NOTICE OF AVAILABILITY

Draft Environmental Assessment and
Draft Finding of No Significant Impact/
Finding of No Practicable Alternative Addressing Infrastructure Improvements at Cannon Air Force Base, New Mexico

The United States Air Force (USAF) and Cannon Air Force Base (AFB) announce the availability of a Draft Environmental Assessment (EA) addressing wastewater and stormwater infrastructure improvements at Cannon AFB, New Mexico. The Draft EA was prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and USAF instructions implementing NEPA.

The Draft EA describes the USAF proposal to replace two golf course impoundment liners and repair six stormwater outfall culverts on the South Playa of the installation. The impoundments, located in the northwestern portion of the installation, store reclaimed water from the installation's wastewater treatment plant as well as stormwater during heavy rain events. Due to the low-lying topography of the area, stormwater naturally flows into the impoundments, mixes with the reclaimed water, and is then used to irrigate the golf course turf. The stormwater outfall culverts within the South Playa have degraded structurally over time due to the drainage of stormwater directed to these areas eroding and undermining the soil, causing the pipes to separate and break in several places. The impoundment liners would be replaced, and the six culverts would be repaired as a part of the Proposed Action.

The Draft EA evaluates potential impacts on the environment from the Proposed Action and the No Action Alternative. The Draft EA demonstrates that the Proposed Action would not significantly impact the environment and based on this analysis, the USAF has prepared a Draft Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA).

The Draft EA and Draft FONSI/FONPA are available for review on the Cannon AFB website at www.cannon.af.mil, under the Environmental tab, and at the Clovis-Carver Public Library, 701 N Main St, Clovis, NM 88101-6658 and the Portales Public Library, 218 S Avenue B, Portales NM 88130-6248.

Comments regarding this document will be accepted for 30 days from the publication of this notice. Comments for consideration and other inquiries should be directed by mail to the NEPA Manager, 27th Special Operations Civil Engineer Squadron, 506 North Air Commando Way, Cannon AFB, New Mexico 88103, or by email to 27soces.ceie.environmental@us.af.mil.

January

2024

Draft

Environmental Assessment

Addressing Wastewater and Stormwater Infrastructure Improvements, Cannon Air Force Base, New Mexico

United States Air Force
Air Force Special Operations Command
27th Special Operations Wing

ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-containing material
AFB	Air Force Base
AFFF	Aqueous film forming foam
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AFSOC	Air Force Special Operations Command
APE	Area of potential effects
BGEPA	Bald and Golