the existing conditions would occur. Therefore, implementation of the No Action Alternative would result in less than significant impacts to infrastructure and utilities.

3.7.3 Cumulative Effects

Due to the small increase in utilities usage attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.8 SOLID AND HAZARDOUS MATERIALS/WASTE

3.8.1 Affected Environment

3.8.1.1 Proposed and Action Alternatives

Hazardous and toxic materials at JBSA are managed by the JBSA Environmental Section (802 Civil Engineering Squadron/Civil Engineering Installation Environmental Office [CES/CEIE]), which has overall responsibility of the installation environmental program. The Bioenvironmental Engineering Flight/Preventative Medicine supports and monitors environmental permits, hazardous materials, and hazardous waste storage, spill prevention and response, and participation on the Environmental Safety and Occupational Health Council (JBSA, 2016). Hazardous wastes generated at JBSA include waste flammable solvents, paints/coating, stripping chemicals, contaminated fuels and lubricants, waste oils, mixed-solid waste, and other miscellaneous wastes.

There are no Installation Restoration Program (IRP) or Resource Conservation and Recovery Act (RCRA) sites located within the project area. The closest IRP sites are a is a trichloroethane (TCE) plume located approximately 0.5 miles west of the project area and a tetrachloroethylene (PCE) plume located approximately 0.7 miles southeast of the project area (JBSA, 2023b). Additionally, RCRA site E-3 is located approximately half a mile southeast of the project area (TCEQ, 2019).

3.8.2 Environmental Consequences

3.8.2.1 Proposed/Action Alternative

Under the Proposed Action and the Action Alternative, the construction of the EMP test facility would involve minimal use of hazardous materials. Common materials associated with construction include concrete, metals, wiring, and non-hazardous construction materials. Equipment used during construction would include trucks, lawnmowers, and blowers that contain or require use of petroleum products. Prior approval and coordination is required for any fuel/POL storage containers greater than 50 gallons. Petroleum products used in construction equipment do not impact hazardous waste or materials unless they are spilled, contaminated, or disposed of improperly. In the event that small quantities of hazardous materials (e.g., cleaning agents or lubricants) are spilled or used, they would be properly handled, stored, and disposed of in accordance with the JBSA Hazardous Waste Management Plan (JBSA, 2016), Spill Prevention Control and Countermeasures Plan (JBSA, 2018a), and Facility Response Plan (JBSA, 2018b).

These plans ensure that hazardous waste is managed according to all federal, state, and local laws and regulations.

The Proposed/Active Alternative are located within the footprint of the former Kelly AFB RCRA permit. As such, there are potential coordination requirements associated with the permit conditions. The operation and maintenance of EMP testing facilities would not generate hazardous wastes, as they do not involve processes that produce toxic byproducts. Routine maintenance activities such as cleaning and electrical inspections would be performed using non-toxic substances.

The potential exists to encounter abandoned underground water mains and servicing lines (made of asbestos or cement. Transite visually appears like concrete, and sometimes the layers or fibers are visible. If these pipes are encountered and subsequently damaged during excavation, the area-specific JBSA Environmental office will be notified for further instructions. Repair or abatement of the pipes would be performed by a certified asbestos abatement team.

Under the Action Alternative, construction would involve the excavation of soil during the site preparation and foundation work for the personnel support structure and other associated structures. While not expected, contamination may be present in the excavated soils. If excavation indicates the potential presence of contaminated soil, sampling and laboratory analysis would be completed until all contaminated soil has been handled in accordance with JBSA plans.

3.8.2.2 No Action Alternative

Under the No Action Alternative, there would be no antenna use or activity. No impacts to Hazardous Materials and Waste would occur.

The Proposed Action and Action Alternative would not involve substantial quantities of hazardous or toxic materials, nor would it disturb any known contamination sites, and would be performed in adherence to regulatory requirements by JBSA. Therefore, implementation of the Proposed Action or Action Alternative would result in a negligible impact to hazardous materials and wastes.

3.8.3 Cumulative Effects

Due to the small increase in waste generation attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.9 TRANSPORTATION AND PARKING

3.9.1 Affected Environment

JBSA is located in the southwestern portion of the San Antonio Metropolitan Area in Bexar County, Texas. The nearest major highway interchange to JBSA is US Highway 90 and Interstate 410, northwest of the Installation. Most roads at JBSA are paved asphalt and experience regular high traffic volumes (JBSA, 2023c). Numerous surface parking lots are clustered around buildings and other facilities surrounding the runway. In the southwestern area of the runway north of The Bubble, along Oscar Westover Rd. a review of recent aerial photography suggests that parking demand in this area is concentrated around existing facilities, with vacant spaces available in the outlying lots. Currently, JBSA has approximately 70,000 direct employees, most of which commute to the base every day (City of San Antonio, 2024).

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action

Under the Proposed Action, operations would result in a temporary increase in traffic volumes for the duration of the maximum testing scenario of 50 tests per year or maximum periodicity of testing of up to ten 1-week periods. Periodic construction during each test would involve a crew of approximately seven personnel using supporting equipment such as boom lifts and trucks. Due to the relatively small construction effort and infrequency of the tests, the impact to traffic from the implementation of the Proposed Action would have a negligible impact on transportation and parking when compared to the existing transportation and traffic network.

3.9.2.2 Action Alternative

Under the Action Alternative, construction would require materials to be brought to the site via truck. At any given time during the construction period, it is expected that 12 construction workers and a few trucks would be traveling to and from the various project sites. Due to the relatively small project size and construction team, there would be a negligible temporary increase in traffic and parking from construction vehicles and worker commutes when compared to the existing transportation and traffic network.

3.9.2.3 No Action Alternative

Under the No Action Alternative, there would be no antenna use or activity. No impacts to transportation and parking would occur.

Over the long-term, operation of the Proposed Action and Action Alternative would add approximately 20 personnel to JBSA. Currently, JBSA has 70,000 direct employees; thus, the relatively small addition of personnel would have a negligible effect on traffic and parking in and around JBSA. Therefore, implementation of the Proposed Action or Action Alternative would result in a negligible impact to transportation and parking.

3.9.3 Cumulative Effects

Due to the insignificant increase in transportation attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.10 ELECTROMAGNETIC FIELD

3.10.1 Affected Environment

Existing EMF conditions in the vicinity of the project site present a dense, complex EMF environment populated with many types of antennae that both receive and transmit data, as well as EMF due to the JBSA power grid. These include stationary ground-based sources associated with daily flightline operations, ground-based sources external to the airfield (such as TV stations, radio stations, and cell phone towers), and airborne transceivers on the aircraft operating in the vicinity of the airfield. Each of these radio frequency (RF) sources operate at specific frequencies such that they do not interfere with each other, and care must be taken when adding a new EMF source to ensure compatibility with the existing EMF environment.

The Federal Communications Commission (FCC) maintains the Table of Frequency Allocations which includes both the International Table of Frequency Allocations and the United States Table of Frequency Allocations. This table codifies specific uses for individual bands into federal law.

3.10.2 Environmental Consequences

There are several aspects of an EMP that should be considered to fully determine the level of environmental impact. Each of the below will be addressed for each action alternative and the no action alternative.

- Human Health and Safety
- Interaction with the Existing EMF Environment
- Interaction with Electronics
- Interaction with Fuels
- Interaction with Explosives

Please see Section 3.4 for EMP/EMF effects on the natural environment.

3.10.2.1 Proposed Action

As initially described in Section 2.1.2, and further described in Appendix C, the Proposed Action would use a portable antenna system at the JBSA-Lackland Kelly Field Annex. The mobile EMP consists of a single mast, manufactured by Contact Corp., that is approximately 24 meters tall and supported by up to 16 tension cables and stakes. At the top of the mast an ARA LPC-1030-101 crossed log periodic antenna would operate in one of two modes: horizontal and vertical. The mobile test would be powered by an AR 150U1000 150-watt amplifier running off a portable generator and would be capable of producing EMF from 0.1 MHz to 1,000 MHz. Only specific frequencies in this range would be used, and several frequencies (known as "skip bands") would be omitted to ensure no interaction with the existing EMF/RF environment. Operation would occur in a "stepped" fashion, beginning with a ~40 millisecond signal at 0.1 MHz followed by a ~460 millisecond gap with no transmission, then moving on to the next frequency for ~40 milliseconds, and so on until test completion at 1,000 MHz about 12 minutes later. This process would occur for, at a minimum, four "shots" per aircraft: nose-on, tail-on, left-wing-on, and right-wing-on. The mobile EMP antenna would remain stationary for each test; a tug would be used to position the aircraft for each orientation. Once all tests are complete, the mobile unit would be taken down and put into storage until needed again (Auxilio, 2024).

<u>Human Health and Safety</u>

Human health and safety of EMF is determined by calculating the distance at which the maximum permissible exposure (MPE) could be exceeded based on the characteristics of the specific frequency, power, and antenna used. For the purposes of the operations described this can be treated as a pulsed emitter – one that operates in small bursts of energy followed by a brief pause. As seen in Appendix C, both the Upper Tier and Lower Tier MPE and the associated hazard distance at which the MPE could be exceeded were calculated for both the electric and magnetic fields at every frequency identified for use by the USAF. The Upper Tier values are used for personnel who are aware they are working with EMF devices and know of the hazard that may exist. The Lower Tier values are used for personnel and members of the public who are not aware of the hazard; the hazard distance for this value is somewhat larger to ensure personnel and public safety. The furthest hazard distance was then determined for each of the Upper Tier and Lower Tier, as shown in Table 3-5 (Auxilio, 2024).

Table 3-5. MPE Hazard Distances for the Proposed Action

Antenna Orientation	Hazard Distance Upper Tier Environment [meters]	Hazard Distance Lower Tier Environment [meters]
Horizontal	0.684	1.529
Vertical	0.653	1.460

Given that the mast is 24 meters tall, all personnel working in the vicinity of the antenna would be well outside the hazardous range during normal operation. However, it must be noted that this assumes the antenna would only be in operation with the telescoping mast extended. If the antenna were to operate with the mast lowered for any reason, the Upper Tier values should be observed for all EMF workers. It should also be noted that due to the security of the particular location of the test that no unaware personnel or members of the public should be within several hundred meters of the emitter (i.e., the Lower Tier values should not be needed) (Auxilio, 2024).

In addition to the calculated MPE values, DAFI 48-109 specifically states that for an EMP, the safe EMF field strength limit should be limited to 100 kilovolts per meter (kV/m) (USAF, 2020). Based on the design of the antenna and the low power amplifier in use, engineers who have created the system state the field strength would be no more than 3 volts per meter (V/m) directly next to the antenna. This value would decrease quickly as distance increases and would measure approximately 1 V/m at the test target (USAF, 2023).

Interference with the Existing EMF Environment

The project team will identify those EMF frequencies in use around the JBSA-Lackland Kelly Field Annex and omit them from the EMP test to minimize interference. Engineers are also able to reduce the gain for specific frequencies by up to 10 dB, which would further reduce interference among frequencies near those in use (USAF, 2023). Given these contingencies, the power input, the narrow bandwidth (10 Hz) and unmodulated signal at each frequency, and direction the antenna would be pointing, it is unlikely that any other receiving antenna (such as standard radio) would pick up anything other than slight noise in a specific band. It should be noted that even if a radio were to pick up the test, it would present as very slight static noise and would only last for ~0.040 seconds before the test pauses and progresses to the next frequency.

Interaction with Electronics

The primary concern with an EMP is the initial wave of EMF that couples with various electrical components found in consumer electronics, potentially causing damage. This has become even more relevant today as microchips are now constructed of nanometer-scale components. The problem with these miniscule traces and structures is that an induced current from an EMP would flow through parts not designed for such power, causing individual components to melt, break, or otherwise be damaged.

The maximum field strength of the mobile EMP is 3 V/m directly next to the antenna, which rapidly decreases to 1 V/m as the distance from the antenna increases. For comparison, an EMP-based weapon could be expected to exceed 50,000 V/m (50 kV/m) within a few nanoseconds of the initiating explosion (Reardon, 2014). Given the very low output of the CWMS system, EMF workers could wear wristwatches, communications equipment (such as handheld radios), and even keep their cell phones on them without interference.

Interaction with Fuels

Per DAFI 48-109, the Air Force Safety Center develops protocols for the hazard of electromagnetic radiation to fuel (HERF). HERF is also discussed in DoDI 3222.03, *DoD Electromagnetic Environmental Effects (E3) Program* (DoD, 2017) and further elaborated on in MIL-STD-461F, *Requirements for the Control of the Electromagnetic Interference Characteristics of Subsystems and Equipment* (DoD, 2007) and MIL-STD-464D, *Electromagnetic Environmental Effects Requirements for Systems* (DoD, 2020). MIL-STD-464D contains tables for all types of military equipment (ships, fixed-wing aircraft, ground vehicles, etc.) that list peak and average field strengths that systems in each category should withstand. Based on Table VI of MIL-STD-464D, abridged here as Table 3-6, fixed-wing aircraft should withstand peak field strengths of 58 V/m and average field strengths of 3 V/m, and often significantly higher depending on the frequency (DoD, 2020). USAF engineers have stated the mobile system would produce less than 1 V/m at the target. Additionally, the test vehicle would contain minimal fuel and be grounded prior to the test.

Table 3-6. MIL-STD-464D Table VI (abridged to show subject EMF frequencies)

Frequency Range [MHz]	Electric Field [V/m – rms]	
	Peak	Average
0.01 – 2	88	27
2 – 30	64	64
30 – 150	67	13
150 – 225	67	36
225 – 400	58	3
400 – 700	2,143	159
700 – 790	554	81
790 – 1,000	289	105
1,000 – 2,000	3,363	420

Source: DOD, 2020

Interaction with Explosives

Per DAFI 48-109, the Air Force Safety Center develops protocols for the hazard of electromagnetic radiation to ordnance (HERO). As with HERF, HERO is also discussed in DoDI 3222.03 (2017) and further elaborated on in MIL-STD-461F and MIL-STD-464D. MIL-STD-464D contains a table outlining the maximum field intensity allowable for most common ordnance; this table (Table IX) is abridged here as Table 3-7.

Table 3-7. MIL-STD-464D Table IX (abridged to show subject EMF frequencies)

Frequency Range [MHz]	Electric Field [V/m – rms] Unrestricted[1]	
	Peak	Average
0.01 – 2	200	200
2 – 30	200	200
30 – 150	200	200
150 – 225	200	200
225 – 400	200	200
400 – 700	2,200	410
700 – 790	700	190
790 – 1,000	2,700	490
1,000 – 2,000	6,100	420

Source: DOD, 2020

[1] Unrestricted in this context represents worst-case levels to which ordnance may be exposed. Table IX also includes 'restricted' values; however, those values only apply when ordnance is being handled, which would not be the case during this test.

For the large-frame test aircraft that are the subject of this EMP testing, it is unlikely any ordnance (flares, countermeasures, etc.) would be loaded during the test (USAF, 2023). However, based on the above table and field strength involved (~1 V/m), it would be unlikely to cause any interference were any such ordnance present.

Current Explosives Site Plans (ESP) approved by the Department of Defense Explosives Safety Board for explosive storage/operations at the Combat Aircraft Parking Area, Live Ordnance Loading Area, Flightline Munitions Holding Area, Explosives Cargo Area, and Trim-Pad are based on anticipated amounts of differing Hazard Class Divisions of Explosives. Encroachment of a facility/structure into Explosive Clear Zones (ECZs) around these locations will require updated ESPs that would incorporate the planned EMP Test Facility.

In summary, no controls other than immediate site access control during testing are required, and no hazards exist outside of the site that require specific control.

3.10.2.2 Action Alternative

As initially described in Section 2.1.3, and further described in Appendix E, the Action Alternative would use a permanently installed antenna system at the project site called the Ellipticus. This alternative would necessitate construction of two tall masts (greater than 36 meters in height) and associated stakes, cabling, and wire mesh. The direction of the EMF field can be controlled based on the location of a gap in the antenna, and both vertical and horizontal modes may be used during the EMP test (Prather, 2012). It is expected that each test would take approximately three to four days to complete.

The Ellipticus would be powered by a 252-watt amplifier running off prime power, capable of producing EMF from 0.1 MHz to 1,000 MHz. As with the mobile CWMS test, only specific frequencies in this range would be used to ensure no interaction with the existing EMF environment. Operation would occur in the same 'stepped' fashion as the Proposed Action, beginning with a ~40 millisecond pulse at 0.1 MHz followed by a ~460 millisecond gap with no transmission, then moving on to the next frequency for ~40

milliseconds, and so on until test completion at 1,000 MHz about 12 minutes later. This process would occur for, at a minimum, four 'shots' per aircraft: nose-on, tail-on, left-wing-on, and right-wing-on. A tug would be used between shots to position the aircraft for each orientation (USAF, 2023).

Human Health and Safety

As with the mobile CWMS discussed in the previous section, both the Upper Tier and Lower Tier MPE and associated hazard distances were calculated for both the electric and magnetic fields at every frequency identified for use by the USAF. It was then determined what the furthest hazard distance was for each of the Upper Tier and Lower Tier, as shown in Table 3-8 below.

Table 3-8. MPE Hazard Distances for the Proposed Action

Antenna Orientation	Hazard Distance Upper Tier Environment [meters]	Hazard Distance Lower Tier Environment [meters]
Horizontal	0.201	0.449
Vertical	0.449	1.005

Given that the mast would be over 36 meters tall, personnel working in the vicinity of the antenna would generally be well outside the hazardous range during operation. However, the ends of the Ellipticus are close to the ground, meaning the Upper Tier values should be observed for all EMF workers. If work must occur within 0.5 meters of the active antenna, personnel should observe a working time of less than six minutes to minimize the risk of burns. As with the mobile CWMS system, operational constraints and existing security protocols for flightline operations should negate the need for the Lower Tier values.

Interference with Existing EMF Environment

Impacts to the existing EMF environment from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 3.10.2.1 and Appendix E for further information.

Interference with Electronics

Impacts to the other electronics from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 3.10.2.1 and Appendix E for further information.

Interference with Fuels

Impacts to fuels from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 3.10.2.1 and Appendix E for further information.

Interference with Explosives

Impacts to explosives from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 3.10.2.1 and Appendix E for further information.

3.10.2.3 No Action Alternative

Under the No Action alternative, the USAF would not implement EMP testing at the project site for large-frame aircraft.

Human Health and Safety

Since no EMP testing would occur under the No Action alternative, there would be no direct EMF/EMP interactions with personnel. However, an indirect effect of not testing the EMP countermeasures of large-frame aircraft could lead to catastrophic electrical failure during an EMP incident, which could then lead to potentially harmful – or even fatal – events if the aircraft were to lose power while in flight.

Interference with Existing EMF Environment

Since no EMP testing would occur under the No Action alternative, there would be no potential EMF/EMP interactions with the existing frequencies in use in the vicinity of the Kelly Field Annex. Therefore, there would be no impacts associated with the existing EMF environment.

Interference with Electronics

Since no EMP testing would occur under the No Action alternative, there would be no potential EMF/EMP interactions with other electrical systems in use in the vicinity of the Kelly Field Annex. Therefore, there would be no direct impact or interference with other types of electronics. However, as with Human Health and Safety, an indirect effect of not testing the EMP countermeasures of large-frame aircraft could lead to catastrophic electrical failure during an EMP incident.

Interference with Fuels

Since no EMP testing would occur under the No Action alternative, there would be no potential EMF/EMP interactions with fuels in use in the vicinity of the Kelly Field Annex. Therefore, there would be no impacts or interference with fuels.

Interference with Explosives

Since no EMP testing would occur under the No Action alternative, there would be no potential EMF/EMP interactions with explosives in use in the vicinity of the Kelly Field Annex. Therefore, there would be no impacts or interference with explosives.

3.10.3 Cumulative Effects

No other projects past, present, or future have been identified that would have an EMF component inconsistent with current uses at JBSA Lackland-Kelly Field Annex. Since no other changes in the EMF environment have been identified, there would be no associated cumulative impacts.

3.11 Safety and Occupational Health

A safe environment is one in which there is no potential, or an optimally reduced potential, for death, serious bodily injury or illness, or property damage. The elements of an accident-prone environment include the presence of unnecessary hazards and an exposed population at risk of encountering hazards. This section addresses the current conditions for military personnel and civilian safety, as well as health and safety following the implementation of the Proposed Action.

3.11.1 Affected Environment

The project site is located in a restricted access portion of the airfield. JBSA-Lackland is a controlled access facility, and unauthorized access to the project site is improbable.

3.11.2 Environmental Consequences

3.11.2.1 Proposed/Action Alternative

Construction activities would be minor and short term, and not significant new safety and occupational health concerns would be introduced.

Operation of the EMP test facility would introduce a new hazard due to potential personnel exposure to EMF. These hazards are described in Section 3.10, but are predicted to be minor.

All construction-related activities would be performed in accordance with applicable OSHA regulations.

No significant adverse impacts to safety and occupational health resources are predicted.

3.11.2.2 No Action Alternative

Under the No Action Alternative, no change to the existing conditions would occur, and current safety and occupational health concerns would not be impacted.

3.11.3 Cumulative Effects

No cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.12 SOCIOECONOMICS

3.12.1 Affected Environment

Socioeconomic resources are described using demographic and employment measures, as these measures influence the local economy, community services, and housing demand. Table 3-9 presents socioeconomic statistics for an area with three miles of the project area.

Table 3-9. Socioeconomic Statistics

Area	County	Population (within 3 miles)	Population Density (persons per square mile)
The Bubble	Bexar	68,984	2,472
Source: USEPA 2024a.			

This population density is indicative of an urban setting. Additionally, JBSA-Lackland is located in the greater San Antonio, TX metropolitan area. As such, an available workforce to support construction activities and facility operations and maintenance needs currently exists in the immediate area.

3.12.2 Environmental Consequences

3.12.2.1 Proposed/Action Alternative

The Proposed/Action Alternative would result in a permanent increase of approximately 20 personnel at JBSA-Lackland. This is an insignificant increase to the large workforce at JBSA-Lackland. Any potential impacts from these minor changes in staffing are anticipated to be negligible. No significant changes to population, income levels, housing, or local tax revenues are anticipated. Given the large metropolitan area of San Antonio, TX, it is assumed that the project construction activities could be accomplished with a local workforce, resulting in a possible short-term localized beneficial impact to socioeconomic resources

without the impacts associated with an in-migrating workforce. No significant adverse impacts to socioeconomic resources are predicted.

3.12.2.2 No Action Alternative

Under the No Action Alternative, construction and operation of the EMF test facility would not occur, and no adverse or beneficial impacts to socioeconomic resources would result.

3.12.3 Cumulative Effects

Due to the insignificant increase in the scope of the project and personnel attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.13 COMMUNITY SERVICES

Community services are provided by public and non-profit agencies and organizations to support and enhance the community with educational, protective, medical, and recreational services. These services include local community hospitals and clinics, fire/rescue and emergency medical services, law enforcement, local schools, and parks and recreation facilities.

3.13.1 Affected Environment

The Bubble at JBSA-Lackland is located in the San Antonio, TX metropolitan area. As such, significant community services are available to the population supporting activities at JBSA-Lackland. Many of the community services supporting JBSA-Lackland are provided directly by the USAF, including local law enforcement and medical and fire response capabilities.

3.13.2 Environmental Consequences

3.13.2.1 Proposed/Action Alternative

The Proposed/Action Alternative would result in a permanent increase of approximately 20 personnel at JBSA-Lackland. This is an insignificant increase to the large workforce at JBSA-Lackland. No significant additional load is expected to be placed on the fire or police departments as the result of the Proposed/Action Alternative. Expanded use of other public or community services as a result of the Proposed/Action Alternative is not expected. As such, the Proposed/Action Alternative is expected to have a negligible adverse and potential beneficial impact on local public services.

3.13.2.2 No Action Alternative

Under the No Action Alternative, construction and operation of the EMF test facility would not occur, and less than significant impacts to community services would result.

3.13.3 Cumulative Effects

Due to the insignificant increase in personnel attributable to the project, no cumulative effects from implementation of the Proposed/Action Alternative are predicted.

3.14 PERMITS AND APPROVALS

Table 3-10 lists environmental permits or other agreements that may need to be obtained by USAF to implement the actions in this EA.

Table 3-10. Environmental Permits and Agreements

Agency	Project Stage	Environmental Permit, Compliance, or Coordination	Key Requirements
Water Resources			
Texas Commission on Environmental Quality (TCEQ)	Prior to construction (Action Alternative only)	TCEQ Texas Pollutant Discharge Elimination System (TPDES) General Permit for Stormwater Discharges from Construction Activities within the State of Texas	Construction projects that propose to disturb more than one acre of the ground surface must obtain and comply with the TCEQ TPDES General Permit TXR150000 for Stormwater Discharges from Construction Activities within the State of Texas. A copy of the Stormwater Construction Notice must be provided to the JBSA MS4 Operator.
Geology and Soils			
802 CES/CEIE	Prior to construction, Prior to soil transport (Action Alternative only)	Soil Reuse Request Form	Applies to all providers who perform construction, maintenance, and environmental restoration activities (including servicing utilities) for JBSA facilities.
Floodplains and Wetlands			
U.S. Army Corps of Engineers (USACE)	Prior to construction – If placement of dredged or fill material into a jurisdictional water of the U.S. is involved (Action Alternative only)	Clean Water Act Section 401/404 permit(s)	If the project will include impacts to jurisdictional wetlands, submit the permit application to the local regulatory office prior to starting work. USACE will determine the type of permit, if any, that will be required. A wetlands delineation will be required.
Approvals			
JBSA AOR	90 days prior to conducting EMP test	Coordination	Temporary assignments must be acquired through the local ISM office.
AFMC Spectrum Management Office	Prior to conducting EMP test	Coordination	Must be notified due to the nature of the EMP test. Notify: Darron Ison Jason Long John Bushnell

Agency	Project Stage	Environmental Permit, Compliance, or Coordination	Key Requirements
Air Force Life Cycle Management Center (AFLCMC)	Prior to conducting EMP test	Coordination	Must be notified due to the nature of the EMP test. Notify: John Choby Felipe Nazario-Romero Howard Culumns Julias Pueblo David Daulton
JBSA-SMO	Prior to conducting EMP test	Coordination	Must be notified due to the nature of the EMP test. Notify: Yakim Johnson Lisa Mechaley

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CHAPTER 4
RESOURCE MANAGEMENT MEASURES

Per established protocols, procedures, and requirements, USAF and its construction contractor(s) would implement BMPs and would satisfy all applicable regulatory requirements in association with the design, construction, and operation of the EMF test facility. These "management measures" are described in this EA and are included as components of the Proposed/Action Alternative. "Management measures" are defined as routine BMPs and/or regulatory compliance measures that are regularly implemented as part of proposed activities, as appropriate, across the State of Texas. In general, implementation of such management measures would maintain impacts at acceptable levels for all resource areas analyzed. These are different from "mitigation measures," which are defined as project-specific requirements, not routinely implemented as part of construction projects, necessary to reduce identified potentially significant adverse environmental impacts to less than significant levels.

With implementation of routine BMPs, the Proposed/Action Alternative would not result in significant adverse impacts to, and would reduce any identified potential adverse effects to, the current environmental setting associated with the following technical resource areas:

4.1 AIR QUALITY

For the Action Alternative, the USAF's construction contractor(s) should implement the following measures during construction:

- Use appropriate dust control methods during construction activities. Dust control methods include water sprays, chemical soil additives, and wheel washers.
- Suspend construction activities during periods of high winds.
- Reduce vehicle speeds to reduce dust generated by vehicles and equipment on unpaved surfaces.
- Quickly re-vegetate exposed soils following completion of construction activities.

4.2 FLOODPLAINS, WETLANDS, AND COASTAL ZONE MANAGEMENT

Resource management measures can be employed to avoid or minimize impacts to sensitive species and migratory birds if they happen to occur within or adjacent to the proposed project area. Many of these measures were obtained from the USFWS' Nationwide Standard Conservation Measures List (USFWS, 2024c). These mitigation measures are listed below.

- Conduct a Wetland Delineation within any riparian or wet area adjacent or connected to Leon Creek around The Bubble project area to determine the presence of or the extent of Waters of the United States, including wetlands, that may occur within or adjacent to the proposed project area.
- If Waters of the United States, including wetlands, will be impacted by the proposed project, obtain a 404-Wetland Permit from the U.S. Army Corps of Engineers prior to construction.
- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife.
- Provide enclosed solid waste receptacles at the project site.
- Report any incidental take of a migratory bird to the local USFWS office.
- Minimize project creep by clearly delineating and maintaining project boundaries, including parking areas.

- Maximize use of disturbed land for project activities wherever possible.
- Prevent an increase in lighting of native habitats during the bird and bat breeding season and limit test activities as much as possible to daylight hours between dawn and dusk to avoid illumination of adjacent habitat areas. Bright white light, such as metal halide, halogen, fluorescent, mercury vapor, and incandescent lamps should not be used.
- Prevent the increase in noise above ambient levels during the breeding and nesting seasons (if birds or bats are observed) by installing temporary structural barriers such as sandbags or using baffle boxes or sound walls.
- Prevent the introduction of chemical contaminants into the environment by implementing a Hazardous Materials Plan, avoiding soil contamination by using drip pans underneath equipment and containments zones at construction sites and when refueling vehicles or equipment, limit all equipment maintenance, staging laydown, and dispensing of fuels or oils to designated upland areas.

4.3 NOISE AND VIBRATION

Comply, to the extent practicable, with the City of San Antonio Noise Ordinance, and implement the following:

- For the Action Alternative, schedule construction activities for daylight hours, attempting to minimize impacts to ongoing operations.
- Maintain mufflers and sound shielding on construction equipment and routine maintenance equipment.
- Minimize equipment idling and shut down construction equipment when not in use.
- Prevent the increase in noise above ambient levels during the breeding and nesting seasons (if birds or bats are observed) by installing temporary structural barriers such as sandbags or using baffle boxes or sound walls.

4.4 SOLID AND HAZARDOUS MATERIALS/WASTE

Continue proper vehicle maintenance and inspection to reduce the potential for incidental releases of vehicle fluids. Prevent soil contamination by using drip pans underneath equipment, and when refueling vehicles or equipment, limit all equipment maintenance, staging laydown, and dispensing of fuels or oils to designated areas.

Any chemical brought on-Site shall be placed in proper secondary containment.

Any debris or waste disposal shall be at an appropriately authorized disposal facility.

CHAPTER 5
CONCLUSIONS

Table 5-1 summarizes the anticipated environmental impacts associated with implementation of the Proposed Action and Action Alternative. Based on the information and analysis presented in this EA, JBSA has determined that there would be no significant environmental impacts associated with implementing the Proposed Action. Therefore, this EA concludes that a FONSI is appropriate, and that an EIS is not required.

Table 5-1. Summary of Environmental Effects of the Alternatives

Resource Area	Proposed Action	Action Alternative	No Action Alternative
Airspace	No Impact	No Impact	No Impact
Air Quality	Negligible Impact	Negligible Impact	No Impact
Cultural Resources	No Impact	No Impact	No Impact
Biological and Natural Resources	No Adverse Effects	No Adverse Effects	No Effect
Water Resources	No Impact	No Impact	No Impact
Floodplains, Wetlands, and Coastal Zone Management	No Impact	No Impact	No Impact
Geology and Soils	No Impact	No Impact	No Impact
Noise and Vibration/Acoustic Environment	Minor, Not Significant	Minor, Not Significant	No Impact
Land Use and Aesthetics	No Impact	No Impact	No Impact
Infrastructure and Utilities	Minor, Not Significant	Minor, Not Significant	No Impact
Solid and Hazardous Materials/Waste	Minor, Not Significant	Minor, Not Significant	No Impact
Transportation and Parking	Negligible Impact	Negligible Impact	No Impact
Electromagnetic Field	Minor, Not Significant	Minor, Not Significant	No Impact
Safety and Occupational Health	Minor, Not Significant	Minor, Not Significant	No Impact
Socioeconomics	Minor, Not Significant	Minor, Not Significant	No Impact
Community Services	Minor, Not Significant	Minor, Not Significant	No Impact
Environmental Justice	No Disproportionate Impact	No Disproportionate Impact	No Impact

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CHAPTER 6
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CHAPTER 7
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CHAPTER 8
LIST OF ACRONYMS AND ABBREVIATIONS

ACAM Air Conformity Applicability Model
ACHP Advisory Council on Historic Preservation
AFB Air Force Base
AFCEC Air Force Civil Engineer Center
AFMC Air Force Materiel Command
AIRFA American Indian Religious Freedom Act
APE Area of Potential Effect
BA Biological Assessment
BASH Bird/Wildlife Aircraft Strike Hazard
BE Biological Evaluation
BMP Best Management Practice
CBRN Chemical, Biological, Radiological, and Nuclear
CEQ Council on Environmental Quality
CFR Code of Federal Regulations
CO_2 Carbon Dioxide
CO_2e Carbon Dioxide Equivalent
CRM Cultural Resources Manager
CWMS Continuous Wave Measurement System
CZMA Coastal Zone Management Act
DAF Department of the Air Force
DoD Department of Defense
E3 Electromagnetic Environmental Effects
EA Environmental Assessment
ECZ Explosive Clear Zone
EIAP Environmental Impact Analysis Process
EIS Environmental Impact Statement
EO Executive Order
EMF Electromagnetic Force
EMP Electromagnetic Pulse
ESA Endangered Species Act
ESP Explosives Site Plan
FCC Federal Communications Commission
FEMA Federal Emergency Management Agency
FONSI Finding of No Significant Impact
GHz gigahertz
GMI Geo-Marine, Inc.
HEMP High-Altitude Electromagnetic Pulse
HERF Hazard of Electromagnetic Radiation to Fuel
HERO Hazard of Electromagnetic Radiation to Ordnance
IICEP Interagency/Intergovernmental Coordination for Environmental Planning
IPaC Information for Planning and Consultation
IRP Installation Restoration Program
JBSA Joint Base San Antonio
kHz kilohertz
kV kilovolt
kV/m kilovolt per meter
LLCW Low-Level Continuous Wave
MIL-STD Military Standard
Mgal million gallons
MHz megahertz
MPE Maximum Permissible Exposure
MW megawatt
NAAQS National Ambient Air Quality Standards
NAGPRA Native American Graves Protection and Repatriation Act
NEPA National Environmental Policy Act
NESHAP National Emissions Standards for Hazardous Air Pollutants
NHPA National Historic Preservation Act
NOA Notice of Availability
NOAA National Oceanic and Atmospheric Administration

NO_x Nitrous Oxide
NRHP National Register of Historic Places
O_3 Ozone
PBR Permit by Rule
PCE Tetrachloroethylene
psi pounds per square inch
RCRA Act Resource Conservation and Recovery Act
RF Radio Frequency
ROCA Record of Conformity Analysis
SHPO State Historic Preservation Officer
TAFB Tinker Air Force Base
TCE Trichloroethane
TCEQ Texas Commission on Environmental Quality
TPDES Texas Pollutant Discharge Elimination System
tpy tons per year
USACE U.S. Army Corps of Engineers
USC United States Code
USEPA U.S. Environmental Protection Agency
USFWS U.S. Fish and Wildlife Service
V/m volt per meter
VOC Volatile Organic Compound

APPENDIX A – CORRESPONDENCE

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DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

19 August 2024

Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Jaime Loichinger
Office of Federal Agency Programs, Director
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC, 20001

Dear Director Loichinger,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Please address all questions and comments to Mr. Franz Schmidt, NEPA and EMS Chief, by email to 802CES.CEIE.NEPATeam@us.af.mil or at (210) 296-5942.

Sincerely,

LARSON.BRENT.DANIEL.1515771324 Digitally signed by LARSON.BRENT.DANIEL.1515771324 Date: 2024.08.20 12:22:42 -05'00'

BRENT D. LARSON, GS-14, DAF
Chief, Installation Management Flight

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DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

19 August 2024

Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

David Wegmann
Interim Director of Public Works
Bexar County Public Works
1948 Probandt St.
San Antonio, TX 78214

Dear Director Wegmann,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Brandon Ross, AICP
City of San Antonio Parks and Recreation
P.O. Box 839966
San Antonio, TX 78283-3966

Dear Mr. Ross,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

John E. Cantu
Environmental Manager
City of San Antonio Public Works
P.O. Box 839966
San Antonio, TX 78283-3966

Dear Mr. Cantu,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Elizabeth Campos
Texas State Representative District 119
3124 Sidney Brooks, Suite A
San Antonio, TX 78235

Dear Representative Campos,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Tony Robinson
Region 6 Administrator
Federal Emergency Management Agency
800 North Loop 288
Denton, TX 76209

Dear Administrator Robinson,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Greg Casar
U.S. Congressman District 35
1339 Longworth House Office Building
Washington, DC 20515

Dear Congressman Casar,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Joaquin Castro
U.S. Congressman District 20
727 E. Cesar E. Chavez Blvd, Suite B-128
San Antonio, TX 78206

Dear Congressman Castro,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

John Cornyn
U.S. Senator
600 Navarro, Suite 210
San Antonio, TX 78205

Dear Senator Cornyn,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

José Menéndez
Texas State Senator District 26
4522 Fredericksburg Road, A-22
San Antonio, TX 78201

Dear Senator Menéndez,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Josey Garcia
Texas State Representative District 124
P.O. Box 2910
Austin, TX 78768

Dear Representative Garcia,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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LARSON.BRENT.DANIEL.1515771324 Digitally signed by LARSON.BRENT.DANIEL.1515771324 Date: 2024.08.20 12:22:42 -05'00'

BRENT D. LARSON, GS-14, DAF
Chief, Installation Management Flight

Attachment:
JBSA-Lackland EMP EA Final DOPAA

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

19 August 2024

Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Philip Cortez
Texas State Representative District 117
2600 SW Military Dr., Suite 211
San Antonio, TX 78224

Dear Representative Cortez,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Roland Gutierrez
Texas State Senator District 19
P.O. Box 12068, Capitol Station
Austin, TX 78711

Dear Senator Gutierrez,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Shaun Donovan
Manager, Environmental Science
San Antonio River Authority
100 East Guenther Street
San Antonio, TX 78204

Dear Manager Donovan,

The United States Air Force has initiated the development of an Environmental Assessment (EA) to support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at Joint Base San Antonio (JBSA)-Lackland, Kelly Field Annex (KFA), Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of KFA to support EMP testing on the VC-25B and similar aircraft.

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Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Ted Cruz
U.S. Senator
9901 IH-10W, Suite 950
San Antonio, TX 78230

Dear Senator Cruz,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Stefania Munoz, MC 118
NEPA Coordinator
TCEQ
P.O. Box 13087
Austin, TX 78711-3087

Dear Ms. Munoz,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Alexander Shane
Program Coordinator, Federal and State Review
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

Dear Mr. Shane,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Russell Hooten
Wildlife Habitat Assessment Program
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744

Dear Mr. Hooten,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Jeff Walker
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Dear Mr. Walker,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Tony Gonzales
U.S. Congressman District 23
4372 N. Loop 1604 W, Suite 205
San Antonio, TX 78249

Dear Congressman Gonzales,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Stephen Brooks
Regulatory Branch, Permit Section
U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Room 3A37
Fort Worth, TX 76102

Dear Mr. Brooks,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Amy Lueders
Acting Deputy Director
U.S. Fish & Wildlife Service, Southwest Region
500 Gold Avenue SW
Albuquerque, NM 87103

Dear Deputy Director Lueders,

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Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

David W. Gray
Deputy Regional Administrator
U.S. Environmental Protection Agency Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Dear Administrator Gray,

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To ensure the U.S. Air Force has sufficient time to consider your input in the preparation of the Draft EA, please provide written questions or comments at your earliest convenience but no later than 30 days from the date of this correspondence. The U.S. Air Force anticipates publishing the Draft EA in Winter 2024 and the Final EA in Spring 2025.

Please address all questions and comments to Mr. Franz Schmidt, NEPA and EMS Chief, by email to 802CES.CEIE.NEPATeam@us.af.mil or at (210) 296-5942.

Sincerely,

LARSON.BRENT.DANIEL.1515771324 Digitally signed by LARSON.BRENT.DANIEL.1515771324 Date: 2024.08.20 12:22:42 -05'00'

BRENT D. LARSON, GS-14, DAF
Chief, Installation Management Flight

Attachment:
JBSA-Lackland EMP EA Final DOPAA

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

19 August 2024

Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Mr. William Nelson Sr.
Chairman
Comanche Nation Historic Preservation Office
P.O. Box 908
Lawton, OK 73502

Dear Chairman Nelson,

The purpose of this letter is twofold: 1) to invite your Tribe to participate in government-to-government consultation with Joint Base San Antonio (JBSA) pursuant to Section 106 of the National Historic Preservation Act (NHPA); and 2) to provide an opportunity for you to review and comment on proposed activities at JBSA pursuant to the National Environmental Policy Act (NEPA) of 1969, wherein you identify any properties of religious and cultural significance within the Area of Potential Effect.

The United States Air Force (USAF) is preparing an Environmental Assessment (EA) under NEPA as amended (42 United States Code 4321 et seq.), the White House Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the Department of the Air Force (DAF) Environmental Impact Analysis Process (EIAP) (32 CFR Part 989), to evaluate the potential environmental impacts associated with implementation of the Proposed Action.

The EA would support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at JBSA-Lackland, Kelly Field Annex, Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of Kelly Field Annex to support EMP testing on the VC-25B and other similar aircraft.

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and Department of Defense instructions. The Proposed Action is necessary because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size.

Per 54 USC § 306 I 08 (Section I 06 of the NHPA) and its implementing regulations at 36 CFR Part 800, the USAF is accounting for various environmental concerns and engaging early with tribal governments as it formulates the undertakings. We invite the Comanche Nation, Oklahoma and Comanche Nation Historic Preservation Office to review the information contained in this letter and

enclosed Final Description of Proposed Action and Alternatives (DOPAA), and submit any comments or concerns you have, with a focus on identifying any properties of religious or cultural significance within the Area of Potential Effect.

The U.S. Air Force anticipates publishing and providing you with a copy of the Draft EA in Winter 2024. Your early communication will aid in our planning and our ability to prepare an all-inclusive EA.

In accordance with the NHPA, the USAF would like to initiate government-to-government consultation regarding the proposed EMP test site at JBSA. To date, no tribe has identified any properties of religious and cultural significance (i.e., Traditional Cultural Properties [TCPs]) on the installation. Please let us know if you would like to share any information on TCPs that we could use in our planning process to avoid or minimize impacts to them.

Please address all questions and comments to Mr. Franz Schmidt, NEPA and EMS Chief, by email to 802CES.CEIE.NEPATeam@us.af.mil or at (210) 296-5942.

Sincerely,

BRENT D. LARSON, GS-14, DAF
Chief, Installation Management Flight

Attachment:
JBSA-Lackland EMP EA Final DOPAA

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

19 August 2024

Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Mr. Eddie Martinez
President
Mescalero Apache Tribe of the Mescalero Reservation
P.O. Box 227
Mescalero, NM 88340

Dear President Martinez,

The purpose of this letter is twofold: 1) to invite your Tribe to participate in government-to-government consultation with Joint Base San Antonio (JBSA) pursuant to Section 106 of the National Historic Preservation Act (NHPA); and 2) to provide an opportunity for you to review and comment on proposed activities at JBSA pursuant to the National Environmental Policy Act (NEPA) of 1969, wherein you identify any properties of religious and cultural significance within the Area of Potential Effect.

The United States Air Force (USAF) is preparing an Environmental Assessment (EA) under NEPA as amended (42 United States Code 4321 et seq.), the White House Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the Department of the Air Force (DAF) Environmental Impact Analysis Process (EIAP) (32 CFR Part 989), to evaluate the potential environmental impacts associated with implementation of the Proposed Action.

The EA would support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at JBSA-Lackland, Kelly Field Annex, Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of Kelly Field Annex to support EMP testing on the VC-25B and other similar aircraft.

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and Department of Defense instructions. The Proposed Action is necessary because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size.

Per 54 USC § 306 I 08 (Section I 06 of the NHPA) and its implementing regulations at 36 CFR Part 800, the USAF is accounting for various environmental concerns and engaging early with tribal governments as it formulates the undertakings. We invite the Mescalero Apache Tribe of the Mescalero Reservation to review the information contained in this letter and enclosed Final

Description of Proposed Action and Alternatives (DOPAA), and submit any comments or concerns you have, with a focus on identifying any properties of religious or cultural significance within the Area of Potential Effect.

The U.S. Air Force anticipates publishing and providing you with a copy of the Draft EA in Winter 2024. Your early communication will aid in our planning and our ability to prepare an all-inclusive EA.

In accordance with the NHPA, the USAF would like to initiate government-to-government consultation regarding the proposed EMP test site at JBSA. To date, no tribe has identified any properties of religious and cultural significance (i.e., Traditional Cultural Properties [TCPs]) on the installation. Please let us know if you would like to share any information on TCPs that we could use in our planning process to avoid or minimize impacts to them.

Please address all questions and comments to Mr. Franz Schmidt, NEPA and EMS Chief, by email to 802CES.CEIE.NEPATeam@us.af.mil or at (210) 296-5942.

Sincerely,

BRENT D. LARSON, GS-14, DAF
Chief, Installation Management Flight

Attachment:
JBSA-Lackland EMP EA Final DOPAA

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

19 August 2024

Mr. Brent D. Larson
Chief, Installation Management Flight
802d Civil Engineer Squadron
1555 Gott St, Bldg 5595
JBSA-Lackland, TX 78236

Mr. Russell Martin
President
Tonkawa Tribe of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653

Dear President Martin,

The purpose of this letter is twofold: 1) to invite your Tribe to participate in government-to-government consultation with Joint Base San Antonio (JBSA) pursuant to Section 106 of the National Historic Preservation Act (NHPA); and 2) to provide an opportunity for you to review and comment on proposed activities at JBSA pursuant to the National Environmental Policy Act (NEPA) of 1969, wherein you identify any properties of religious and cultural significance within the Area of Potential Effect.

The United States Air Force (USAF) is preparing an Environmental Assessment (EA) under NEPA as amended (42 United States Code 4321 et seq.), the White House Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the Department of the Air Force (DAF) Environmental Impact Analysis Process (EIAP) (32 CFR Part 989), to evaluate the potential environmental impacts associated with implementation of the Proposed Action.

The EA would support a proposal by the U.S. Air Force to construct and operate a new Electromagnetic Pulse (EMP) test site at JBSA-Lackland, Kelly Field Annex, Texas. Under the Proposed Action, Air Force Materiel Command (AFMC) would receive and operate a mobile ellipticus antenna at the southwestern end of Kelly Field Annex to support EMP testing on the VC-25B and other similar aircraft.

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and Department of Defense instructions. The Proposed Action is necessary because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size.

Per 54 USC § 306 I 08 (Section I 06 of the NHPA) and its implementing regulations at 36 CFR Part 800, the USAF is accounting for various environmental concerns and engaging early with tribal governments as it formulates the undertakings. We invite the Tonkawa Tribe of Indians of Oklahoma to review the information contained in this letter and enclosed Final Description of

Proposed Action and Alternatives (DOPAA), and submit any comments or concerns you have, with a focus on identifying any properties of religious or cultural significance within the Area of Potential Effect.

The U.S. Air Force anticipates publishing and providing you with a copy of the Draft EA in Winter 2024. Your early communication will aid in our planning and our ability to prepare an all-inclusive EA.

In accordance with the NHPA, the USAF would like to initiate government-to-government consultation regarding the proposed EMP test site at JBSA. To date, no tribe has identified any properties of religious and cultural significance (i.e., Traditional Cultural Properties [TCPs]) on the installation. Please let us know if you would like to share any information on TCPs that we could use in our planning process to avoid or minimize impacts to them.

Please address all questions and comments to Mr. Franz Schmidt, NEPA and EMS Chief, by email to 802CES.CEIE.NEPATeam@us.af.mil or at (210) 296-5942.

Sincerely,

BRENT D. LARSON, GS-14, DAF
Chief, Installation Management Flight

Attachment:
JBSA-Lackland EMP EA Final DOPAA

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

30 May 2025

MEMORANDUM FOR NEPA/

FROM: CES/CEIEA/ CRO

SUBJECT: Draft Environmental Assessment sharing with the Public and Interested Parties

1. The purpose of the Proposed Action is to ensure that the VC-25B meets EMP exposure performance criteria as defined in military standards and DoD instructions.

2. This is necessary because existing EMP testing facilities cannot accommodate the VC-25B or other similar aircraft.

3. While the proposed undertaking is located within the JBSA-KELLY FIELD ANNEX, Security Hill District, it has been determined that there are no concerns regarding Cultural Resources on Draft EA.

4. However, it is located within a viewshed of the Historic District as referenced in the eTrac letter 20120601, dated June 1, 2012.

5. The purpose of the EA is to provide an environmental analysis of the Proposed Action in sufficient detail to allow the public and interested parties to review the analysis, provide comments, and identify any issues or concerns that may have been overlooked.

6. The feedback will be valuable in ensuring that the final EA accurately reflects the potential impacts of the proposed project and addresses any concerns raised by the community.

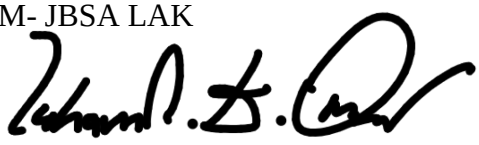
7. The CRO has no objection to the proposed actions, except for COA #3, which involves building a new Emp facility on the draft EA. This action will require full consultation with the State Historic Preservation Office (SHPO) and the National Park Service (NPS).

8. Therefore, at this point, there is no need for a consultation in this Draft EA.

9. For questions, please contact me at 303-748-7181 or mahamoud.omar@us.af.mil.

Sincerely,

Mahamoud D. Omar, *Assoc. AIA, LEED GA*
CRM- JBSA LAK



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APPENDIX B – AIR QUALITY

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AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: LACKLAND AFB
State: Texas
County(s): Bexar
Regulatory Area(s): San Antonio, TX

b. Action Title: Electromagnetic Pulse Test Facility (Proposed Action)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2027

e. Action Description:

Under the Proposed Action, AFMC would receive and operate a mobile ellipticus antenna at The Bubble to support EMP testing on the VC-25B and other similar aircraft. The portable CWMS antenna would be erected by a crew of approximately seven personnel using supporting equipment such as boom lifts and trucks. Once erected, the mobile CWMS would remain for approximately one week for testing operations, after which it would be dismantled and returned to storage. A portable generator would be used during the one-week test period to provide power and area lighting while the system is in use.

The Proposed Action would result in a permanent increase of approximately 20 personnel at JBSA-Lackland, as well as an increase in flight sorties by one per quarter (four per year).

This EA identifies and analyzes a potential maximum testing scenario of 50 tests per year. This EA also establishes a maximum periodicity of testing of up to ten 1-week periods.

Under the Alternative Action, JBSA-Lackland would install and operate a permanently affixed 30-meter Extended Ellipticus Antenna to support LLCW testing on aircraft. Civil engineering site improvements would occur to support the fixed antenna. Other operations would similar to the proposed action except there would be no need to erect and take down the tower.

f. Point of Contact:

Name: Julie Werner
Title: Civilian Contractor. Environmental Engineer
Organization: Scout Environmental, Inc.
Email: julie.werner@scoutenv.com
Phone Number: 4257859533

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

____ applicable
__X__ not applicable

Conformity Analysis Summary:

2027

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr) [1]	Exceedance (Yes or No)
San Antonio, TX			
VOC	1.124	50	No
NOx	9.682	50	No
CO	5.935		
SOx	0.985		
PM 10	0.596		
PM 2.5	0.576		
Pb	0.000		
NH3	0.005		

[1] Thresholds manually adjusted to new requirements for San Antonio.

2028 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr) [1]	Exceedance (Yes or No)
San Antonio, TX			
VOC	1.123	50	No
NOx	9.678	50	No
CO	5.931		
SOx	0.985		
PM 10	0.595		
PM 2.5	0.576		
Pb	0.000		
NH3	0.005		

[1] Thresholds manually adjusted to new requirements for San Antonio.

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Julie Werner, Civilian Contractor. Environmental Engineer	Mar 09 2025
Name, Title	**Date**

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: LACKLAND AFB
State: Texas
County(s): Bexar
Regulatory Area(s): San Antonio, TX

- Action Title: Electromagnetic Pulse Test Facility (Proposed Action)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2027

- Action Purpose and Need:

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and DoD instructions.

The Proposed Action is needed because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

- Action Description:

Under the Proposed Action, AFMC would receive and operate a mobile ellipticus antenna at The Bubble to support EMP testing on the VC-25B and other similar aircraft. The portable CWMS antenna would be erected by a crew of approximately seven personnel using supporting equipment such as boom lifts and trucks. Once erected, the mobile CWMS would remain for approximately one week for testing operations, after which it would be dismantled and returned to storage. A portable generator would be used during the one-week test period to provide power and area lighting while the system is in use.

The Proposed Action would result in a permanent increase of approximately 20 personnel at JBSA-Lackland, as well as an increase in flight sorties by one per quarter (four per year).

This EA identifies and analyzes a potential maximum testing scenario of 50 tests per year. This EA also establishes a maximum periodicity of testing of up to ten 1-week periods.

Under the Alternative Action, JBSA-Lackland would install and operate a permanently affixed 30-meter Extended Ellipticus Antenna to support LLCW testing on aircraft. Civil engineering site improvements would occur to support the fixed antenna. Other operations would similar to the proposed action except there would be no need to erect and take down the tower.

- Point of Contact

Name: Julie Werner
Title: Civilian Contractor. Environmental Engineer
Organization: Scout Environmental, Inc.
Email: julie.werner@scoutenv.com
Phone Number: 4257859533

Report generated with ACAM version: 5.0.23a

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity List:

Activity Type		Activity Title
2.	Aircraft	Proposed Action - Mobile Antenna
3.	Emergency Generator	Proposed Action - Mobile Generator
4.	Personnel	Proposed Action - Increased Personnel
5.	Construction / Demolition	Operational - CWMS Antenna Erection Tasks
6.	Aircraft	Proposed Action - Four additional sorties per Year

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Mobile Antenna

- Activity Description:
Aircraft VC-25B modeled by its surrogate, VC-25A. Assumed additional maximum take off and landings as 50 times per year equal to the number of tests.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.618774
SO_x	0.531163
NO_x	6.491249
CO	3.923847

Pollutant	Emissions Per Year (TONs)
PM 10	0.024420
PM 2.5	0.021982
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.065837
N_2O	0.012553

Pollutant	Emissions Per Year (TONs)
CO_2	1595.380122
CO_2e	1600.967878

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.618774
SO_x	0.531163

Pollutant	Emissions Per Year (TONs)
PM 10	0.024420
PM 2.5	0.021982

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

NO_x	6.491249
CO	3.923847

Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH_4	0.065837
N_2O	0.012553

Pollutant	Emissions Per Year (TONs)
CO_2	1595.380122
CO_2e	1600.967878

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: VC-25A
Engine Model: CF6-80C2B1
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	1556.00	10.88	1.07	3.73	43.22	0.12	0.11
Approach	4889.00	0.24	1.07	8.83	2.37	0.06	0.06
Intermediate	14865.00	0.10	1.07	21.26	0.55	0.06	0.06
Military	18135.00	0.09	1.07	28.11	0.58	0.08	0.07
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
Idle	1556.00	0.13	0.03	3203.44	3214.64
Approach	4889.00	0.13	0.03	3203.44	3214.64
Intermediate	14865.00	0.13	0.03	3203.44	3214.64
Military	18135.00	0.13	0.03	3203.44	3214.64
After Burn	0.00	0.13	0.03	3203.44	3214.64

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 50
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	15.9 (default)
Approach [Approach] (mins):	5.1 (default)
Climb Out [Intermediate] (mins):	1.2 (default)
Takeoff [Military] (mins):	0.4 (default)
Takeoff [After Burn] (mins):	0 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12 (default)
Approach (mins):	27 (default)
Intermediate (mins):	9 (default)
Military (mins):	12 (default)
AfterBurn (mins):	0 (default)

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft

NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	8	No	GTCP 660-4	Honeywell Inc.

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
GTCP 660-4	862.9	0.242	0.915	4.599	7.460	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
GTCP 660-4	862.9	0.1	0.0	2764.2	2773.9

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Emergency Generator

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

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County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Mobile Generator

- Activity Description:
Portable generator used for 8 days per activity, for a total of 80 days per year, 10 hours per day.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.446400
SO_x	0.376000
NO_x	1.840000
CO	1.228800

Pollutant	Emissions Per Year (TONs)
PM 10	0.401600
PM 2.5	0.401600
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.007408
N_2O	0.001481

Pollutant	Emissions Per Year (TONs)
CO_2	184.000000
CO_2e	212.800000

3.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 2

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 200
Average Operating Hours Per Year (hours): 800

3.3 Emergency Generator Emission Factor(s)

- Emergency Generators Criteria Pollutant Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251		

- Emergency Generators Greenhouse Gasses Pollutant Emission Factor (lb/hp-hr)

CH_4	N_2O	CO_2	CO_2e
0.000046297	0.000009259	1.15	1.33

3.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

4. Personnel

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Increased Personnel

- Activity Description:
20 additional staff for JBSA that would have an average commute.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.030048
SO_x	0.000218
NO_x	0.014656
CO	0.400233

Pollutant	Emissions Per Year (TONs)
PM 10	0.000499
PM 2.5	0.000441
Pb	0.000000
NH_3	0.004960

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.001571
N_2O	0.000667

Pollutant	Emissions Per Year (TONs)
CO_2	42.139086
CO_2e	42.376964

4.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 20
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule

Active Duty Personnel:	5 Days Per Week (default)
Civilian Personnel:	5 Days Per Week (default)
Support Contractor Personnel:	5 Days Per Week (default)
Air National Guard (ANG) Personnel:	4 Days Per Week (default)
Reserve Personnel:	4 Days Per Month (default)

4.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

4.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.23880	0.00165	0.10433	3.65368	0.00364	0.00322	0.04833
LDGT	0.19432	0.00205	0.12624	3.11754	0.00423	0.00374	0.03985
HDGV	0.72030	0.00474	0.50250	9.24177	0.01762	0.01558	0.08881
LDDV	0.09055	0.00125	0.14524	6.17299	0.00368	0.00338	0.01656
LDDT	0.12733	0.00142	0.40517	5.16830	0.00597	0.00550	0.01683
HDDV	0.09196	0.00412	2.06496	1.43563	0.03682	0.03387	0.06671
MC	2.88942	0.00199	0.61282	11.89251	0.02195	0.01942	0.05462

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01228	0.00476	320.14901	321.87319
LDGT	0.01141	0.00658	395.97759	398.22329
HDGV	0.04652	0.02521	915.75947	924.42679
LDDV	0.04659	0.00067	372.46028	373.82357
LDDT	0.03282	0.00098	420.45828	421.57107
HDDV	0.02059	0.16411	1228.80987	1278.22943
MC	0.11223	0.00294	394.26887	397.95138

4.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)

VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Operational - CWMS Antenna Erection Tasks

- Activity Description:
The CWMS antenna would be erected by a crew of 7 people using boom lifts and trucks. Activity to be completed 10 times per year.

Using building construction as a surogate. Construction time is 20 days total per year (one day up, one day down).

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000370
SO_x	0.000010
NO_x	0.004407
CO	0.004390

Pollutant	Total Emissions (TONs)
PM 10	0.000111
PM 2.5	0.000102
Pb	0.000000
NH_3	0.000000

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.000046
N_2O	0.000009

Pollutant	Total Emissions (TONs)
CO_2	1.129135
CO_2e	1.133010

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- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.000046
N_2O	0.000009

Pollutant	Total Emissions (TONs)
CO_2	1.129135
CO_2e	1.133010

5.1 Building Construction Phase

5.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 0
Number of Days: 20

5.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 20
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: No
Average Day(s) worked per week: 1

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Aerial Lifts Composite	2	8
Cranes Composite	1	4

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 0

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 0

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 0

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

5.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Aerial Lifts Composite [HP: 46] [LF: 0.31]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.15103	0.00542	2.87048	3.07022	0.02025	0.01863
Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.19464	0.00487	1.74774	1.62852	0.07179	0.06605

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Aerial Lifts Composite [HP: 46] [LF: 0.31]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02381	0.00476	586.90129	588.91539
Cranes Composite [HP: 367] [LF: 0.29]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02140	0.00428	527.45492	529.26501

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

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.23880	0.00165	0.10433	3.65368	0.00364	0.00322	0.04833
LDGT	0.19432	0.00205	0.12624	3.11754	0.00423	0.00374	0.03985
HDGV	0.72030	0.00474	0.50250	9.24177	0.01762	0.01558	0.08881
LDDV	0.09055	0.00125	0.14524	6.17299	0.00368	0.00338	0.01656
LDDT	0.12733	0.00142	0.40517	5.16830	0.00597	0.00550	0.01683
HDDV	0.09196	0.00412	2.06496	1.43563	0.03682	0.03387	0.06671
MC	2.88942	0.00199	0.61282	11.89251	0.02195	0.01942	0.05462

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

	CH_4	**N_2O**	**CO_2**	**CO_2e**
LDGV	0.01228	0.00476	320.14901	321.87319
LDGT	0.01141	0.00658	395.97759	398.22329
HDGV	0.04652	0.02521	915.75947	924.42679
LDDV	0.04659	0.00067	372.46028	373.82357
LDDT	0.03282	0.00098	420.45828	421.57107
HDDV	0.02059	0.16411	1228.80987	1278.22943
MC	0.11223	0.00294	394.26887	397.95138

5.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

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- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{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)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

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: 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

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

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

- Vender Trips Emissions per Phase

$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender 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)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

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

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6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Four additional sorties per Year

- Activity Description:
Sorties for VC-25B Operations. Estimated to be an additional 4 flight sorties per year (one per quarter). Assumed F-16 aircraft as a basis for the anlysis. Two aircraft per sortie, four sorties per year.

Lackland is a training base, this is a minimal amount of additional sorties.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.028165
SO_x	0.077693
NO_x	1.331743
CO	0.378083

Pollutant	Emissions Per Year (TONs)
PM 10	0.168891
PM 2.5	0.151619
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.869685
N_2O	0.861760

Pollutant	Emissions Per Year (TONs)
CO_2	232.692308
CO_2e	233.499994

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.028165
SO_x	0.077693
NO_x	1.331743
CO	0.378083

Pollutant	Emissions Per Year (TONs)
PM 10	0.168891
PM 2.5	0.151619
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH_4	0.869685
N_2O	0.861760

Pollutant	Emissions Per Year (TONs)
CO_2	232.692308
CO_2e	233.499994

6.2 Aircraft & Engines

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6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: NF-16A
Engine Model: F100-PW-200
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	1006.00	2.05	1.07	6.21	24.06	2.47	2.22
Approach	3251.00	0.05	1.07	17.93	1.22	2.37	2.13
Intermediate	5651.00	0.07	1.07	26.55	0.38	1.58	1.42
Military	8888.00	0.11	1.07	34.32	0.56	1.66	1.49
After Burn	40123.00	0.69	1.07	6.63	10.42	3.07	2.76

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
Idle	1006.00	0.13	0.03	3203.44	3214.64
Approach	3251.00	0.13	0.03	3203.44	3214.64
Intermediate	5651.00	0.13	0.03	3203.44	3214.64
Military	8888.00	0.13	0.03	3203.44	3214.64
After Burn	40123.00	0.13	0.03	3203.44	3214.64

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 2
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 4
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 29.8 (default)
Approach [Approach] (mins): 3.5 (default)
Climb Out [Intermediate] (mins): 0.8 (default)
Takeoff [Military] (mins): 0.2 (default)
Takeoff [After Burn] (mins): 0.2 (default)

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Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12 (default)
Approach (mins):	27 (default)
Intermediate (mins):	9 (default)
Military (mins):	9 (default)
AfterBurn (mins):	3 (default)

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	1	No	T-62T-40-8	

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
T-62T-40-8	272.6	0.493	0.289	1.216	3.759	0.131	0.037

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
T-62T-40-8	272.6	0.1	0.0	909.0	910.8

6.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: LACKLAND AFB
State: Texas
County(s): Bexar
Regulatory Area(s): San Antonio, TX

b. Action Title: Electromagnetic Pulse Test Facility (Action Alternative)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2027

e. Action Description:

Under the Alternative Action, JBSA-Lackland would install and operate a permanently affixed 30-meter Extended Ellipticus Antenna to support LLCW testing on aircraft. Civil engineering site improvements would occur to support the fixed antenna. Other operations would similar to the proposed action except there would be no need to erect and take down the tower.

The Proposed Action would result in a permanent increase of approximately 20 personnel at JBSA-Lackland, as well as an increase in flight sorties by one per quarter (four per year).

This EA identifies and analyzes a potential maximum testing scenario of 50 tests per year. This EA also establishes a maximum periodicity of testing of up to ten 1-week periods.

f. Point of Contact:

Name: Julie Werner
Title: Civilian Contractor. Environmental Engineer
Organization: Scout Environmental, Inc.
Email: julie.werner@scoutenv.com
Phone Number: 4257859533

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

____ applicable
_X_ not applicable

Conformity Analysis Summary:

2027

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr) [1]	Exceedance (Yes or No)
San Antonio, TX			
VOC	0.705	50	No
NOx	8.082	50	No
CO	5.050		
SOx	0.610		
PM 10	0.214		
PM 2.5	0.183		
Pb	0.000		
NH3	0.006		

[1] Thresholds manually adjusted to new requirements for San Antonio.

2028 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr) [1]	Exceedance (Yes or No)
San Antonio, TX			
VOC	0.677	50	No
NOx	7.838	50	No
CO	4.702		
SOx	0.609		
PM 10	0.194		
PM 2.5	0.174		
Pb	0.000		
NH3	0.005		

[1] Thresholds manually adjusted to new requirements for San Antonio.

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Julie Werner, Civilian Contractor. Environmental Engineer — Mar 09 2025

Name, Title — **Date**

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: LACKLAND AFB
State: Texas
County(s): Bexar
Regulatory Area(s): San Antonio, TX

- Action Title: Electromagnetic Pulse Test Facility (Action Alternative)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2027

- Action Purpose and Need:

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and DoD instructions.

The Proposed Action is needed because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

- Action Description:

Under the Alternative Action, JBSA-Lackland would install and operate a permanently affixed 30-meter Extended Ellipticus Antenna to support LLCW testing on aircraft. Civil engineering site improvements would occur to support the fixed antenna. Other operations would similar to the proposed action except there would be no need to erect and take down the tower.

The Proposed Action would result in a permanent increase of approximately 20 personnel at JBSA-Lackland, as well as an increase in flight sorties by one per quarter (four per year).

This EA identifies and analyzes a potential maximum testing scenario of 50 tests per year. This EA also establishes a maximum periodicity of testing of up to ten 1-week periods.

- Point of Contact

Name: Julie Werner
Title: Civilian Contractor. Environmental Engineer
Organization: Scout Environmental, Inc.
Email: julie.werner@scoutenv.com
Phone Number: 4257859533

Report generated with ACAM version: 5.0.23a

- Activity List:

	Activity Type	Activity Title
2.	Aircraft	Proposed Action - Mobile Antenna
3.	Personnel	Proposed Action - Increased Personnel
4.	Aircraft	Proposed Action - Four additional sorties per Year

5.	Construction / Demolition	Alternative Action Construction of Permanent CWMA

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Mobile Antenna

- Activity Description:
Aircraft VC-25B modeled by its surrogate, VC-25A. Assumed additional maximum take off and landings as 50 times per year equal to the number of tests.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.618774
SO_x	0.531163
NO_x	6.491249
CO	3.923847

Pollutant	Emissions Per Year (TONs)
PM 10	0.024420
PM 2.5	0.021982
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.065837
N_2O	0.012553

Pollutant	Emissions Per Year (TONs)
CO_2	1595.380122
CO_2e	1600.967878

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.618774
SO_x	0.531163
NO_x	6.491249
CO	3.923847

Pollutant	Emissions Per Year (TONs)
PM 10	0.024420
PM 2.5	0.021982
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)

Pollutant	Emissions Per Year (TONs)

CH_4	0.065837
N_2O	0.012553

CO_2	1595.380122
CO_2e	1600.967878

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: VC-25A
Engine Model: CF6-80C2B1
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	1556.00	10.88	1.07	3.73	43.22	0.12	0.11
Approach	4889.00	0.24	1.07	8.83	2.37	0.06	0.06
Intermediate	14865.00	0.10	1.07	21.26	0.55	0.06	0.06
Military	18135.00	0.09	1.07	28.11	0.58	0.08	0.07
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
Idle	1556.00	0.13	0.03	3203.44	3214.64
Approach	4889.00	0.13	0.03	3203.44	3214.64
Intermediate	14865.00	0.13	0.03	3203.44	3214.64
Military	18135.00	0.13	0.03	3203.44	3214.64
After Burn	0.00	0.13	0.03	3203.44	3214.64

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 50
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 15.9 (default)
Approach [Approach] (mins): 5.1 (default)
Climb Out [Intermediate] (mins): 1.2 (default)
Takeoff [Military] (mins): 0.4 (default)

Takeoff [After Burn] (mins): 0 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12 (default)
Approach (mins):	27 (default)
Intermediate (mins):	9 (default)
Military (mins):	12 (default)
AfterBurn (mins):	0 (default)

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	8	No	GTCP 660-4	Honeywell Inc.

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
GTCP 660-4	862.9	0.242	0.915	4.599	7.460	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
GTCP 660-4	862.9	0.1	0.0	2764.2	2773.9

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Personnel

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Increased Personnel

- Activity Description:

20 additional staff for JBSA that would have an average commute.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.030048
SO_x	0.000218
NO_x	0.014656
CO	0.400233

Pollutant	Emissions Per Year (TONs)
PM 10	0.000499
PM 2.5	0.000441
Pb	0.000000
NH_3	0.004960

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.001571
N_2O	0.000667

Pollutant	Emissions Per Year (TONs)
CO_2	42.139086
CO_2e	42.376964

3.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 20
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule
Active Duty Personnel: 5 Days Per Week (default)
Civilian Personnel: 5 Days Per Week (default)
Support Contractor Personnel: 5 Days Per Week (default)
Air National Guard (ANG) Personnel: 4 Days Per Week (default)
Reserve Personnel: 4 Days Per Month (default)

3.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

3.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.23880	0.00165	0.10433	3.65368	0.00364	0.00322	0.04833

LDGT	0.19432	0.00205	0.12624	3.11754	0.00423	0.00374	0.03985
HDGV	0.72030	0.00474	0.50250	9.24177	0.01762	0.01558	0.08881
LDDV	0.09055	0.00125	0.14524	6.17299	0.00368	0.00338	0.01656
LDDT	0.12733	0.00142	0.40517	5.16830	0.00597	0.00550	0.01683
HDDV	0.09196	0.00412	2.06496	1.43563	0.03682	0.03387	0.06671
MC	2.88942	0.00199	0.61282	11.89251	0.02195	0.01942	0.05462

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01228	0.00476	320.14901	321.87319
LDGT	0.01141	0.00658	395.97759	398.22329
HDGV	0.04652	0.02521	915.75947	924.42679
LDDV	0.04659	0.00067	372.46028	373.82357
LDDT	0.03282	0.00098	420.45828	421.57107
HDDV	0.02059	0.16411	1228.80987	1278.22943
MC	0.11223	0.00294	394.26887	397.95138

3.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year
$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Location
County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Proposed Action - Four additional sorties per Year

- Activity Description:
Sorties for VC-25B Operations. Estimated to be an additional 4 flight sorties per year (one per quarter). Assumed F-16 aircraft as a basis for the anlysis. Two aircraft per sortie, four sorties per year.

Lackland is a training base, this is a minimal amount of additional sorties.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.028165
SO_x	0.077693
NO_x	1.331743
CO	0.378083

Pollutant	Emissions Per Year (TONs)
PM 10	0.168891
PM 2.5	0.151619
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH_4	0.869685
N_2O	0.861760

Pollutant	Emissions Per Year (TONs)
CO_2	232.692308
CO_2e	233.499994

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.028165
SO_x	0.077693
NO_x	1.331743
CO	0.378083

Pollutant	Emissions Per Year (TONs)
PM 10	0.168891
PM 2.5	0.151619
Pb	0.000000
NH_3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH_4	0.869685
N_2O	0.861760

Pollutant	Emissions Per Year (TONs)
CO_2	232.692308
CO_2e	233.499994

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: NF-16A
Engine Model: F100-PW-200
Primary Function: Combat
Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	1006.00	2.05	1.07	6.21	24.06	2.47	2.22
Approach	3251.00	0.05	1.07	17.93	1.22	2.37	2.13
Intermediate	5651.00	0.07	1.07	26.55	0.38	1.58	1.42
Military	8888.00	0.11	1.07	34.32	0.56	1.66	1.49
After Burn	40123.00	0.69	1.07	6.63	10.42	3.07	2.76

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
Idle	1006.00	0.13	0.03	3203.44	3214.64
Approach	3251.00	0.13	0.03	3203.44	3214.64
Intermediate	5651.00	0.13	0.03	3203.44	3214.64
Military	8888.00	0.13	0.03	3203.44	3214.64
After Burn	40123.00	0.13	0.03	3203.44	3214.64

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 2
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 4
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 29.8 (default)
Approach [Approach] (mins): 3.5 (default)
Climb Out [Intermediate] (mins): 0.8 (default)
Takeoff [Military] (mins): 0.2 (default)
Takeoff [After Burn] (mins): 0.2 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12 (default)
Approach (mins): 27 (default)
Intermediate (mins): 9 (default)
Military (mins): 9 (default)
AfterBurn (mins): 3 (default)

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	1	No	T-62T-40-8	

4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
T-62T-40-8	272.6	0.493	0.289	1.216	3.759	0.131	0.037

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH_4	N_2O	CO_2	CO_2e
T-62T-40-8	272.6	0.1	0.0	909.0	910.8

4.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location

County: Bexar
Regulatory Area(s): San Antonio, TX

- Activity Title: Alternative Action Construction of Permanent CWMA

- Activity Description:

Under the Alternative Action, JBSA-Lackland would install and operate a permanently affixed 30-meter Extended Ellipticus Antenna to support LLCW testing on aircraft. Because this would be a permanent test site, the following site improvement activities would occur:

• Site preparation and foundation work: This includes constructing a personnel support structure, winch foundations, and pouring a concrete pad for a climate controlled, 8’ x 10’ personnel shelter.

• Site preparation: This includes leveling the ground plane to the approximate height of the existing Bubble. A concrete pad with wooden poles around the perimeter would be installed to prevent damage to ground plane and pad.

• Amplifier structure: An 8’ x 10’ metal, climate-controlled structure would be constructed to house the amplifier. It would be placed on a pad and anchored in place at the base of the northwest antenna pole.

• Power supply: Dedicated power would be installed for the amplifier structure (for lighting, climate control, additional 110-volt outlets, 220-volt 30-amp for the amplifier) and the support structures (for the winches and emergency lighting system). All power would be installed underground from the nearest point of connection.

• Antenna emplacement: The two support structures would be erected and secured with down-guys and cross-guys between the structures, followed by installing powered winches to raise/lower the antenna and lightning protection system. The antenna and ground plane would then be installed.

• Lighting and lighting protection: An Aircraft Warning Light System, Aerial Markers, and a Lightning Protection System for the antenna and supporting shelter would be installed.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.028154
SO_x	0.000534
NO_x	0.244698
CO	0.347341

Pollutant	Total Emissions (TONs)
PM 10	0.020258
PM 2.5	0.008568
Pb	0.000000
NH_3	0.000634

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.002397
N_2O	0.000776

Pollutant	Total Emissions (TONs)
CO_2	61.030808
CO_2e	61.322042

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.002397
N_2O	0.000776

Pollutant	Total Emissions (TONs)
CO_2	61.030808
CO_2e	61.322042

5.1 Site Grading Phase

5.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 1
Number of Days: 0

5.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1000

Amount of Material to be Hauled On-Site (yd^3): 500
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)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

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

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.29535	0.00490	2.28401	3.40565	0.12705	0.11688
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.25231	0.00487	2.49971	3.48392	0.13245	0.12186
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.34288	0.00492	3.09108	2.65644	0.13550	0.12466
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02155	0.00431	531.25291	533.07604
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02140	0.00428	527.44206	529.25211
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				

	CH_4	N_2O	CO_2	CO_2e
Emission Factors	0.02160	0.00432	532.55942	534.38703
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

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

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.23880	0.00165	0.10433	3.65368	0.00364	0.00322	0.04833
LDGT	0.19432	0.00205	0.12624	3.11754	0.00423	0.00374	0.03985
HDGV	0.72030	0.00474	0.50250	9.24177	0.01762	0.01558	0.08881
LDDV	0.09055	0.00125	0.14524	6.17299	0.00368	0.00338	0.01656
LDDT	0.12733	0.00142	0.40517	5.16830	0.00597	0.00550	0.01683
HDDV	0.09196	0.00412	2.06496	1.43563	0.03682	0.03387	0.06671
MC	2.88942	0.00199	0.61282	11.89251	0.02195	0.01942	0.05462

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

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01228	0.00476	320.14901	321.87319
LDGT	0.01141	0.00658	395.97759	398.22329
HDGV	0.04652	0.02521	915.75947	924.42679
LDDV	0.04659	0.00067	372.46028	373.82357
LDDT	0.03282	0.00098	420.45828	421.57107
HDDV	0.02059	0.16411	1228.80987	1278.22943
MC	0.11223	0.00294	394.26887	397.95138

5.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: 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

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)

$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
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

5.2 Trenching/Excavating Phase

5.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 1
Number of Days: 0

5.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 100
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.37809	0.00542	3.36699	4.21640	0.08879	0.08169
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.43579	0.00542	3.52468	4.59651	0.09918	0.09125
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02383	0.00477	587.39431	589.41010
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02385	0.00477	587.92708	589.94470
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

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

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.23880	0.00165	0.10433	3.65368	0.00364	0.00322	0.04833
LDGT	0.19432	0.00205	0.12624	3.11754	0.00423	0.00374	0.03985
HDGV	0.72030	0.00474	0.50250	9.24177	0.01762	0.01558	0.08881
LDDV	0.09055	0.00125	0.14524	6.17299	0.00368	0.00338	0.01656
LDDT	0.12733	0.00142	0.40517	5.16830	0.00597	0.00550	0.01683

HDDV	0.09196	0.00412	2.06496	1.43563	0.03682	0.03387	0.06671
MC	2.88942	0.00199	0.61282	11.89251	0.02195	0.01942	0.05462

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

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01228	0.00476	320.14901	321.87319
LDGT	0.01141	0.00658	395.97759	398.22329
HDGV	0.04652	0.02521	915.75947	924.42679
LDDV	0.04659	0.00067	372.46028	373.82357
LDDT	0.03282	0.00098	420.45828	421.57107
HDDV	0.02059	0.16411	1228.80987	1278.22943
MC	0.11223	0.00294	394.26887	397.95138

5.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: 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

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
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_{VE}: 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

5.3 Building Construction Phase

5.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
Start Quarter: 1
Start Year: 2027

- Phase Duration

Number of Month: 2
Number of Days: 0

5.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 2000
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Aerial Lifts Composite	2	4
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

5.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Aerial Lifts Composite [HP: 46] [LF: 0.31]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.15103	0.00542	2.87048	3.07022	0.02025	0.01863
Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.19464	0.00487	1.74774	1.62852	0.07179	0.06605
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.22849	0.00487	2.15229	3.56761	0.09240	0.08501
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Aerial Lifts Composite [HP: 46] [LF: 0.31]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02381	0.00476	586.90129	588.91539
Cranes Composite [HP: 367] [LF: 0.29]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02140	0.00428	527.45492	529.26501
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02138	0.00428	527.06992	528.87869
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

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

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.23880	0.00165	0.10433	3.65368	0.00364	0.00322	0.04833
LDGT	0.19432	0.00205	0.12624	3.11754	0.00423	0.00374	0.03985
HDGV	0.72030	0.00474	0.50250	9.24177	0.01762	0.01558	0.08881
LDDV	0.09055	0.00125	0.14524	6.17299	0.00368	0.00338	0.01656

LDDT	0.12733	0.00142	0.40517	5.16830	0.00597	0.00550	0.01683
HDDV	0.09196	0.00412	2.06496	1.43563	0.03682	0.03387	0.06671
MC	2.88942	0.00199	0.61282	11.89251	0.02195	0.01942	0.05462

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

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01228	0.00476	320.14901	321.87319
LDGT	0.01141	0.00658	395.97759	398.22329
HDGV	0.04652	0.02521	915.75947	924.42679
LDDV	0.04659	0.00067	372.46028	373.82357
LDDT	0.03282	0.00098	420.45828	421.57107
HDDV	0.02059	0.16411	1228.80987	1278.22943
MC	0.11223	0.00294	394.26887	397.95138

5.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{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)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

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: 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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

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

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender 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)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

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

APPENDIX C – BIOLOGICAL ASSESSMENT

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BIOLOGICAL ASSESSMENT FOR FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES FOR AN ELECTROMAGNETIC PULSE TEST PROJECT AT THE JOINT BASE SAN ANTONIO-LACKLAND KELLY FIELD ANNEX IN TEXAS

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BIOLOGICAL ASSESSMENT FOR FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES FOR AN ELECTROMAGNETIC PULSE TEST PROJECT AT THE JOINT BASE SAN ANTONIO-LACKLAND KELLY FIELD ANNEX IN TEXAS

INTRODUCTION

The Endangered Species Act of 1973, as amended, under oversight by the U.S. Fish and Wildlife Service (USFWS), directs Federal agencies to conserve endangered and threatened species and to ensure that actions authorized, funded, or implemented are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction of their critical habitats. Additionally, many birds are protected under the Migratory Bird Treaty Act of 1918 as well as the Bald and Golden Eagle Protection Act of 1940 and consultation with the USFWS for this project may include species that are not federally listed but deemed sensitive and worthy of evaluation in the areas of the proposed project.

This Biological Assessment evaluates the possible effects to endangered and threatened species known or that may occur at the Electromagnetic Pulse Test Site at the Joint Base San Antonio-Lackland Kelly Field Annex in Texas. The project would consist of the use of a mobile electromagnetic pulse test facility or a permanently established electromagnetic pulse test facility. A small "bubble" will be established for the testing of the VC25-B aircraft.

PROPOSED ACTION

Project Name

The project name is the Environmental Assessment for an Electromagnetic Pulse Test Facility Joint Base San Antonio-Lackland, Texas.

PROPOSED PROJECT AND PURPOSE

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and DoD instructions. The Proposed Action is needed because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

ACTION AREAS

JBSA-Lackland Kelly Field is home to the USAF 433rd Airlift Wing, the 149th Fighter Wing of the Air National Guard, the Port of San Antonio, and one of Boeing's largest maintenance operations for civilian and military aircraft, including the VC-25B aircraft. **Figure 1** presents the vicinity map of the project area. The proposed project area is located at the southwestern end of

Figure 1
Project Location Map
JBSA-Lackland Kelly Field Annex

Kelly Field Annex at an area referred to as "The Bubble", shown enclosed by the orange square on **Figure 2.**

Under the Proposed Action, AFMC would receive and operate a mobile ellipticus antenna at "The Bubble" to support EMP testing on the VC-25B and other similar aircraft. The antenna would be a portable Continuous Wave Measurement System (CWMS) ante1ma. The CWMS would provide Low-Level Continuous Wave (LLCW) testing of the VC-25B and other similar aircraft and would create a low-intensity electromagnetic field which would approximate EMP effects in a controlled setting.

The CWMS would be used to measure the integrity of the shielding on an EMP hardened aircraft. It would illuminate the aircraft with an overhead-incident, uniform field of approximately I-volt per meter and wave impedance of 377 ohms. The test system would consist of a transmitter that would illuminate the aircraft over the frequency range of 100 kilohertz (kHz) to 1 gigahertz (GHz), and a receiver that would measure the aircraft's responses to the radiated energy.

The range of frequencies would be chosen to correspond to the EMP specification being simulated. The specification may call for a frequency range of 100 kHz to 100 MHz, or for a range of 100 kHz to 1 gigahertz (GHz). Within the 100 kHz-100 MHz frequency range, there are approximately 1,200 discrete frequency points. The total sweep time would be approximately 12 minutes, and the maximum dwell time would be approximately 0.3 seconds on each frequency. When the 100 kHz-I GHz range is used, there would be approximately 3,000 discrete frequency points requiring a total sweep time of approximately 30 minutes.

The portable CWMS antenna would be erected by a crew of approximately seven personnel using supporting equipment such as boom lifts and trucks. Once erected, the mobile CWMS would remain for approximately one week for testing operations, after which it would be dismantled and returned to storage. A portable generator would be used during the one-week test period to provide power and area lighting while the system is in use. The portable CWMS would be oriented to the side of the aircraft for testing. Only one aircraft would be tested at a time.

LISTED SPECIES

The official list of species considered in this analysis includes endangered and threatened species that may occur within and directly around the proposed project area at the Electromagnetic Test Site at JBSA-Lackland Kelly Field Annex. This official list was obtained from the USFWS' (2024a) Information for Planning and Consultation (IPaC) database mapper for the project ai·ea under Project Code 2024-0140063 on September 5, 2024, through the Austin Ecological Services Field Office. The official USFWS species list is presented in **Attachment A.** These species include the following:

- Golden-cheeked warbler *(Dendroica chryoparia)* Endangered
- Piping plover *(Charadrius melodus)* Threatened
- Red knot *(Calidris canutus rufa)* Threatened
- San Marcos salamander *(Eurycea nana)* Threatened

Figure 2
Project Area "Bubble" Location
JBSA-Lackland Kelly Field Annex

- Texas blind salamander (*Eurycea* [=Typhlomolge] *rathbuni*) Endangered
- Fountain darter (*Etheostoma fonticola*) Endangered
- Beetle (*Rhadine exilis*) Endangered
- Beetle (*Rhadine infernalis*) Endangered
- Comal Springs dryopid beetle (*Stygoparnus comalensis*) Endangered
- Comal Springs riffle beetle (*Heterelmis comalensis*) Endangered
- Helotes mold beetle (*Batrisodes venyivi*) Endangered
- Monarch butterfly (*Danaus plexippus*) Candidate
- Cokendolpher Cave harvestman (*Texella cokendolpheri*) Endangered
- Government Canyon bat cave meshweaver (*Cicurina vespera*) Endangered
- Government Canyon bat cave spider (*Neoleptoneta microps*) Endangered
- Madla Cave meshweaver (*Cicurina madla*) Endangered
- Robber Baron Cave meshweaver (*Cicurina baronia*) Endangered
- Peck's Cave amphipod (*Stygobromus* (=Stygonectes) *pecki*) Endangered
- Texas wild-rice (*Zizania texana*) Endangered

ANALYSIS OF EFFECTS

No Action Alternative

Direct, Indirect, and Cumulative Effects

No direct or indirect effects or cumulative effects to sensitive species would occur under this alternative as no impact to the vegetation communities and wildlife habitats within the proposed project area would be realized.

Proposed Action Alternative

The existing JBSA-Lackland Kelly Field Annex has been in use for years and is comprised of buildings, paved parking lots, sidewalks, runways, as well as small areas of vegetation that are mowed and managed.

Direct, Indirect, and Cumulative Effects

No critical habitat for federally protected or state sensitive species occurs in the Proposed Action project area. No habitat for the federally sensitive species listed above occurs within the project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Again, the area of use under the Proposed Action Alternative is small, aerially limited, and already disturbed by use as an airfield. Therefore, implementation of the Proposed Action Alternative would have no adverse effects to federally listed species.

Alternative Action Alternative

Direct, Indirect, and Cumulative Effects.

No critical habitat for federally protected or state sensitive species occurs in the Proposed Action project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Again, the area of use under the Alternative Action is small, aerially limited, and already disturbed by use as an airfield. Therefore, implementation of the Proposed Action Alternative would have no adverse effects to federally listed or state listed species.

VEGETATION COMMUNITIES OCCURRING AT THE PROPOSED PROJECT SITE

The JBSA-Lackland Kelly Field Annex is located within the Blackland Prairie, South Texas Plains, and Edwards Plateau Ecosystems. The base is comprised of three general vegetative cover types including deciduous shrublands and woodlands, riparian woodlands, and grasslands (Weston Solutions, Inc. 2014). Two habitat types occur within the EMP project area within the JBSA-LAK Kelley Field Annex. These habitat types include grasslands and riparian woodlands. These habitat types were distinguished and characterized by their associated vegetation communities and dominant species as well as their location on the landscape.

Grasslands: The grassland habitat occurs across most of the project area in and around the airfield and runways. The vast majority of the Kelly Field Annex has been developed. Dominant species include Bermuda grass (*Cynodon dactylon*), silver bluestem (*Bothriochloa laguroides*), silverleaf nightshade (*Solanum elaeagnifolium*), clover species, oldfield threeawn (*Aristida oligantha*), and thistle species (GMI 2011). The managed grasslands are mowed frequently and perpetually to keep the vegetation low to the ground. Additionally, the native species composition is limited (Weston Solutions, Inc. 2014).

This vegetation community provides little to no habitat for wildlife due to the lack of vertical cover which is kept short by frequent mowing. Additionally, this community is located within and adjacent to a busy airfield which discourages wildlife from traveling, perching, foraging, resting, and occupying the space. JBSA-LAK frequently manages the vegetation by removing trees and shrubs except for the Leon Creek riparian corridor, which is very narrow, and the very outer fringes of the base property.

Riparian Woodlands: The riparian woodland habitat type occurs in a small portion of the project area and is associated with Leon Creek. This habitat type is dominated by cedar elm (*Ulmus crassifolia*), pecan (*Carya illinoensis*), hackberry (*Celtis occidentalis*), and live oak (*Quercus virginiana*). Wetter areas within the riparian corridor support Eastern cottonwood (*Populus deltoides*) and black willow (*Salix nigra*). Canada wildrye (*Elymus canadensis*), poison ivy (*Rhus radicans*), greenbrier (*Smilax* sp.), and giant ragweed (*Ambrosia trifida*) are found in the herbaceous strata in this habitat type (GMI 2011).

A wide variety of wildlife utilizes this habitat type due to the presence of surface water, vegetative species diversity, and vegetative cover. Common birds in this habitat type include the mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), Carolina chickadee (*Poecile carolinensis*), Eastern bluebird (*Sialia sialis*), and tufted titmouse (*Baeolophus bicolor*). Large mammals that occupy this habitat type include white-tailed deer (*Odocoileus virginianus*) and feral hog (*Sus scrofa*). Commonly found medium-sized mammals within this community type include raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and nine-banded armadillo (*Dasypus novemcinctus*). Small mammals that occupy this habitat type include the white-ankled mouse (*Peromyscus pectorialis*) and eastern woodrat (*Neotoma floridana*). A variety of amphibian species may also utilize this habitat type.

According to the U.S. Fish and Wildlife Service's National Wetland Inventory Mapper, Leon Creek is mapped as a permanently flooded, lower perennial riverine system with an unconsolidated bottom (R2UBH) (USFWS 2024b) adjacent to the proposed "bubble" project area. No wetlands occur within the proposed project area.

FEDERALLY SENSITIVE SPECIES

An official Federally Sensitive Species List was obtained from the USFWS (2024a) for the proposed project area and is presented in **Appendix A**. A description of each species and their habitat requirements as well as their potential to occur within the proposed project area is presented below.

Golden-cheeked warbler (*Dendroica chryoparia*). This species requires juniper-oak woodland habitat and is dependent on Ashe juniper (*Juniperus ashei*) (also known as cedar) for long fine bark strips secured by cobwebs for nest construction. The bark strips are only available from mature trees. Nests are constructed in various trees other than Ashe juniper. The warbler forages for insects in broad-leaved teres and shrubs.

The EMP Test site has no suitable habitat for this species. No habitat suitability occurs within the project area for this species. Implementation of the Action Alternatives would have no impact on the golden-cheeked warbler.

Piping plover (*Charadrius melodus*). According to the USFWS (2024c), this species occurs in unvegetated sand or pebble beaches on shorelines or islands in freshwater and saline wetlands as well as open shorelines and sandbars of rivers and large reservoirs. This bird is pale brown above and lighter below with a black band across the forehead. The bill is orange with a black tip and the legs are orange as well.

There is no potential for the piping plover to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the piping plover.

Red knot (*Calidris canutus rufa*). According to the USFWS (2024d), the red knot is a robin-sized shorebird that occurs in flocks, sometimes with other species. The bird is finely mottled

with dark and light gray as well as black and light ochre coloring with stripes on the crown, throat, breast, and sides of the head. This species occupies larger wetlands and shorelines of waterbodies and large rivers. The knot breeds in the central Canadian Arctic and it winters at the southern tip of South America.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the red knot.

San Marcos salamander (*Eurycea nana*). According to the Texas Parks and Wildlife Department (TPWD) (2024a), this salamander is a dark reddish-brown salamander about 1 to 2 inches in length and slender in stature. This species is only known to occur in Spring Lake and an adjacent downstream portion of the upper San Marcos River. This species prefers clear, flowing spring water coming from the headwaters of the San Marcos River.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the San Marcos salamander.

Texas blind salamander (*Eurycea* [=Typhlomolge] *rathbuni*). According to the TPWD (2024b), the Texas blind salamander lives in water-filled caves of the Edwards Aquifer near San Marcos, Texas. It has adapted for living in water underground and is an active predator. It has no eyes with only two small black dots under the skin on the face. It has little skin pigment and has red external gills used to get oxygen from the water.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Texas blind salamander.

Fountain darter (*Etheostoma fonticola*). According to the TPWD (2024c), this small fish lives only in the San Marcos and Comal River headwaters in Hays and Comal counties in Texas. They are most often found in mats of filamentous green algae. The adults occupy the quiet and flowing parts of the river, but the young stay mostly in slow-flowing backwater areas with lots of vegetation.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the fountain darter.

Beetle (*Rhadine exilis*). This species has no common name and is a small, essentially eyeless ground beetle that occupies Karstic (cavelike) formations of Bexar County (Eckhardt 2021). These species prefer the dark zone deep within the caves and are not commonly found near the entrances to the caves (Eckhardt 2021). This species is currently known to inhabit 50 caves in north and northwest Bexar County, including caves located on Camp Bullis in the Stone Oak karst region and the Helotes, UTSA, and Stone Oak karst regions (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Beetle (*Rhadine infernalis*). This beetle is small and essentially eyeless with a reddish-brown carapace that occupies the karstic formations in Bexar County like the *Rhadine exilis* beetle described above.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Comal Springs dryopid beetle (*Stygoparnus comalensis*). This beetle is a subterranean species that lives primarily in flowing, uncontaminated waters in Comal Springs and Fern Bank Springs in Hays County (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Comal Springs riffle beetle (*Heterelmis comalensis*). This species is a small aquatic, surface-dwelling species that occurs in the gravel substrate and shallow riffles in spring runs of Comal Springs and San Marcos Springs (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Helotes mold beetle (*Batrisodes venyivi*). This species also occupies karstic formations in Bexar County like the two previously discussed beetles (Eckhardt 2021). This species is known to occupy eight caves near Helotes (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Cokendolpher Cave harvestman (*Texella cokendolpheri*). This spider is a small orange, eyeless daddy long-legs with very long and thin legs and a small body (Eckhardt 2021). This species is currently known from the Robber Baron Cave in Alamo Heights (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Cokendolpher Cave harvestman spider.

Government Canyon Bat Cave meshweaver (*Cicurina vespera*). This species is a small, essentially eyeless spider that also occurs in Karstic formations in Bexar County (Eckhardt

2021). The spider is known from Government Canyon Bat Cave in the Government Canyon State Natural Area (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Government Canyon Bat Cave meshweaver spider.

Government Canyon Bat Cave spider (*Neoleptoneta microps*). This species is small and yellowish in color occurring in Karstic formations in Bexar County (Eckhardt 2021). It is known from two caves in the Government Canyon State Natural Area (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Government Canyon Bat Cave spider.

Madla Cave meshweaver (*Cicurina madla*). This spider is small and essentially eyeless with a reduced pigment that occupies cave like formations in Bexar County (Eckhardt 2021). This species is known from eight caves in or near Government Canyon, Helotes, and UTSA (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Madla Cave meshweaver spider.

Robber Baron Cave meshweaver (*Cicurina baronia*). This spider is a small, essentially eyeless spider that also occurs in Karstic formations in Bexar County (Eckhardt 2021). This species occupies the Robber Baron Cave in Alamo Heights (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Robber Baron Cave meshweaver spider.

Peck's Cave amphipod (*Stygobromus* (=Stygonectes) *pecki*). This species is a subterranean, aquatic crustacean that is eyeless and unpigmented (Eckhardt 2021). This amphipod occupies crevices in rock and gravel near the three largest orifices of Comal Springs on the west side of Landa Park in Comal County near the aquifer (Eckhardt 2021). The species is known from Comal Springs and Hueco Springs in Comal County.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Peck's Cave amphipod.

Texas wild-rice (*Zizania texana*). According to Mr. Gregg Eckhardt of the Edwards Aquifer Website (2021), this species forms large clones or masses of clones that firmly root in gravel shallows near the middle of the river. This species was historically abundant in the San Marcos River, in contiguous irrigation ditches with constant flows, and in Spring Lake at the River's

headwaters (Eckhardt 2021). It is currently known from the upper four miles of the San Marcos River in and near the city of San Marcos (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Texas wild-rice species.

DETERMINATION

Implementation of the Proposed Action Alternative or the Alternative Action Alternative *will have no effect* on the threatened or endangered species discussed above due to a lack of suitable habitat within the project area for any of these species.

A variety of mitigation measures can be employed to avoid or minimize impacts to sensitive species and migratory birds if they happen to occur within or adjacent to the proposed project area. These mitigation measures are listed below.

Mitigative Measures

Mitigation measures can be employed to avoid or minimize impacts to sensitive species and migratory birds if they happen to occur within or adjacent to the proposed project area. Many of these mitigation measures were obtained from the USFWS' Nationwide Standard Conservation Measures List (USFWS 2024f). These mitigation measures are listed below.

- Conduct a Wetland Delineation within any riparian or wet area adjacent or connected to Leon Creek around the proposed "bubble" project area to determine the presence of or the extent of Waters of the United States, including wetlands, that may occur within or adjacent to the proposed project area.
- If Waters of the United States, including wetlands, will be impacted by the proposed project, obtain a 404-Wetland Permit from the U.S. Army Corps of Engineers prior to construction.
- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife.
- Provide enclosed solid waste receptacles at the project site.
- Report any incidental take of a migratory bird to the local USFWS office.
- Minimize project creep by clearly delineating and maintaining project boundaries, including parking areas.
- Maximize use of disturbed land for project activities wherever possible.
- Prevent an increase in lighting of native habitats during the bird and bat breeding season and limit test activities as much as possible to daylight hours between dawn and dusk to avoid illumination of adjacent habitat areas. Bright white light, such as metal halide, halogen, fluorescent, mercury vapor, and incandescent lamps should not be used.
- Prevent the increase in noise above ambient levels during the breeding and nesting seasons (if birds or bats are observed) by installing temporary structural barriers such as sandbags or using baffle boxes or sound walls.

- Prevent the introduction of chemical contaminants into the environment by implementing a Hazardous Materials Plan, avoiding soil contamination by using drip pans underneath equipment and containments zones at construction sites and when refueling vehicles or equipment, limit all equipment maintenance, staging laydown, and dispensing of fuels or oils to designated upland areas.

PREPARERS

This Biological Assessment was completed by Darcy A. Tiglas, Tiglas Ecological Services, in September of 2024.

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Attachment A
Official USFWS Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Austin Ecological Services Field Office
1505 Ferguson Lane
Austin, TX 78754-4501
Phone: (512) 937-7371

In Reply Refer To:
Project Code: 2024-0140063
Project Name: JBSA-Lackland Kelly Field Annex Electro-Magnetic Pulsing Project

09/05/2024 17:04:09 UTC

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

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

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

This species list is provided by:

Austin Ecological Services Field Office
1505 Ferguson Lane
Austin, TX 78754-4501
(512) 937-7371

PROJECT SUMMARY

Project Code: 2024-0140063
Project Name: JBSA-Lackland Kelly Field Annex Electro-Magnetic Pulsing Project
Project Type: Airport - Maintenance/Modification
Project Description: The USAF proposes to install a mobile or a fixed electro-magnetic pulsing station at the corner of the existing airfield to test the resilience of the specific aircraft to radar interruption and disabling.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@29.369759199999997,-98.58594365809716,14z

Counties: Bexar County, Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 19 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 3 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME STATUS

Golden-cheeked Warbler *Setophaga chrysoparia* Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/33

Piping Plover *Charadrius melodus* Threatened

Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
This species only needs to be considered under the following conditions:

- Wind Energy Projects

Species profile: https://ecos.fws.gov/ecp/species/6039

Rufa Red Knot *Calidris canutus rufa* Threatened

There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
This species only needs to be considered under the following conditions:

- Wind Energy Projects

Species profile: https://ecos.fws.gov/ecp/species/1864

AMPHIBIANS

NAME STATUS

San Marcos Salamander *Eurycea nana* Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6374

Texas Blind Salamander *Eurycea rathbuni* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- Effects to water quality and quantity in the Edwards Aquifer and to surface waters in the recharge and contributing zones of the Edwards Aquifer must be considered if they adversely affect water quality and quantity in Texas blind salamander habitat

Species profile: https://ecos.fws.gov/ecp/species/5130

FISHES

NAME STATUS

Fountain Darter *Etheostoma fonticola* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/5858

INSECTS

NAME STATUS

[no Common Name] Beetle *Rhadine exilis* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6942

NAME STATUS

[no Common Name] Beetle *Rhadine infernalis* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3804

Comal Springs Dryopid Beetle *Stygoparnus comalensis* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/7175

Comal Springs Riffle Beetle *Heterelmis comalensis* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3403

Helotes Mold Beetle *Batrisodes venyivi* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/1149

Monarch Butterfly *Danaus plexippus* Candidate
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

ARACHNIDS

NAME STATUS

Cokendolpher Cave Harvestman *Texella cokendolpheri* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/676

Government Canyon Bat Cave Meshweaver *Cicurina vespera* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/7037

Government Canyon Bat Cave Spider *Tayshaneta microps* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/553

Madla Cave Meshweaver *Cicurina madla* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2467

Robber Baron Cave Meshweaver *Cicurina baronia* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2361

CRUSTACEANS

NAME STATUS

Peck's Cave Amphipod *Stygobromus (=Stygonectes) pecki* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8575

FLOWERING PLANTS

NAME	STATUS
Texas Wild-rice *Zizania texana*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/805

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Darcy Tiglas
Address: 5015 Swainsona Drive
City: Loveland
State: CO
Zip: 80537
Email tiglasd@aol.com
Phone: 9702222151

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Air Force

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EMP TEST FACILITY EA

BIOLOGICAL ANALYSIS

Prepared using IPaC

Generated by Doug Schlagel (dschlagel@auxiliomanagement.com)

May 2, 2025

The purpose of this document is to assess the effects of the proposed project and determine whether the project may affect any federally threatened, endangered, proposed, or candidate species. If appropriate for the project, this document may be used as a biological assessment (BA), as it is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)).

In this document, any data provided by U.S. Fish and Wildlife Service is based on data as of May 2, 2025.

Prepared using IPaC version 6.126.0-rc2

EMP TEST FACILITY EA BIOLOGICAL ASSESSMENT

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1 DESCRIPTION OF THE ACTION

1.1 PROJECT NAME

EMP Test Facility EA

1.2 EXECUTIVE SUMMARY

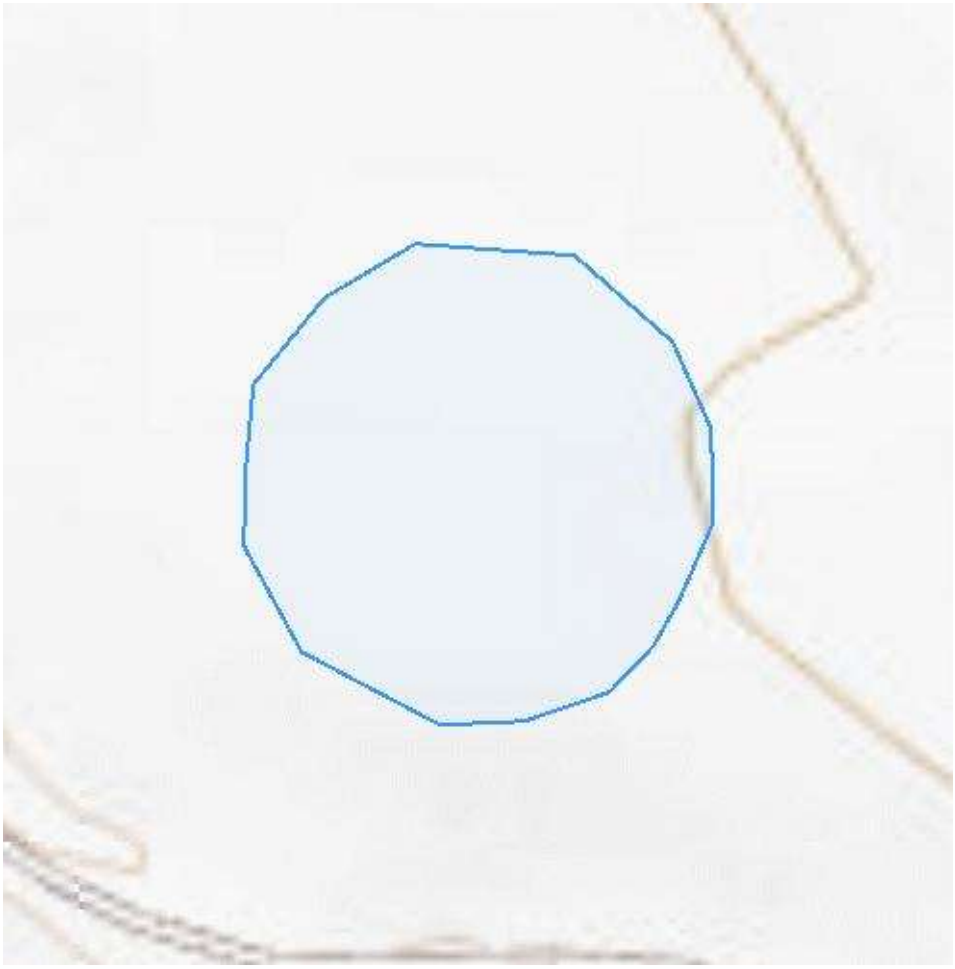
No adverse impact to Federally listed species.

1.3 EFFECT DETERMINATION SUMMARY

SPECIES (COMMON NAME)	SCIENTIFIC NAME	LISTING STATUS	PRESENT IN ACTION AREA	EFFECT DETERMINATION
Cokendolpher Cave Harvestman	Texella cokendolpheri	Endangered	No	NE
Comal Springs Dryopid Beetle	Stygoparnus comalensis	Endangered	No	NE
Comal Springs Riffle Beetle	Heterelmis comalensis	Endangered	No	NE
Fountain Darter	Etheostoma fonticola	Endangered	No	NE
Golden-cheeked Warbler	Setophaga chrysoparia	Endangered	No	NE
Government Canyon Bat Cave Meshweaver	Cicurina vespera	Endangered	No	NE
Government Canyon Bat Cave Spider	Tayshaneta microps	Endangered	No	NE
Helotes Mold Beetle	Batrisodes venyivi	Endangered	No	NE
Madla Cave Meshweaver	Cicurina madla	Endangered	No	NE
Monarch Butterfly	Danaus plexippus	Proposed Threatened	Excluded from analysis	Excluded from analysis
Peck's Cave Amphipod	Stygobromus (=Stygonectes) pecki	Endangered	No	NE
Piping Plover	Charadrius melodus	Threatened	No	NE
Robber Baron Cave Meshweaver	Cicurina baronia	Endangered	No	NE
Rufa Red Knot	Calidris canutus rufa	Threatened	No	NE
San Marcos Salamander	Eurycea nana	Threatened	No	NE
Texas Blind Salamander	Eurycea rathbuni	Endangered	No	NE
Texas Wild-rice	Zizania texana	Endangered	No	NE
[no Common Name] Beetle	Rhadine infernalis	Endangered	No	NE
[no Common Name] Beetle	Rhadine exilis	Endangered	No	NE

1.4 PROJECT DESCRIPTION

1.4.1 LOCATION



LOCATION
Bexar County, Texas

1.4.2 DESCRIPTION OF PROJECT HABITAT

Wildlife and Vegetation. The JBSA-Lackland Kelly Field Annex is located within the Blackland Prairie, South Texas Plains, and Edwards Plateau Ecosystems. The base is comprised of three general vegetative cover types including deciduous shrublands and woodlands, riparian woodlands, and grasslands (Weston Solutions, Inc., 2014). Two habitat types occur within the EMP project area within the JBSA-Lackland Kelly Field Annex. These habitat types include grasslands and riparian woodlands. These habitat types were distinguished and characterized by their associated vegetation communities and dominant species as well as their location on the landscape. Grasslands: The grassland habitat occurs across most of the project area in and around the airfield and runways. The vast majority of the Kelly Field Annex has been developed. Dominant species include Bermuda grass (*Cynodon dactylon*), silver bluestem (*Bothriochloa laguroides*), silverleaf nightshade (*Solanum elaeagnifolium*), clover species, oldfield threeawn (*Aristida oligantha*), and thistle species (GMI, 2011). The managed grasslands are mowed frequently and perpetually to keep the vegetation low to the ground. Additionally, the native species composition is limited (Weston Solutions, Inc., 2014). This vegetation community provides little to no habitat for wildlife due to the lack of vertical cover which is kept short by frequent mowing. Additionally, this community is located within and adjacent to a busy airfield which discourages wildlife from traveling, perching, foraging, resting, and occupying the space. JBSA-Lackland frequently manages the vegetation by removing trees and shrubs except for the Leon Creek riparian corridor, which is very narrow, and the very outer fringes of the base property. Riparian Woodlands: The riparian woodland habitat type occurs in a small portion of the project area and is associated with Leon Creek. This habitat type is dominated by cedar elm (*Ulmus crassifolia*), pecan (*Carya illinoensis*), hackberry (*Celtis occidentalis*), and live oak (*Quercus virginiana*). Wetter areas within the riparian corridor support Eastern cottonwood (*Populus deltoides*) and black willow (*Salix nigra*). Canada wildrye (*Elymus canadensis*), poison ivy (*Rhus radicans*), greenbrier (*Smilax sp.*), and giant ragweed (*Ambrosia trifida*) are found in the herbaceous strata in this habitat type (GMI, 2011). A wide variety of wildlife utilizes this habitat type due to the presence of surface water, vegetative species diversity, and vegetative cover. Common birds in this habitat type include the mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), Carolina chickadee (*Poecile carolinensis*), Eastern bluebird (*Sialia sialis*), and tufted titmouse (*Baeolophus bicolor*). Large mammals that occupy this habitat type include white-tailed deer (*Odocoileus virginianus*) and feral hog (*Sus scrofa*). Commonly found medium-sized mammals within this community type include raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and nine-banded armadillo (*Dasypus novemcinctus*). Small mammals that occupy this habitat type include the white-ankled mouse (*Peromyscus pectorialis*) and eastern woodrat (*Neotoma floridana*). A variety of amphibian species may also utilize this habitat type.

1.4.3 PROJECT PROPONENT INFORMATION

Provide information regarding who is proposing to conduct the project, and their contact information. Please provide details on whether there is a Federal nexus.

REQUESTING AGENCY

Department of Defense

Air Force

FULL NAME

Doug Schlagel

STREET ADDRESS

802 CES/CEIEA

CITY	STATE	ZIP
JBSA-Lackland	TX	78236

PHONE NUMBER	E-MAIL ADDRESS
3039680995	dschlagel@auxiliomanagement.com

LEAD AGENCY

Lead agency is the same as requesting agency

1.4.4 PROJECT PURPOSE

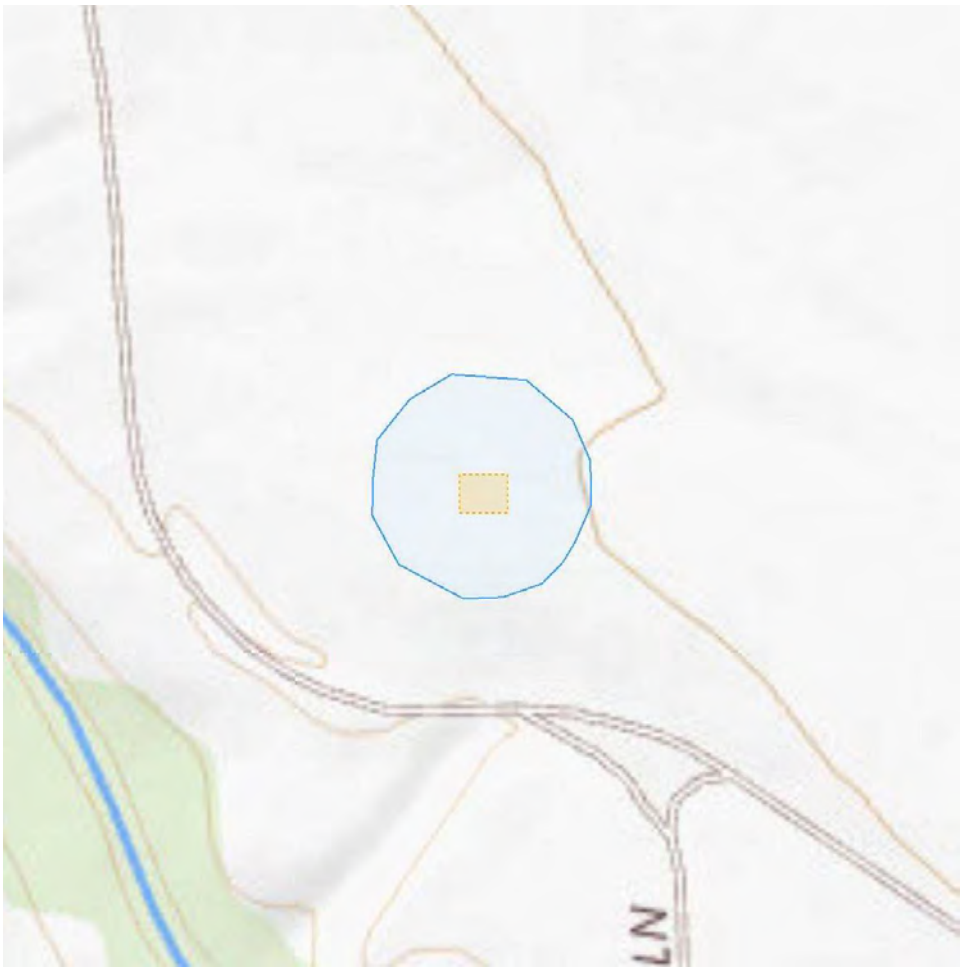
The purpose of the Proposed Action is to ensure the VC-25B aircraft meets EMP exposure performance criteria as defined in military standards and Department of Defense (DoD) instructions.

The Proposed Action is needed because existing EMP testing facilities cannot accommodate the VC-25B aircraft. As the lead agency responsible for EMP testing, the Air Force Materiel Command (AFMC) must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

1.4.5 PROJECT TYPE AND DECONSTRUCTION

This project is a aircraft operations project.

1.4.5.1 PROJECT MAP



LEGEND

Project footprint

CWMS: Mobile antenna (structure)

1.4.5.2 MOBILE ANTENNA

STRUCTURE COMPLETION DATE
October 01, 2025

REMOVAL/DECOMMISSION DATE (IF APPLICABLE)
Not applicable

STRESSORS
This activity is not expected to have any impact on the environment.

DESCRIPTION
The existing JBSA-Lackland Kelly Field Annex has been in use for years and is comprised of buildings, paved parking lots, sidewalks, runways, as well as small areas of vegetation that are mowed and managed.

Direct Effects

Loss of Habitat and Vegetative Cover. An approximate 300 foot diameter of existing paved area would be used for the implementation of the Proposed Action. The project area is small, square, and aerially limited. Managed grassland and riparian woodland habitat associated with Leon Creek lie outside of the paved area and would not be directly affected by the mobile Electromagnetic Pulse Test Facility.

Wildlife. Displacement of wildlife species, including sensitive species, is already occurring due to the existence of airfields and runways at the Kelly Field Annex. Due to the populated buildings and roads within and around the Proposed Action project area, wildlife populations are not typically observed, although individual urban wildlife species, such as raccoons, are likely observed. Increased traffic and human activities at the Proposed Action project area may result in an increase in wildlife-vehicle collisions, however, the increase in wildlife mortality due to vehicle collisions would be unlikely to have a significant impact on local wildlife population.

The small area within the Proposed Action project area near Leon Creek may see fewer wildlife species using the space but the far side of the drainage and the up- and downstream areas of Leon Creek will be accessible to wildlife and no change to those areas availability will occur.

Birds may strike the cables securing the CWMS antennae within the project area, but the birds will adapt to the cables (as they do to transmission lines and telephone lines) and the antennae will be erected for only a short period of time for each testing period. However, since the antennae will be present infrequently, birds may strike the cables and/or antennae more frequently than under the Action Alternative. Restrictions to using the CWMS during bird migration seasons are not anticipated. Any impacts to wildlife in The Bubble proposed under the Proposed Action alternatives would be minimal and would not be adverse.

According to Malkemper et al. (2018), the magnetic orientation for migratory birds can be affected by radio frequency fields. The magnetic compass of migratory birds can be disrupted by the weak radio frequency background in larger cities, but it is currently unclear which exact frequencies are most effective. At this time, it is unclear whether disruption of a magnetic compass has real ecological consequences as animals and birds use a variety of mechanisms for orientation.

Due to the proximity of the project to the flightline, precautions must be taken to prevent Bird/Wildlife Aircraft Strike Hazard (BASH) issues and other wildlife attractants or entrances on or near the airfields. Any maintenance or construction activities on or near the airfields will follow the JBSA BASH Plan and AFPAM 91-212 to include but not limited to, the prevention of ruts, bare spots, wildlife entrances, or any other disturbance that could cause water to pool up or attract birds/wildlife.

Sensitive Species and Critical Habitat. No critical habitat for federally protected or state sensitive species occurs in the Proposed Action project area. No habitat for the state and federally sensitive species listed above occurs within the project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Therefore, implementation of the Proposed Action would have no adverse effects to federally listed or state listed species. JBSA-Lackland will communicate with USFWS presenting this position, satisfying Endangered Species Act Section 7 consultation requirements.

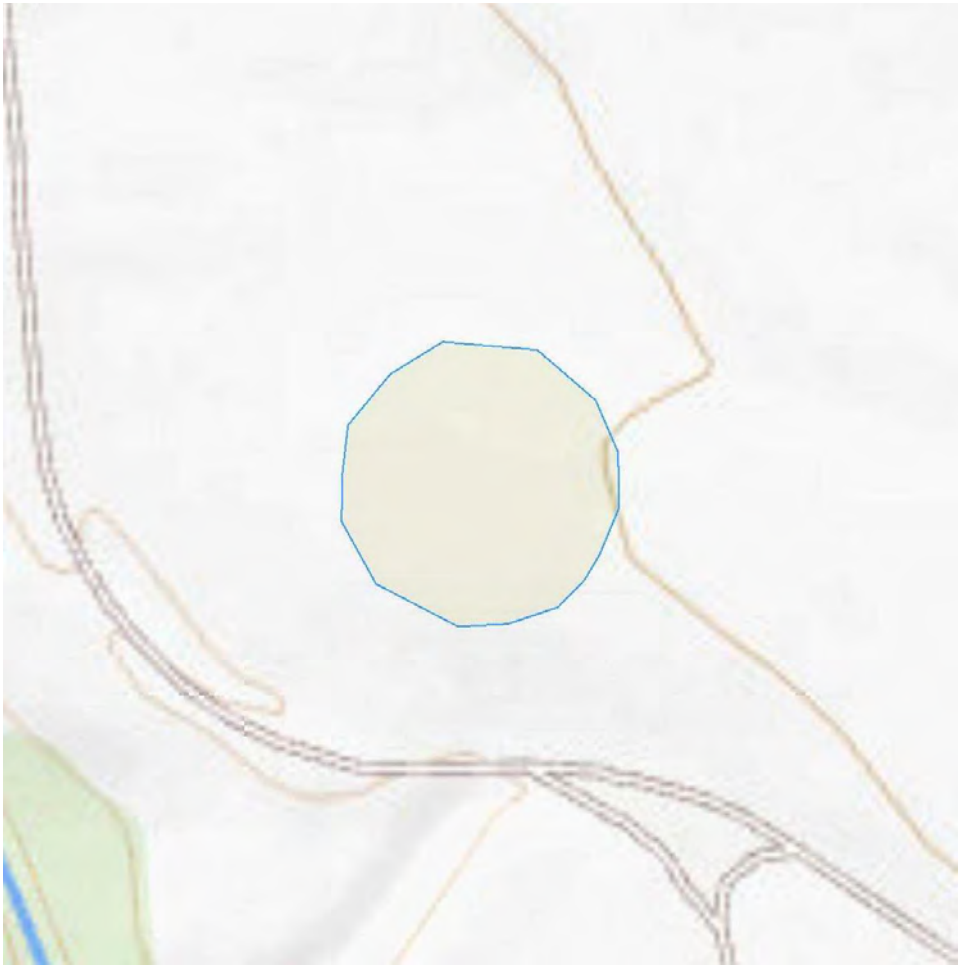
Indirect Effects

No indirect effects will occur to plants and their communities, wildlife, and sensitive species under the Proposed Action. Again, the area of use under the Proposed Action is small, aerially limited, and already disturbed by use as an airfield.

1.4.6 ANTICIPATED ENVIRONMENTAL STRESSORS

Describe the anticipated effects of your proposed project on the aspects of the land, air and water that will occur due to the activities above. These should be based on the activity deconstructions done in the previous section and will be used to inform the action area.

1.5 ACTION AREA



LEGEND

Project footprint

Stressor location

1.6 CONSERVATION MEASURES

Describe any proposed measures being implemented as part of the project that are designed to reduce the impacts to the environment and their resulting effects to listed species. To avoid extra verbiage, don't list measures that have no relevance to the species being analyzed.

No conservation measures have been selected for this project.

1.7 PRIOR CONSULTATION HISTORY

None.

1.8 OTHER AGENCY PARTNERS AND INTERESTED PARTIES

None

1.9 OTHER REPORTS AND HELPFUL INFORMATION

None.

2 SPECIES EFFECTS ANALYSIS

This section describes, species by species, the effects of the proposed action on listed, proposed, and candidate species, and the habitat on which they depend. In this document, effects are broken down as direct interactions (something happening directly to the species) or indirect interactions (something happening to the environment on which a species depends that could then result in effects to the species).

These interactions encompass effects that occur both during project construction and those which could be ongoing after the project is finished. All effects, however, should be considered, including effects from direct and indirect interactions and cumulative effects.

2.1 COKENDOLPHER CAVE HARVESTMAN

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from a single locality, Robber Baron Cave.

Suitable habitat is not present within or adjacent to the proposed project area.

2.2 COMAL SPRINGS DRYOPID BEETLE

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterranean species occurring in flowing, uncontaminated waters.

Suitable habitat is not present within or adjacent to the proposed project area.

2.3 COMAL SPRINGS RIFFLE BEETLE

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Not a subterranean species. It occurs in the gravel substrate and shallow riffles in spring runs.

Suitable habitat is not present within or adjacent to the proposed project area.

2.4 FOUNTAIN DARTER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Vegetated springs, pools, and runs of effluent rivers with dense beds of aquatic plants growing close to the bottom, which is normally mucky.

Suitable habitat is not present within or adjacent to the proposed project area.

2.5 GOLDEN-CHEEKED WARBLER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Breeding habitat consists of old-growth and mature regrowth Ashe juniper-oak woodlands in limestone hills and canyons at 180-520 meters in elevation.

Suitable habitat is not present within or adjacent to the proposed project area.

2.6 GOVERNMENT CANYON BAT CAVE MESHWEAVER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from a single locality in Bexar County, TX.

Suitable habitat is not present within or adjacent to the proposed project area.

2.7 GOVERNMENT CANYON BAT CAVE SPIDER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Suitable habitat is not present within or adjacent to the proposed project area.

2.8 HELOTES MOLD BEETLE

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from 8 caves in Bexar County, TX.

Suitable habitat is not present within or adjacent to the proposed project area.

2.9 MADLA CAVE MESHWEAVER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from 8 caves in Bexar County, TX.

Suitable habitat is not present within or adjacent to the proposed project area.

2.10 MONARCH BUTTERFLY

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Breeding habitat must contain milkweeds.

Suitable habitat is not present within or adjacent to the proposed project area.

2.11 PECK'S CAVE AMPHIPOD

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Primary habitat is a zone of permanent darkness in the underground Edwards Aquifer feeding the springs.

Suitable habitat is not present within or adjacent to the proposed project area.

2.12 PIPING PLOVER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Suitable breeding habitats are wide beaches with highly clumped vegetation and less than 5% overall vegetation cover and/or with extensive gravel.

Suitable habitat is not present within or adjacent to the proposed project area.

2.13 ROBBER BARON CAVE MESHWEAVER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from a single locality, Robber Baron Cave.

Suitable habitat is not present within or adjacent to the proposed project area.

2.14 RUFA RED KNOT

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Breeding habitat is elevated and sparsely vegetated slopes or ridges, often adjacent to wetlands and lake edges.

Suitable habitat is not present within or adjacent to the proposed project area.

2.15 SAN MARCOS SALAMANDER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Shallow alkaline springs carved out of limestone, with sand and gravel substrate. Associated with water plants and algal mat covering spring pool.

Suitable habitat is not present within or adjacent to the proposed project area.

2.16 TEXAS BLIND SALAMANDER

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Water filled caves of the Edwards Aquifer

Suitable habitat is not present within or adjacent to the proposed project area.

2.17 TEXAS WILD-RICE

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Gravel shallows near the middle of the river.

Suitable habitat is not present within or adjacent to the proposed project area.

2.18 [NO COMMON NAME] BEETLE

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from 49 to 55 caves in Bexar County, TX.

Suitable habitat is not present within or adjacent to the proposed project area.

2.19 [NO COMMON NAME] BEETLE

This species has been excluded from analysis in this environmental review document.

JUSTIFICATION FOR EXCLUSION

Subterrestrial species known from 36 to 39 caves in Bexar County, TX.

Suitable habitat is not present within or adjacent to the proposed project area.

3 CRITICAL HABITAT EFFECTS ANALYSIS

No critical habitats intersect with the project action area.

4 SUMMARY DISCUSSION AND CONCLUSION

4.1 SUMMARY DISCUSSION

The existing JBSA-Lackland Kelly Field Annex has been in use for years and is comprised of buildings, paved parking lots, sidewalks, runways, as well as small areas of vegetation that are mowed and managed.

Direct Effects

Loss of Habitat and Vegetative Cover. An approximate 300 foot diameter of existing paved area would be used for the implementation of the Proposed Action. The project area is small, square, and aerially limited. Managed grassland and riparian woodland habitat associated with Leon Creek lie outside of the paved area and would not be directly affected by the mobile Electromagnetic Pulse Test Facility.

Wildlife. Displacement of wildlife species, including sensitive species, is already occurring due to the existence of airfields and runways at the Kelly Field Annex. Due to the populated buildings and roads within and around the Proposed Action project area, wildlife populations are not typically observed, although individual urban wildlife species, such as raccoons, are likely observed. Increased traffic and human activities at the Proposed Action project area may result in an increase in wildlife-vehicle collisions, however, the increase in wildlife mortality due to vehicle collisions would be unlikely to have a significant impact on local wildlife population.

The small area within the Proposed Action project area near Leon Creek may see fewer wildlife species using the space but the far side of the drainage and the up- and downstream areas of Leon Creek will be accessible to wildlife and no change to those areas availability will occur.

Birds may strike the cables securing the CWMS antennae within the project area, but the birds will adapt to the cables (as they do to transmission lines and telephone lines) and the antennae will be erected for only a short period of time for each testing period. However, since the antennae will be present infrequently, birds may strike the cables and/or antennae more frequently than under the Action Alternative. Restrictions to using the CWMS during bird migration seasons are not anticipated. Any impacts to wildlife in The Bubble proposed under the Proposed Action alternatives would be minimal and would not be adverse.

According to Malkemper et al. (2018), the magnetic orientation for migratory birds can be affected by radio frequency fields. The magnetic compass of migratory birds can be disrupted by the weak radio frequency background in larger cities, but it is currently unclear which exact frequencies are most effective. At this time, it is unclear whether disruption of a magnetic compass has real ecological consequences as animals and birds use a variety of mechanisms for orientation.

Due to the proximity of the project to the flightline, precautions must be taken to prevent Bird/Wildlife Aircraft Strike Hazard (BASH) issues and other wildlife attractants or entrances on or near the airfields. Any maintenance or construction activities on or near the airfields will follow the JBSA BASH Plan and AFPAM 91-212 to include but not limited to, the prevention of ruts, bare spots, wildlife entrances, or any other disturbance that could cause water to pool up or attract birds/wildlife.

Sensitive Species and Critical Habitat. No critical habitat for federally protected or state sensitive species occurs in the Proposed Action project area. No habitat for the state and federally sensitive species listed above occurs within the project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Therefore, implementation of the Proposed Action would have no adverse effects to federally listed or state listed species. JBSA-Lackland will communicate with USFWS presenting this position, satisfying Endangered Species Act Section 7 consultation requirements.

Indirect Effects

No indirect effects will occur to plants and their communities, wildlife, and sensitive species under the Proposed Action. Again, the area of use under the Proposed Action is small, aerially limited, and already disturbed by use as an airfield.

4.2 CONCLUSION

No adverse impacts.

APPENDIX D – BIOLOGICAL EVALUATION

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BIOLOGICAL EVALUATION FOR STATE LISTED ENDANGERED AND THREATENED SPECIES FOR AN ELECTROMAGNETIC PULSE TEST PROJECT AT THE JOINT BASE SAN ANTONIO-LACKLAND KELLY FIELD ANNEX IN TEXAS

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BIOLOGICAL EVALUATION FOR STATE LISTED ENDANGERED AND THREATENED SPECIES FOR AN ELECTROMAGNETIC PULSE TEST PROJECT AT THE JOINT BASE SAN ANTONIO-LACKLAND KELLY FIELD ANNEX IN TEXAS

INTRODUCTION

This Biological Evaluation examines the possible effects to state endangered and threatened species known or that may occur at the Electromagnetic Pulse Test Site at the Joint Base San Antonio-Lackland Kelly Field Annex in Texas. The project would consist of the use of a mobile electromagnetic pulse test facility or a permanently established electromagnetic pulse test facility. A small "bubble" will be established for the testing of the VC25-B aircraft.

The Air Force is preparing an Environmental Assessment (EA) for the proposed project to fulfill the National Environmental Policy Act (NEPA) requirements. In accordance with the requirements of the NEPA, the Air Force is evaluating Texas state sensitive species for the proposed project through the preparation of a Biological Evaluation.

PROPOSED ACTION

Project Name

The project name is the Environmental Assessment for an Electromagnetic Pulse Test Facility Joint Base San Antonio-Lackland, Texas.

PROPOSED PROJECT AND PURPOSE

The purpose of the Proposed Action is to ensure the VC-25B meets EMP exposure performance criteria as defined in military standards and DoD instructions. The Proposed Action is needed because existing EMP testing facilities cannot accommodate the VC-25B. As the lead agency responsible for EMP testing, AFMC must establish an adequate facility to support the EMP resiliency testing of the VC-25B and other aircraft of similar size. Failure to do so would mean AFMC would not be able to properly test the EMP countermeasures of the VC-25B, the selected model intended to serve as the future Air Force One.

ACTION AREAS

JBSA-Lackland Kelly Field is home to the USAF 433rd Airlift Wing, the 149th Fighter Wing of the Air National Guard, the Port of San Antonio, and one of Boeing's largest maintenance operations for civilian and military aircraft, including the VC-25B aircraft. **Figure 1** presents the vicinity map of the project area. The proposed project area is located at the southwestern end of

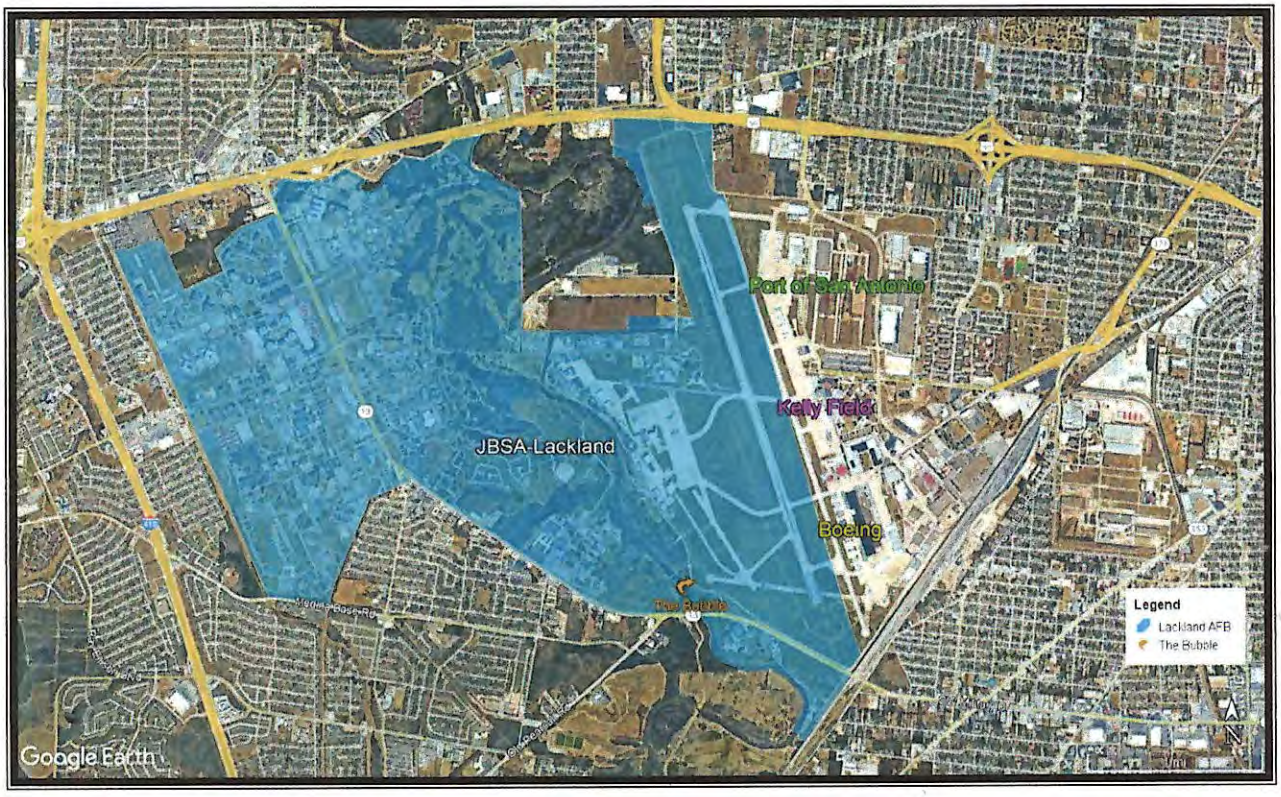

Figure 1
Project Location Map
JBSA-Lackland Kelly Field Annex

Kelly Field Annex at an area referred to as "The Bubble", shown enclosed by the orange square on **Figure 2**.

Under the Proposed Action, AFMC would receive and operate a mobile ellipticus antenna at "The Bubble" to support EMP testing on the VC-25B and other similar aircraft. The antenna would be a portable Continuous Wave Measurement System (CWMS) antenna. The CWMS would provide Low-Level Continuous Wave (LLCW) testing of the VC-25B and other similar aircraft and would create a low-intensity electromagnetic field which would approximate EMP effects in a controlled setting.

The CWMS would be used to measure the integrity of the shielding on an EMP hardened aircraft. It would illuminate the aircraft with an overhead-incident, uniform field of approximately 1-volt per meter and wave impedance of 377 ohms. The test system would consist of a transmitter that would illuminate the aircraft over the frequency range of 100 kilohertz (kHz) to 1 gigahertz (GHz), and a receiver that would measure the aircraft's responses to the radiated energy.

The range of frequencies would be chosen to correspond to the EMP specification being simulated. The specification may call for a frequency range of 100 kHz to 100 MHz, or for a range of 100 kHz to 1 gigahertz (GHz). Within the 100 kHz-100 MHz frequency range, there are approximately 1,200 discrete frequency points. The total sweep time would be approximately 12 minutes, and the maximum dwell time would be approximately 0.3 seconds on each frequency. When the 100 kHz-1 GHz range is used, there would be approximately 3,000 discrete frequency points requiring a total sweep time of approximately 30 minutes.

The portable CWMS antenna would be erected by a crew of approximately seven personnel using supporting equipment such as boom lifts and trucks. Once erected, the mobile CWMS would remain for approximately one week for testing operations, after which it would be dismantled and returned to storage. A portable generator would be used during the one-week test period to provide power and area lighting while the system is in use. The portable CWMS would be oriented to the side of the aircraft for testing. Only one aircraft would be tested at a time.

This Biological Evaluation addresses species identified as Threatened or Endangered by the Texas Parks and Wildlife Department (TPWD) and are considered possibly present or have habitat present within or near the proposed project site. State sensitive species have no protection under the Endangered Species Act of 1973, as amended, but are evaluated for impacts from projects occurring within lands in the spirit of the Act. Consideration of these sensitive species helps to protect them from future up-listing.

LISTED SPECIES

The official list of species considered in this analysis includes state endangered and threatened species that may occur within and directly around the proposed project area at the Electromagnetic Test Site at JBSA-Lackland Kelly Field Annex. This list was obtained from the review of the Integrated Natural Resource Management Plan (INRMP) (Weston Solutions, Inc. 2014) and the TPWD On-line Threatened and Endangered Species List (2024a).

Figure 2
Project Area "Bubble" Location
JBSA-Lackland Kelly Field Annex

These species include the following:

- San Marcos salamander (*Eurycea nana*) Threatened
- Texas horned lizard (*Phrynosoma cornutum*) Threatened
- Texas tortoise (*Gopherus berlandieri*) Threatened
- Cascade Caverns salamander (*Eurycea latitans*) Threatened
- Comal blind salamander (*Eurycea tridentifera*) Threatened
- Texas blind salamander (*Eurycea* {=Typhlomolge} *rathbuni*) Endangered
- Comal Springs dryopid beetle (*Stygoparnus comalensis*) Endangered
- Comal Springs riffle beetle (*Heterelmis comalensis*) Endangered
- Peck's Cave amphipod *Stygobromus* (=Stygenectes) *pecki* Endangered
- Peregrine falcon (*Falco perengrinus anatum*) Threatened
- White-faced ibis (*Plegadis chihi*) Threatened
- Piping plover (*Charadrius melodus*) Threatened
- Bald eagle (*Haliaeetus leucocephalus*) Threatened
- Red knot (*Calidris canutus rufa*) Threatened
- Wood stork (*Mycteria americana*) Threatened
- Zone-tailed hawk (*Buteo albonotatus*) Threatened
- Golden-cheeked warbler (*Dendroica chrysoparia*) Endangered
- Whooping crane (*Grus americana*) Endangered
- Black bear (*Ursus americanus*) Threatened

ANALYSIS OF EFFECTS

No Action Alternative

Direct, Indirect, and Cumulative Effects

No direct or indirect effects or cumulative effects to sensitive species would occur under this alternative as no impact to the vegetation communities and wildlife habitats within the proposed project area would be realized.

Proposed Action Alternative

The existing JBSA-Lackland Kelly Field Annex has been in use for years and is comprised of buildings, paved parking lots, sidewalks, runways, as well as small areas of vegetation that are mowed and managed.

Direct, Indirect, and Cumulative Effects

No critical habitat for state sensitive species occurs in the Proposed Action project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Again, the area of use under the Proposed Action Alternative is small, aerially limited, and

already disturbed by use as an airfield. Therefore, implementation of the Proposed Action Alternative would have no adverse effects to state listed species.

Alternative Action Alternative

Direct, Indirect, and Cumulative Effects.

No critical habitat for state sensitive species occurs in the Proposed Action project area. Thus, sensitive species and their critical habitat requirements are not present within the project area although minimal and limited opportunities may occur for some species during bird migration. Again, the area of use under the Alternative Action is small, aerially limited, and already disturbed by use as an airfield. Therefore, implementation of the Proposed Action Alternative would have no adverse effects to state listed species.

VEGETATION COMMUNITIES OCCURRING AT THE PROPOSED PROJECT SITE

The JBSA-Lackland Kelly Field Annex is located within the Blackland Prairie, South Texas Plains, and Edwards Plateau Ecosystems. The base is comprised of three general vegetative cover types including deciduous shrublands and woodlands, riparian woodlands, and grasslands (Weston Solutions, Inc. 2014). Two habitat types occur within the EMP project area within the JBSA-LAK Kelley Field Annex. These habitat types include grasslands and riparian woodlands. These habitat types were distinguished and characterized by their associated vegetation communities and dominant species as well as their location on the landscape.

Grasslands: The grassland habitat occurs across most of the project area in and around the airfield and runways. The vast majority of the Kelly Field Annex has been developed. Dominant species include Bermuda grass (*Cynodon dactylon*), silver bluestem (*Bothriochloa laguroides*), silverleaf nightshade (*Solanum elaeagnifolium*), clover species, oldfield threeawn (*Aristida oligantha*), and thistle species (GMI 2011). The managed grasslands are mowed frequently and perpetually to keep the vegetation low to the ground. Additionally, the native species composition is limited (Weston Solutions, Inc. 2014).

This vegetation community provides little to no habitat for wildlife due to the lack of vertical cover which is kept short by frequent mowing. Additionally, this community is located within and adjacent to a busy airfield which discourages wildlife from traveling, perching, foraging, resting, and occupying the space. JBSA-LAK frequently manages the vegetation by removing trees and shrubs except for the Leon Creek riparian corridor, which is very narrow, and the very outer fringes of the base property.

Riparian Woodlands: The riparian woodland habitat type occurs in a small portion of the project area and is associated with Leon Creek. This habitat type is dominated by cedar elm (*Ulmus crassifolia*), pecan (*Carya illinoensis*), hackberry (*Celtis occidentalis*), and live oak (*Quercus virginiana*). Wetter areas within the riparian corridor support Eastern cottonwood (*Populus deltoides*) and black willow (*Salix nigra*). Canada wildrye (*Elymus canadensis*), poison ivy (*Rhus radicans*), greenbrier (*Smilax* sp.), and giant ragweed (*Ambrosia trifida*) are found in the herbaceous strata in this habitat type (GMI 2011).

A wide variety of wildlife utilizes this habitat type due to the presence of surface water, vegetative species diversity, and vegetative cover. Common birds in this habitat type include the mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), Carolina chickadee (*Poecile carolinensis*), Eastern bluebird (*Sialia sialis*), and tufted titmouse (*Baeolophus bicolor*). Large mammals that occupy this habitat type include white-tailed deer (*Odocoileus virginianus*) and feral hog (*Sus scrofa*). Commonly found medium-sized mammals within this community type include raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and nine-banded armadillo (*Dasypus novemcinctus*). Small mammals that occupy this habitat type include the white-ankled mouse (*Peromyscus pectorialis*) and eastern woodrat (*Neotoma floridana*). A variety of amphibian species may also utilize this habitat type.

STATE SENSITIVE SPECIES

A description of each state sensitive species and their habitat requirements as well as their potential to occur within the proposed project area is presented below.

San Marcos salamander (*Eurycea nana*). According to the Texas Parks and Wildlife Department (TPWD) (2024a), this salamander is a dark reddish-brown salamander about 1 to 2 inches in length and slender in stature. This species is only known to occur in Spring Lake and an adjacent downstream portion of the upper San Marcos River. This species prefers clear, flowing spring water coming from the headwaters of the San Marcos River.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the San Marcos salamander.

Texas horned lizard (*Phrynosoma cornutum*). This lizard is a flat-bodied and fierce-looking lizard. The head has numerous horns with two central head spines that are longer than the others. They can be found in arid and semi-arid habitats in open areas with sparse plant cover. They are usually found in loose sand or loamy soils (TPWD 2024b). According to Weston Solutions, Inc. (2014), only one sighting of this species has been recorded on the JBSA-Lackland campus. This sighting occurred in 1992.

The EMP Test site has no suitable habitat for this species. Implementation of the Action Alternatives would have no impact on the Texas horned lizard.

Texas tortoise (*Gopherus berlandieri*). This species has yellowish-orange, "horned" scutes on its shell and cylindrical and columnar hind legs (TPWD 2024c). Its preferred habitat is dry scrub and grasslands, and it especially likes the fruit of cacti such as the prickly pear. This species has not been observed on the JBSA-Lackland campus (Weston Solutions, Inc. 2014).

The EMP Test site has no suitable habitat for this species. Implementation of the Action Alternatives would have no impact on the Texas tortoise.

Cascade Caverns salamander (*Eurycea latitans*). This species is found in the Edwards Plateau of Texas. It is ground-water dependent and is entirely aquatic. This species is present in karstic springs and subterranean voids within the Trinity and Edwards aquifers in Central Texas (USFWS 2024a). This species has not been observed on the JBSA-Lackland campus (Weston Solutions, Inc. 2014).

The EMP Test site has no suitable habitat for this species. Implementation of the Action Alternatives would have no impact on the Cascade Caverns salamander.

Comal blind salamander (*Eurycea tridentifera*). This species is highly adapted for life in an aquatic, underground environment. It lives in total darkness and is translucent white in color. This species has a very restricted range and is only found in water-filled caves fed by the Edwards Aquifer (NWF 2024). This species has not been observed on the JBSA-Lackland campus (Weston Solutions, Inc. 2014).

The EMP Test site has no suitable habitat for this species. Implementation of the Action Alternatives would have no impact on the Comal blind salamander.

Texas blind salamander (*Eurycea* [=Typhlomolge] *rathbuni*). According to the TPWD (2024d), the Texas blind salamander lives in water-filled caves of the Edwards Aquifer near San Marcos, Texas. It has adapted for living in water underground and is an active predator. It has no eyes with only two small black dots under the skin on the face. It has little skin pigment and has red external gills used to get oxygen from the water (NWF 2024a).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Texas blind salamander.

Comal Springs dryopid beetle (*Stygoparnus comalensis*). This beetle is a subterranean species that lives primarily in flowing, uncontaminated waters in Comal Springs and Fern Bank Springs in Hays County (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Comal Springs riffle beetle (*Heterelmis comalensis*). This species is a small aquatic, surface-dwelling species that occurs in the gravel substrate and shallow riffles in spring runs of Comal Springs and San Marcos Springs (Eckhardt 2021).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on this beetle.

Peck's Cave amphipod (*Stygobromus* (=Stygonectes) *pecki*). This species is a subterranean, aquatic crustacean that is eyeless and unpigmented (Eckhardt 2021). This amphipod occupies

crevices in rock and gravel near the three largest orifices of Comal Springs on the west side of Landa Park in Comal County near the aquifer (Eckhardt 2021). The species is known from Comal Springs and Hueco Springs in Comal County.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the Peck's Cave amphipod.

Peregrine falcon (*Falco peregrinus anatum*). This species suffered serious population declines in North America during the 1900s due to pesticides. Breeding pairs nest on cliffs and forage over adjacent coniferous and riparian forests, and at times, other habitats (Andrews and Righter 1992). Migrants and winter residents occur mostly around reservoirs, rivers, and marshes, but may also be seen in grasslands, agricultural areas, and less often in other habitats (Andrews and Righter 1992).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the peregrine falcon.

White-faced ibis (*Plegadis chihi*). This species is large, dark, long-legged with a long down-curved bill. It prefers to feed in freshwater marshes (Stokes 1996). It wades and probes the shallow water searching for crayfish, crabs, frogs, insects, snails, and fish (Stokes 1996).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the ibis.

Piping plover (*Charadrius melodus*). According to the USFWS (2024b), this species occurs in unvegetated sand or pebble beaches on shorelines or islands in freshwater and saline wetlands as well as open shorelines and sandbars of rivers and large reservoirs. This bird is pale brown above and lighter below with a black band across the forehead. The bill is orange with a black tip and the legs are orange as well.

There is no potential for the piping plover to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the piping plover.

Red knot (*Calidris canutus rufa*). According to the USFWS (2024c), the red knot is a robin-sized shorebird that occurs in flocks, sometimes with other species. The bird is finely mottled with dark and light gray as well as black and light ochre coloring with stripes on the crown, throat, breast, and sides of the head. This species occupies larger wetlands and shorelines of waterbodies and large rivers. The knot breeds in the central Canadian Arctic and it winters at the southern tip of South America.

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the red knot.

Wood stork (*Mycteria americana*). This species is very large, long-legged with white feathers and a dark featherless head and neck (Stokes 1996). It feeds in shallow, often muddy water by wading and groping along the bottom with its bill searching for small fish, frogs, snakes, small alligators, and other aquatic animals (Stokes 1996). It occupies swamps, coastal shallows, ponds, and flooded pastures (Stokes 1996).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the wood stork.

Zone-tailed hawk (*Buteo albonotatus*). This species resembles a turkey vulture in flight, but has a paler trailing half of the wings, and tilting side to side when it soars (Stokes 1996). This hawk prefers open rugged country near canyons and cliffs for its habitat (Stokes 1996).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the hawk.

Golden-cheeked warbler (*Dendroica chryoparia*). This species requires juniper-oak woodland habitat and is dependent on Ashe juniper (*Juniperus ashei*) (also known as cedar) for long fine bark strips secured by cobwebs for nest construction. The bark strips are only available from mature trees. Nests are constructed in various trees other than Ashe juniper. The warbler forages for insects in broad-leaved teres and shrubs.

The EMP Test site has no suitable habitat for this species. Implementation of the Action Alternatives would have no impact on the golden-cheeked warbler.

Whooping crane (*Grus americana*). This species only occurs in North America and is the tallest bird (USFWS 2024d). Population declines were caused primarily by shooting and destruction of habitat in the prairies from agricultural development. This bird breeds, migrates, winters, and forages in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, open ponds, shallow bays, salt marsh and sand or tidal flats, upland swales, wet meadows and rivers, pastures, and agricultural fields (USFWS 2024e).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the whooping crane.

Black bear (*Ursus americanus*). Black bears vary in color from black to brown to a rusty cinnamon color (NWF 2024b). This species' range covers most of the North American continent. They have a versatile diet and can live in a variety of habitat types including coniferous and deciduous forests as well as open alpine habitats (NWF 2024b). They generally do not occur in wide-open areas, except along river courses where there is riparian vegetation and trees (NWF 2024b). They are not known to occur at the JBSA-Lackland campus (Weston Solutions, Inc. 2014).

There is no potential for this species to occur because no suitable habitat occurs within the project area. Therefore, implementation of the Action Alternatives would have no impact on the black bear.

DETERMINATION

Implementation of the Proposed Action Alternative or the Alternative Action Alternative *will have no effect* on the state sensitive species discussed above due to a lack of suitable habitat within the project area for any of these species.

A variety of mitigation measures can be employed to avoid or minimize impacts to sensitive species and migratory birds if they happen to occur within or adjacent to the proposed project area. These mitigation measures are listed below.

Mitigative Measures

Mitigation measures can be employed to avoid or minimize impacts to sensitive species and migratory birds if they happen to occur within or adjacent to the proposed project area. Many of these mitigation measures were obtained from the USFWS' Nationwide Standard Conservation Measures List (USFWS 2024e). These mitigation measures are listed below.

- Conduct a Wetland Delineation within any riparian or wet area adjacent or connected to Leon Creek around the proposed "bubble" project area to determine the presence of or the extent of Waters of the United States, including wetlands, that may occur within or adjacent to the proposed project area.
- If Waters of the United States, including wetlands, will be impacted by the proposed project, obtain a 404-Wetland Permit from the U.S. Army Corps of Engineers prior to construction.
- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife.
- Provide enclosed solid waste receptacles at the project site.
- Report any incidental take of a migratory bird to the local USFWS office.
- Minimize project creep by clearly delineating and maintaining project boundaries, including parking areas.
- Maximize use of disturbed land for project activities wherever possible.
- Prevent an increase in lighting of native habitats during the bird and bat breeding season and limit test activities as much as possible to daylight hours between dawn and dusk to avoid illumination of adjacent habitat areas. Bright white light, such as metal halide, halogen, fluorescent, mercury vapor, and incandescent lamps should not be used.
- Prevent the increase in noise above ambient levels during the breeding and nesting seasons (if birds or bats are observed) by installing temporary structural barriers such as sandbags or using baffle boxes or sound walls.

- Prevent the introduction of chemical contaminants into the environment by implementing a Hazardous Materials Plan, avoiding soil contamination by using drip pans underneath equipment and containments zones at construction sites and when refueling vehicles or equipment, limit all equipment maintenance, staging laydown, and dispensing of fuels or oils to designated upland areas.

PREPARERS

This Biological Evaluation was completed by Darcy A. Tiglas, Tiglas Ecological Services, in September of 2024.

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APPENDIX E – EMF TECHNICAL ANALYSIS

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FINAL

Electromagnetic Field Analysis and Technical Report

Proposed Electromagnetic Pulse Testing of Large-Frame Aircraft at Joint Base San Antonio-Lackland Kelly Field Annex, Texas

September 2024

Contract Number: W912BV-22-D-0003
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Digital versions of this document should be accompanied by a Microsoft Excel workbook detailing the calculations used for the analysis. Hardcopies should include a CD/DVD containing the Excel file.

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Electromagnetic Field Analysis and Technical Report

Environmental Assessment for Electromagnetic Pulse Test Site, Joint Base San Antonio-Lackland Kelly Field Annex, Texas

Prepared By:

Joint Base San Antonio

with

Auxilio Management Services

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists	GHz	gigahertz
AFB	Air Force Base	HEMP	High-Altitude EMP
ATLAS-I	Air Force Weapons Lab Transmission-Line Aircraft Simulator	HERF	hazard of electromagnetic radiation to fuel
B	magnetic	HERO	hazard of electromagnetic radiation to ordnance
BE	Bioenvironmental Engineering	Hz	hertz
CBRN	Chemical, Biological, Radiological, and Nuclear	IEEE	Institute of Electrical and Electronics Engineers
CWMS	continuous wave measurement system	JBSA	Joint Base San Antonio
DAFI	Department of the Air Force Instruction	m	meters
DoD	Department of Defense	MHz	megahertz
DoDI	DoD Instruction	MIL-STD	Military Standard
E	energy	MPE	maximum permissible exposure
E	electrical	SMEs	subject matter experts
EA	Environmental Assessment	TX	Texas
EMFR	electromagnetic field radiation	USAF	United States Air Force
EMP	electromagnetic pulse	USAFSAM	USAF School of Aerospace Medicine
FCC	Federal Communications Commission	USN	United States Navy

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1. Introduction

The United States Air Force (USAF) is conducting an environmental assessment (EA) to determine the impacts associated with placing an electromagnetic pulse (EMP) test site at the Kelly Field Annex, part of Joint Base San Antonio (JBSA), located in San Antonio, Texas (TX). This test site would be used to assess the EMP shielding present on various large-frame aircraft to determine effectiveness over a wide range of frequencies. This Technical Report describes electromagnetic field radiation (EMFR) and the effects thereof, EMP systems and their effects, a brief history of EMP simulation systems, and an EMP-focused examination of the Proposed Action, Action Alternative, and No Action Alternative from the EA. The results of this analysis will be included in the EA, and this document will be included as an Appendix to the same.

2. What is EMFR?

Electromagnetic field radiation surrounds us every moment of every day, from natural sources (primarily the sun) and from synthetic sources (such as radio stations and power lines). We see it in the form of visible light and color yet are oblivious to many other forms that pass through and around us. Any home, facility, or area that uses electricity produces EMFR to some degree, often with modern conveniences such as microwaves, Wi-Fi, cell phones, etc. Many types of EMFR are innocuous and harmless, yet other types can be very harmful. So, what is it?

EMFR can be pictured by visualizing two sinusoidal waves traveling together but perpendicular to each other (see **Figure 1**). One of these waves is an electrical component, the other is magnetic. EMFR waves carry energy and momentum and can infuse matter with these characteristics. Think of a household microwave oven; it produces EMFR of a specific frequency that interacts with the water in food, thus heating it. As mentioned previously, there are many types of EMFR, and they all exist on a spectrum based on their frequency of oscillation (identified by the Greek letter nu [ν] or *f* and measured in waves per second as hertz [Hz]) which often includes the corresponding wavelength (identified by the Greek letter lambda [λ] and measured in meters [m]). Frequency and wavelength are inextricably linked by the speed at which the waves travel (**Equation 1**). In a vacuum, EMFR travels at the speed of light (*c*, ~299,792,458 meters per second) and is somewhat slower through the atmosphere and other materials. However, *c* is often used as 'close enough' for many calculations. In essence, the greater the frequency, the shorter the wavelength and vice versa, as seen in **Figure 2**. Additionally, the energy (*E*) carried by EMFR at high frequencies is higher than that at low frequencies (as shown by **Equation 2,** where *h* is the Planck constant).

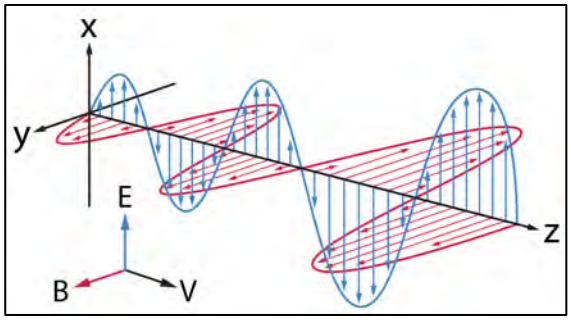

Figure 1: Perpendicular nature of electrical (E) and magnetic (B) EMFR waves.

Equation 1: $$\lambda = \frac{c}{f}$$

Equation 2: $$E = \frac{hc}{\lambda}$$

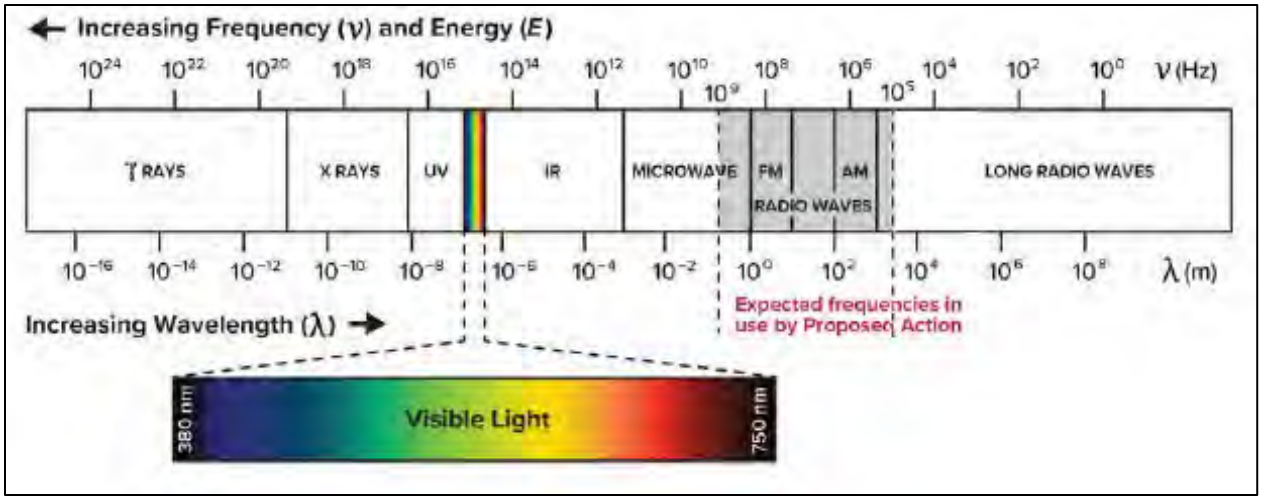

Figure 2: The full EMFR spectrum highlighting visible light and color as well as the anticipated testing frequencies.

2.1. Biological Effects

For this analysis, the focus will be on the frequencies expected to be used by the Proposed Action. This range of 100,000 Hz to 1,000,000,000 Hz (or 0.1 MHz to 1,000 MHz, or 10^3 – 10^9 Hz, see **Figure 2**) excludes extremely high frequency radiation – called ionizing radiation – such as x-rays and gamma (γ) rays that can cause severe health effects if used in an unsafe manner.

Non-ionizing radiation, such as that used in the Proposed Action, is considered nonhazardous to humans in almost all scenarios. However, it should be noted that distance from an emitter plays a role in hazard analysis; the further one is away from a transmitter, the less of a hazard it would present.

2.1.1. Heating of the body and skin burns

Frequencies associated with specific wavelengths can heat various body tissues – much like the operation of the microwave oven previously mentioned. EMFR between 1 megahertz (MHz) and 10 gigahertz (GHz) can heat the body as whole or specific organs based on their physical dimensions. EMFR greater than 10 GHz may cause the skin to heat. Prolonged exposure may lead to burns of the skin or specific organs within the body, which should be avoided. To protect against overexposure to such EMFR, scientists have determined a series of equations that calculate the maximum permissible exposure (MPE) for a given operating frequency of an emitter. For the USAF, these values are presented in the Department of the Air Force Instruction (DAFI) 48-109, *Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program (22 April, 2020)* as Table A2.1 for the Upper Tier environment (i.e., an environment where workers are completely aware of the EMFR hazard and are trained in EMFR safety) and in Table A2.2 for the Lower Tier environment (i.e., an environment where workers or members of the public are unaware of the EMFR hazard). The Lower Tier MPE values are notably stricter to ensure the safety of people in this category.

2.1.2. Induced and contact currents

Low frequency magnetic fields (3 kHz to 5 MHz) can cause currents to flow in the body that stimulate nerve and muscle cells. Some of these effects can be beneficial, such as acceleration of the healing process of broken bones, while others are negative, such as impairment of the heart. The effect largely depends on the frequency used and how much power is applied, and generally requires an individual to be very close to the emitter, if not touching it outright (USAF, 2020).

2.1.3. Human hearing

With the widespread use of radar during World War II, radar workers often complained of hearing a 'clicking' sound when operating near emitters. This phenomenon is known as the Frey effect and, while the exact cause is only postulated at this time, it may be due to rapid micro-heating and cooling of the brain when exposed to EMFR. Several studies over the years have observed and examined this effect. In general, if an individual were to hear such sounds while within an EMFR field, they should increase their distance from the emitter as they may also be subject to burns (Kitchen, 2001).

3. What is an EMP?

An EMP is a wide frequency range, high intensity burst of electromagnetic energy which can couple to metallic conductors associated with electrical and electronic systems to produce damaging current and voltage surges. An EMP can occur naturally as a result of the sun releasing massive amounts of energy or mass, such as with the Carrington Event of 1859 (Kimball, 1960). However, a more common concern involves a synthetic EMP, such as that created by detonating a thermonuclear warhead several hundred kilometers above the Earth's surface, designated as a High-altitude EMP (HEMP) (Reardon, 2014).

When a thermonuclear device is detonated in the upper atmosphere, the resulting explosion emits an enormous amount of energy across a wide frequency range (**Figure 3**). This energy comes in several forms, some of it impacting ground-based electronics nearly instantaneously while others take up to a few minutes to reach targets on the ground. This energy sends an unregulated amount of voltage though electronic circuits, damaging electrical components, traces, and microchips that, at least in the commercial and consumer realms, are not designed to handle such energy. The result is devastating to the target, as a single HEMP can disrupt electronics thousands of kilometers away (Reardon, 2014).

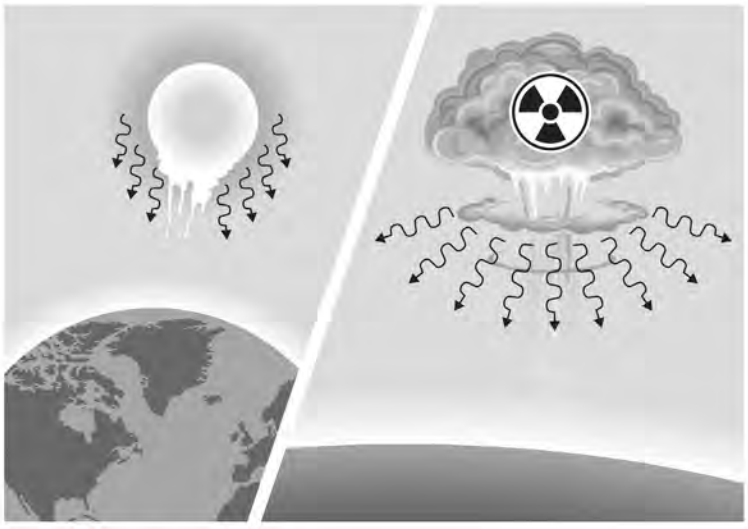

Figure 3: Both a coronal mass ejection of the sun and a HEMP set off several hundred kilometers above the Earth could cause a devastating EMP effect.

Objects such as aircraft without proper shielding or countermeasures would suffer catastrophic effects from a HEMP. The Department of Defense (DoD) takes this threat very seriously and works to combat the effectiveness of any EMP on military equipment. Military Standard (MIL-STD) 3023, *High-Altitude Electromagnetic Pulse (HEMP) Protection for Military Aircraft* (DoD, 2023), defines the performance criteria for HEMP protection against HEMP threat environments as defined in MIL-STD-2169, *High-Altitude Electromagnetic Pulse Environment* (DoD, 2020). In addition, DoD Instruction (DoDI) 3150.09, *The Chemical, Biological, Radiological, and Nuclear (CBRN) Survivability Policy*, assigns responsibilities and establishes policies and procedures for the execution of the DoD CBRN Survivability Policies (including EMP) (DoD, 2023). These regulations require the USAF to perform testing on various aircraft to ensure survivability and readiness during a HEMP event.

4. A Brief History of EMP Testing

Engineers have designed and built EMP simulators since at least the 1970s, which are used in designing and evaluating EMP shielding on aircraft and other test objects. It was imperative during the Cold War that researchers had real-world testing to support theories on EMP hardening. This led to the construction of the Air Force Weapons Lab Transmission-Line Aircraft Simulator (ATLAS-I, aka the 'Trestle') at Kirtland Air Force Base (AFB), as shown in **Figure 4**. This enormous structure was nearly entirely made from wood and glue – including the nuts and bolts – and could support a fully loaded B-52 bomber for EMP testing.

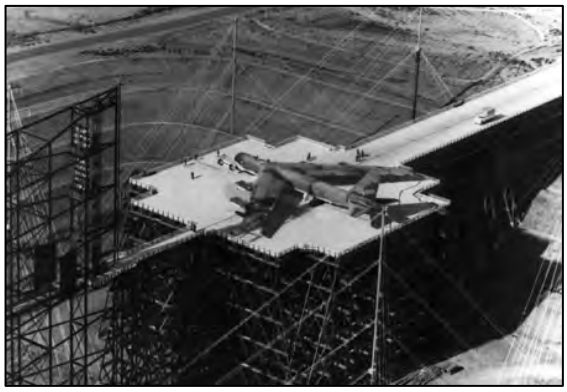

Figure 4: The Trestle at Kirtland AFB is made from wood and glue, seen here supporting a B-52 Stratofortress.

Since then, both the USAF and United States Navy (USN) have continued to execute EMP tests for their respective platforms. The USAF conducts testing on aircraft less than 20 meters in height in Palmdale, California and 30 meters at Tinker AFB, Oklahoma. The USN primarily tests at the Patuxent River complex in Maryland. However, only the Tinker AFB facility can conduct a test on aircraft approaching the scale of a Boeing 747 or larger. Unfortunately, other limitations exist that prevent these tests from occurring at Tinker AFB, such as inadequacy of the concrete pad to support the weight of large aircraft. Constraints such as these make upgrades at other existing sites logistically difficult as well.

5. Analysis of Action Alternatives

This analysis examines two alternatives and the no action alternative for placement of an EMP test site at the Kelly Field Annex. The Proposed Action utilizes a mobile antenna system to "shine" a low power continuous wave measurement system (CWMS) EMP on a test target. The Action Alternative works similarly but would require permanent installation and features different antenna characteristics. Under the No Action Alternative, no such system would be employed at the Kelly Field Annex and EMP shielding on large-frame aircraft would go untested.

5.1. Affected Environment

Since the advent of EMP testing during the Cold War, there are volumes of data that support testing facilities, including those at Tinker AFB, which closely mimic the design of the Action Alternative. All references are listed in **Section 6** and are cited where necessary.

5.1.1. USAF approach to EMFR safety

The USAF EMFR safety program is overseen by the Bioenvironmental Engineering (BE) office at most installations, following guidance developed by subject matter experts (SMEs) at the USAF School of Aerospace Medicine (USAFSAM). Individual industrial shops, such as those in communications and maintenance sections, are responsible for implementing EMFR safety with the assistance of the BE office, while investigations into potential exposures are conducted by the BE office in coordination with USAFSAM SMEs. Several documents created by USAFSAM supplement DAFI 48-109 to include AFRL-SA-WP-SR-2013-0003, *Base-Level Guide for Electromagnetic Frequency Radiation* (USAF, 2012) and AFRL-SA-WP-TR-2022-0003, *Bioenvironmental Engineering Program Management Guide,*

Electromagnetic Frequency Safety (USAF, 2022). These documents are the primary source of calculations for this analysis. Other sources include the Institute of Electrical and Electronics Engineers (IEEE) C95.x series of recommended practices (see **Section 6** for a complete list), as well as the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) guide (ACGIH, 2023).

5.1.2. Existing Conditions

Existing EMFR conditions in the vicinity of the Kelly Field Annex present a dense, complex EMFR environment populated with many types of antennae that both receive and transmit data. These include stationary ground-based sources associated with daily flightline operations, ground-based sources external to the airfield (such as TV stations, radio stations, and cell phone towers), and airborne transceivers on the aircraft operating in the vicinity of the airfield. Each of these sources operate at specific frequencies such that they do not interfere with each other, and care must be taken when adding a new EMFR source to ensure compatibility with the existing EMFR environment.

The Federal Communications Commission (FCC) maintains the Table of Frequency Allocations which includes both the International Table of Frequency Allocations and the United States Table of Frequency Allocations. This table codifies specific uses for individual bands into federal law.

5.1.3. Location

The proposed location for EMP tests is on a circular concrete pad at the southwestern corner of the JBSA Lackland-Kelly Field Annex airfield called “the Bubble” (**Figure 5** and **Figure 6**). To the west of the Bubble lies Oscar Westover Rd, which turns into Oak Street on the south side of the Bubble; the closest portion of the road is approximately 70 meters away. Further to the south is U.S. Highway 13, approximately 270 meters from the Bubble at its closest point. To the north and east of the Bubble lie various taxiways for the airfield. This area is completely inside the fence line of JBSA Lackland-Kelly Field Annex and further inside the airfield fence line, so individuals seeking access to the Bubble would need to acquire both base access and airfield access to approach the site. In short, only EMFR workers would have access to the test site during scheduled testing.

Figure 5: Location of the Bubble in relation to JBSA-Lackland AFB, the Port of San Antonio, and the Boeing complex.

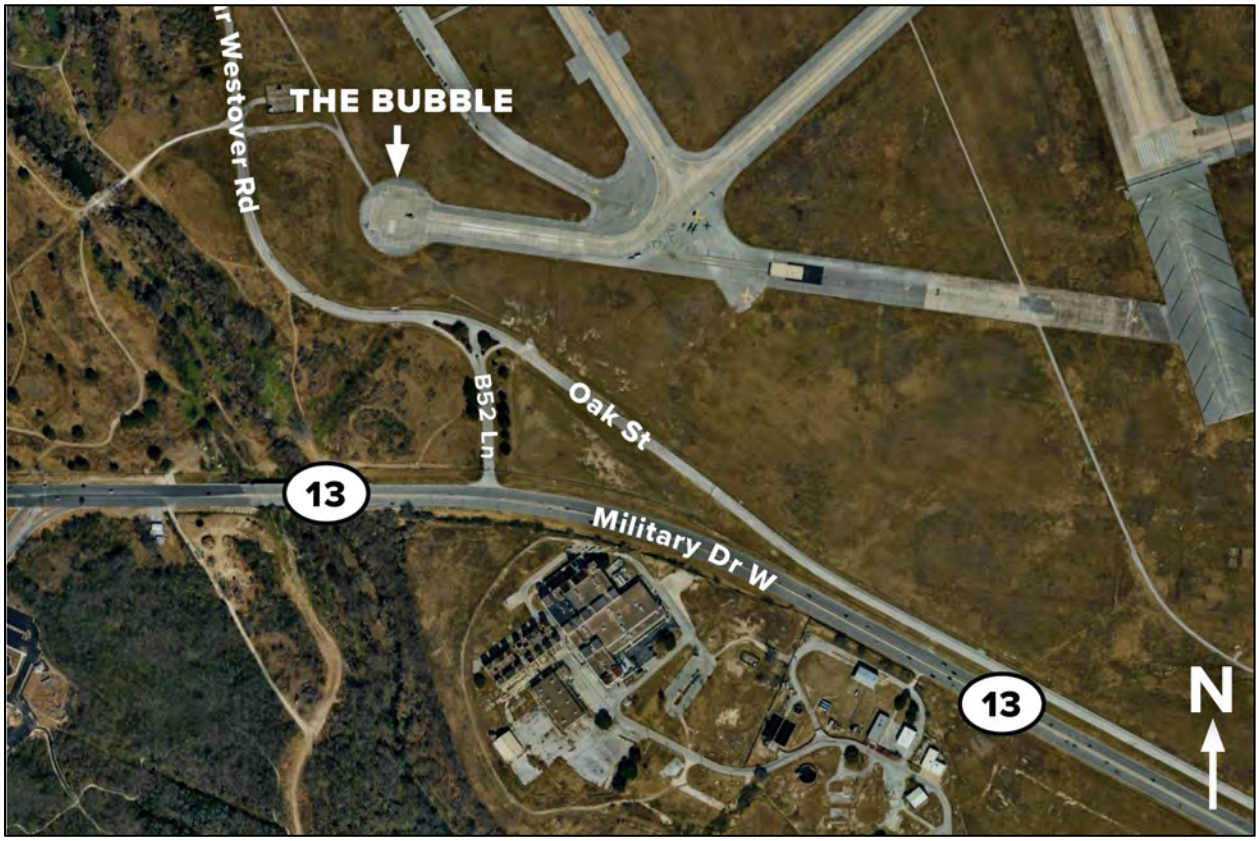

Figure 6: Location of the Bubble in relation to nearby roads.

5.2. Methodology

There are several aspects of an EMP that should be considered to fully determine the level of environmental impact. Each of the below will be addressed for each option and the no action alternative.

- Human Health and Safety
- Interaction with the Existing EMFR Environment
- Interaction with Electronics
- Interaction with Fuels
- Interaction with Explosives

5.3. Proposed Action: Use of a mobile CWMS EMP system

The Proposed Action would use a portable antenna system at the JBSA-Lackland Kelly Field Annex. This option would require temporary erection of a telescoping mast and associated stakes and cabling, and disassembly upon completion of the test. It is expected that each test would take approximately seven days to complete, including setup and teardown.

Figure 7: A mobile antenna system similar to that proposed for Kelly Field erected at another location.

The mobile EMP consists of a single mast, manufactured by Contact Corp., that is approximately 24 meters tall and supported by up to 16 tension cables and stakes (**Figure 7**). Horizontal dipole elements would be extended 100 meters to either side of the mast and staked at the far ends. At the top of the mast an ARA LPC-1030-101 crossed log periodic antenna would operate in one of two modes. The first, "horizontal" mode, angles the antenna down such that the Poynting vector[1] is 17 degrees from geographic horizontal which aims at the test target (**Figure 8**). In "vertical" mode, the antenna would be angled further down such that the Poynting vector would be at 73 degrees from geographic horizontal (**Figure 9**) (USAF, 2023).

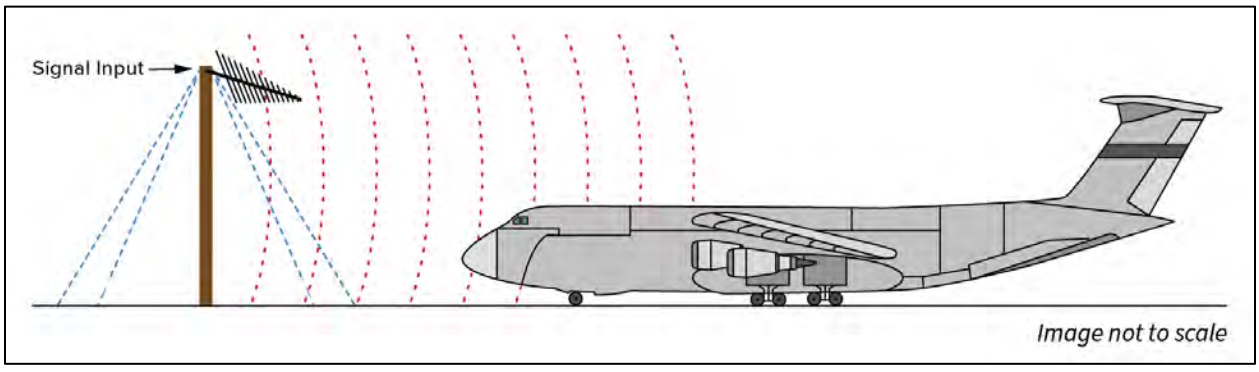

Figure 8: Proposed mobile CWMS EMP test in vertical mode.

[1] The Poynting vector is a quantity that describes the magnitude and direction of an electromagnetic wave.

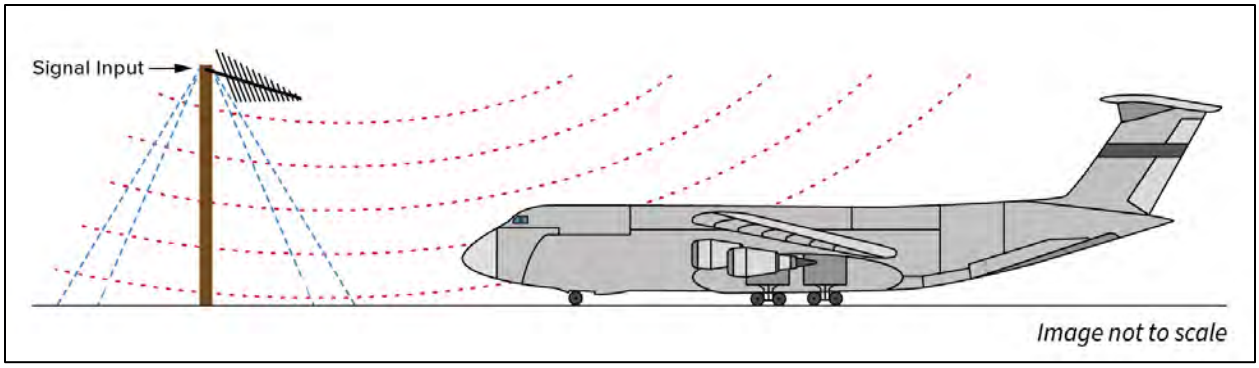

Figure 9: Proposed mobile CWMS EMP test in horizontal mode.

The mobile test would be powered by an AR 150U1000 150-watt amplifier running off a portable generator and would be capable of producing EMFR from 0.1 MHz to 1,000 MHz. Only specific frequencies in this range would be used, and several frequencies (known as "skip bands") would be omitted to ensure no interaction with the existing EMFR environment. Operation would occur in a "stepped" fashion, beginning with a ~40 millisecond signal at 0.1 MHz followed by a ~460 millisecond gap with no transmission, then moving on to the next frequency for ~40 milliseconds, and so on until test completion at 1,000 MHz some 11 to 12 minutes later (**Figure 10**). This process would occur for, at a minimum, four "shots" per aircraft: nose-on, tail-on, left-wing-on, and right-wing-on. The mobile EMP antenna would remain stationary for each test; a tug would be used to position the aircraft for each orientation. Once all tests are complete, the mobile unit would be taken down and put into storage until needed again.

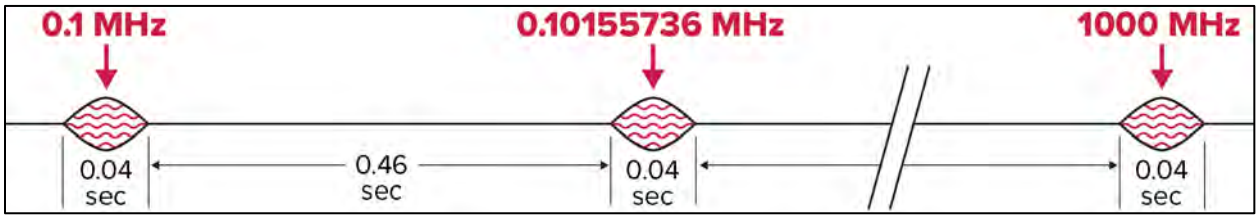

Figure 10: Stepped nature of the proposed test signal.

5.3.1. Human Health and Safety

Human health and safety of EMFR is determined by calculating the distance at which the MPE could be exceeded based on the characteristics of the specific frequency, amplifier, and antenna used. For the purposes of the operations described this can be treated as a pulsed emitter – one that operates in small bursts of energy followed by a brief pause. The hazard distance for a stationary pulsed emitter (i.e., a pulsed emitter that does not rotate during operation) can be calculated using the MPE tables from DAFI 48-109 in conjunction with **Equations 3**, **4**, and **5** shown below. It should be noted that these equations produce hazard distances that are considered conservative; USAFSAM investigations often find the actual distance (when measured with EMFR measuring devices) is notably closer to the emitters than predicted.

Equation 3: $$D_{MPE} = \sqrt{\frac{P_{avg} * G_{abs}}{40 * \pi * MPE}}$$

where: D_{MPE} is the distance (in meters) from the antenna such that the MPE would be met with a six-minute exposure; any

closer than this and the MPE could be exceeded in less than six minutes.

P_{avg} is the average amount of power input to the antenna.

G_{abs} is the absolute gain of the antenna.

Equation 4: $$P_{avg} = P_{peak} * PW * PRF$$

where:

P_{peak} is the maximum amount of power output from the selected amplifier. For this calculation, P_{peak} = 150 watts.

PW is the pulse width, or the operating time per pulse in seconds. For this calculation, the average PW is 40 milliseconds, or 0.040 seconds.

PRF is the pulse repetition frequency, or how many pulses occur in a one second period. Given the average pulse width of 40 milliseconds followed by an average gap of 460 milliseconds, only two (2) pulses can occur per second (40 + 460 + 40 + 460 = 1,000 milliseconds = 1 second).

Equation 5: $$G_{abs} = 10^{\frac{Gain}{10}}$$

where:

Gain is the directivity of a given antenna configuration. For the mobile EMP, that gain when in horizontal mode is 6.9 dBi or less, while the gain in vertical mode is 6.5 dBi or less. A higher gain indicates a more directional EMFR "beam," so these are worst-case values.

In the Microsoft Excel workbook accompanying this report, both the Upper Tier and Lower Tier MPE and D_{MPE} were calculated for both the E- and H-fields at every frequency identified for use by the USAF. The furthest hazard distance was then determined for each of the Upper Tier and Lower Tier, as shown in Table 1.

Table 1: MPE Hazard Distances for Proposed Action

Antenna Orientation	Hazard Distance Upper Tier Environment (meters)	Hazard Distance Lower Tier Environment (meters)
Horizontal	0.684	1.529
Vertical	0.653	1.460

Given that the mast is 24 meters tall, all personnel working in the vicinity of the antenna would be well outside the hazardous range during operation. However, it must be noted that this assumes the antenna would only be in operation with the telescoping mast extended. If the antenna were to operate with the mast unextended for any reason, the Upper Tier values should be observed for all EMFR workers.

In addition to the calculated MPE values, DAFI 48-109 specifically states that for an EMP, the safe EMFR field strength limit would be limited to 100 kilovolts per meter (kV/m) (USAF, 2020). Based on the design of the antenna and the low power amplifier in use, engineers who have created the system state the field strength would be no more than 3 volts per meter (V/m) directly next to the antenna (USAF, 2023). This value would decrease quickly as distance increases and would measure approximately 1 V/m at the test target.

5.3.2. Interference with the Existing EMFR Environment

As previously discussed, the USAF has identified those EMFR frequencies in use around the JBSA-Lackland Kelly Field Annex and has omitted them from the EMP test to minimize interference. Engineers are also able to reduce the gain for specific frequencies by up to 10 dB, which would further reduce interference among frequencies near those in use. Given these contingencies, the power input, and direction the antenna would be pointing, it is unlikely that any other receiving antenna (such as an AM/FM radio) would pick up anything other than slight noise in a specific band. It should be noted that even if a radio were to pick up the test, it would present as very slight static noise and would only last for ~0.040 seconds before the test pauses and progresses to the next frequency.

5.3.3. Interaction with Electronics

The primary concern with a HEMP device is the initial wave of EMFR that couples with various electrical components found in consumer electronics, potentially causing damage. This has become even more relevant today as microchips are now constructed of nanometer-scale components, and picometer scale no longer seems impossible. The problem with these miniscule traces and structures is that an induced current from a HEMP would flow through parts not designed for such power, causing individual components to melt, break, or otherwise be damaged. For comparison, one could think of a light switch and copper wiring in a house and how robust that structure is compared to a gold wire strand - that measures much thinner than a piece of hair - used within modern electronics.

The maximum field strength of the mobile EMP is 3 V/m directly next to the antenna, which rapidly decreases to 1 V/m as the distance from the antenna increases. For comparison, a HEMP would be expected to exceed 50,000 V/m (50 kV/m) within a few nanoseconds of the initiating explosion (Reardon, 2014). Given the very low output of the CWMS system, EMFR workers could wear wristwatches, communications equipment (such as handheld radios), and even keep their cell phones on them without interference.

5.3.4. Interaction with Fuels

Per DAFI 48-109, the Air Force Safety Center develops protocols for the hazard of electromagnetic radiation to fuel (HERF). HERF is also discussed in DoDI 3222.03 *DoD Electromagnetic Environmental Effects (E3) Program* (DoD, 2017) and further elaborated on in MIL-STD-461F, *Requirements for the Control of the Electromagnetic Interference Characteristics of Subsystems and Equipment* (DoD, 2007) and MIL-STD-464D, *Electromagnetic Environmental Effects Requirements for Systems* (DoD, 2020). MIL-STD-464D contains tables for all types of military equipment (ships, fixed-wing aircraft, ground vehicles, etc.) that list peak and average field strengths that systems in each category should withstand. Based on Table VI of MIL-STD-464D, abridged here as Table 2, fixed-wing aircraft should withstand peak field

strengths of 58 V/m and average field strengths of 3 V/m, and often significantly higher depending on the frequency (DoD, 2020). USAF engineers have stated the mobile system would produce less than 1 V/m at the target. Additionally, the test vehicle would contain minimal fuel and be grounded prior to the test.

Table 2: MIL-STD-464D Table VI, abridged to show subject EMFR frequencies (DoD, 2020).

Frequency Range (MHz)	Electric Field (V/m – rms)	
	Peak	Average
0.01 – 2	88	27
2 – 30	64	64
30 – 150	67	13
150 – 225	67	36
225 – 400	58	3
400 – 700	2143	159
700 – 790	554	81
790 – 1000	289	105
1000 – 2000	3363	420

5.3.5. Interaction with Explosives

Per DAFI 48-109, the Air Force Safety Center develops protocols for the hazard of electromagnetic radiation to ordnance (HERO). As with HERF, HERO is also discussed in DoDI 3222.03 (2017) and further elaborated on in MIL-STD-461F and MIL-STD-464D. MIL-STD-464D contains a table outlining the maximum field intensity allowable for most common ordnance; this table (Table IX) is abridged here as Table 3.

Table 3: MIL-STD-464D Table IX, abridged to show subject EMFR frequencies. (DoD, 2020)

Frequency Range (MHz)	Electric Field (V/m – rms)	
	Unrestricted[1]	
	Peak	Average
0.01 – 2	200	200
2 – 30	200	200
30 – 150	200	200
150 – 225	200	200
225 – 400	200	200
400 – 700	2200	410
700 – 790	700	190
790 – 1000	2700	490
1000 – 2000	6100	420

[1]Unrestricted in this context represents worst-case levels to which ordnance may be exposed. Table IX also includes ‘restricted’ values; however, those values only apply when ordnance is being handled, which would not be the case during this test.

For the large-frame test aircraft that are the subject of this EMP testing, it is unlikely any ordnance (flares, countermeasures, etc.) would be loaded during the test (USAF, 2023). However, based on the above table and field strength involved (~1 V/m), it would be unlikely to cause any interference were any such ordnance present.

5.3.6. Land Use Compatibility

Based on the preceding sections, there is a negligible to non-existent hazard for EMFR workers, their electronics, fuels, and explosives from the Proposed Action. Measurements of EMFR produced by the Proposed Action outside the Bubble itself would be difficult to detect even with sensitive equipment and should present virtually no interference to the existing EMFR environment outside the Bubble. Given this, and the fact that the system can be removed from the site so the Bubble could be used for other operations, there would be no impact on land use from the Proposed Action.

5.4. Action Alternative: Use of the Ellipticus antenna

The Action Alternative would use a permanently installed antenna system at the Kelly Field Annex called the Ellipticus. This option would necessitate construction of two tall masts (greater than 36 meters in height) and associated stakes, cabling, and wire mesh. The antenna itself is an arced coaxial cable that is strung with several dozen resistively loaded manganese-zinc ferrite beads along its entire length. The ferrite beads, in conjunction with resistors that are a part of each bead, create a smoother test frequency response. The direction of the EMFR field can be controlled based on the location of a gap in the antenna, and both vertical (**Figure 11**) and horizontal (**Figure 12**) modes may be used during the EMP test (Prather, 2012). It is expected that each test would take approximately three to four days to complete.

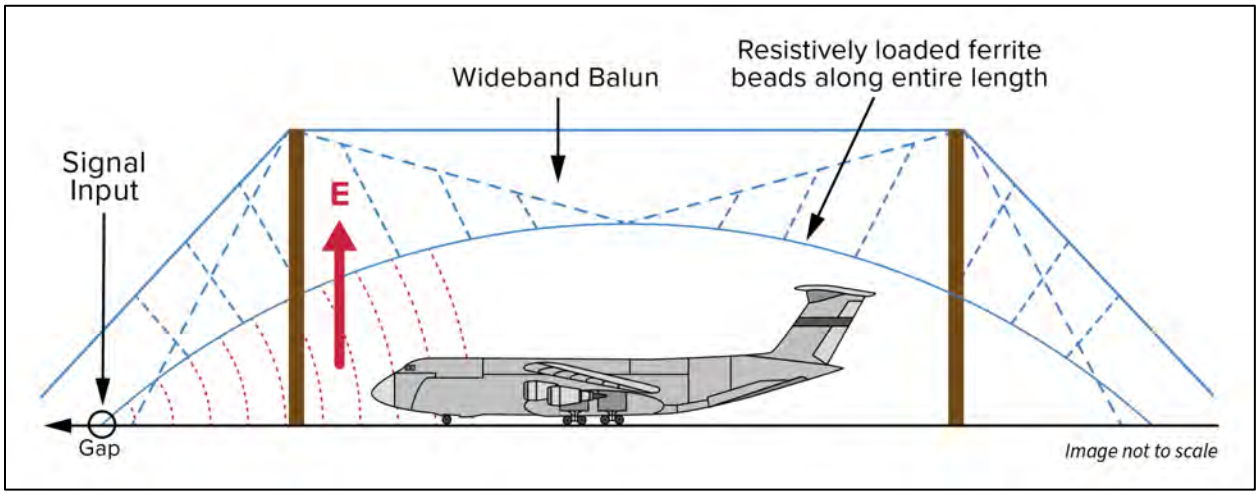

Figure 11: Proposed Ellipticus antenna in vertical mode.

The Ellipticus would be powered by a 252-watt amplifier running off prime power, capable of producing EMFR from 0.1 MHz to 1,000 MHz. As with the mobile CWMS test, only specific frequencies in this range would be used to ensure no interaction with the existing EMFR environment. Operation would occur in the same 'stepped' fashion as the Proposed Action, beginning with a ~40 millisecond pulse at 0.1 MHz followed by a ~460 millisecond gap with no transmission, then moving on to the next frequency for ~40 milliseconds, and so on until test completion at 1,000 MHz approximately 11 to 12 minutes later (**Figure 10**). This process would occur for, at a minimum, four 'shots' per aircraft: nose-on, tail-on, left-wing-on, and right-wing-on. A tug would be used between shots to position the aircraft for each orientation (USAF, 2023).

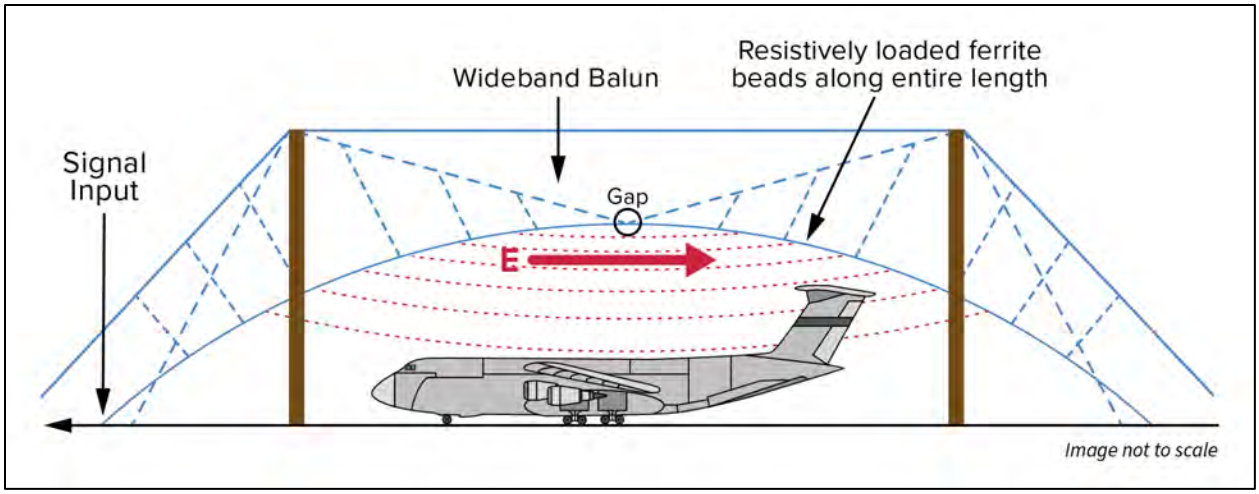

Figure 12: Proposed Ellipticus antenna in horizontal mode.

5.4.1. Human Health and Safety

As with the Proposed Action, the hazard distance for the Ellipticus can be calculated using parameters specific to the antenna and the MPE tables from DAFI 48-108 in conjunction with **Equations 3**, **4**, and **5** shown in **Section 5.3.1**. All variables remain the same for the Ellipticus except for the following:

P_{peak} = 252 watts

Gain = -6 dBi (horizontal mode)
1 dBi (vertical mode)

The above parameters would allow the system to achieve a field strength of 1 V/m at the test aircraft.

In the Microsoft Excel workbook accompanying this report, both the Upper Tier and Lower Tier MPE and D_{MPE} were calculated for both the E- and H-fields at every frequency identified for use by the USAF. It was then determined what the furthest hazard distance was for each of the Upper Tier and Lower Tier, as shown in Table 4 below.

Table 4: MPE Hazard Distances for Action Alternative

Antenna Orientation	Hazard Distance Upper Tier Environment (m)	Hazard Distance Lower Tier Environment (m)
Horizontal	0.201	0.449
Vertical	0.449	1.005

Given that the mast would be over 36 meters tall, personnel working in the vicinity of the antenna would generally be well outside the hazardous range during operation. However, the ends of the Ellipticus are close to the ground, meaning the Upper Tier values should be observed for all EMFR workers. If work must occur within 0.5 meters of the active antenna, personnel should observe a working time of less than six minutes to minimize the risk of burns.

In addition to the calculated MPE values, DAFI 48-109 specifically states that for an EMP the safe EMFR field strength limit would be 100 kV/m (USAF, 2020). Based on the design of the antenna and the low power amplifier in use, engineers who have created the system state the field strength would be no more than 3 V/m directly next to the antenna (USAF, 2023). This value would decrease quickly as distance increases and would measure approximately 1 V/m at the test target.

5.4.2. Interference with the Existing EMFR Environment

Impacts to the existing EMFR environment from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 5.3.2 for further information.

5.4.3. Interaction with Electronics

Impacts to the other electronics from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 5.3.3 for further information.

5.4.4. Interaction with Fuels

Impacts to fuels from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 5.3.4 for further information.

5.4.5. Interaction with Explosives

Impacts to explosives from the Ellipticus EMP system would be the same as those under the mobile EMP – non-existent to negligible in nature. See Section 5.3.5 for further information.

5.4.6. Land Use Compatibility

Based on the preceding sections, there is a negligible to non-existent hazard for EMFR workers, their electronics, fuels, and explosives from the Action Alternative. Measurements of EMFR produced by the Action Alternative outside the Bubble itself would be difficult to detect even with sensitive equipment and should present virtually no interference to the existing EMFR environment outside the Bubble. However, the permanent installation of the Ellipticus may limit potential uses of the Bubble by the USAF as the physical structure could not be moved. While this is in line with current land use – military airfield operations – it may be a limiting factor which must be considered.

5.5. No Action Alternative

Under the No Action Alternative, the USAF would not implement EMP testing at the Kelly Field Annex for large-frame aircraft.

5.5.1. Human Health and Safety

Since no EMP testing would occur under the No Action Alternative, there would be no direct EMF/EMP interactions with personnel. However, an indirect effect of not testing the EMP countermeasures of large-frame aircraft could lead to catastrophic electrical failure during an EMP incident, which could then lead to potentially harmful – or even fatal – events if the aircraft were to lose power while in flight.

5.5.2.Interference with the Existing EMFR Environment

Since no EMP testing would occur under the No Action Alternative, there would be no potential EMF/EMP interactions with the existing frequencies in use in the vicinity of the Kelly Field Annex. Therefore, there would be no impacts associated with the existing EMFR environment.

5.5.3. Interaction with Electronics

Since no EMP testing would occur under the No Action Alternative, there would be no potential EMF/EMP interactions with other electrical systems in use in the vicinity of the Kelly Field Annex. Therefore, there would be no direct impact or interference with other types of electronics. However, as with Section 5.5.1, an indirect effect of not testing the EMP countermeasures of large-frame aircraft could lead to catastrophic electrical failure during an EMP incident.

5.5.4. Interaction with Fuels

Since no EMP testing would occur under the No Action Alternative, there would be no potential EMF/EMP interactions with fuels in use in the vicinity of the Kelly Field Annex. Therefore, there would be no impacts or interference with fuels.

5.5.5. Interaction with Explosives

Since no EMP testing would occur under the No Action Alternative, there would be no potential EMF/EMP interactions with explosives in use in the vicinity of the Kelly Field Annex. Therefore, there would be no impacts or interference with explosives.

5.5.6. Land Use Compatibility

Since no EMP testing would occur under the No Action Alternative, there would be no impacts to land use.

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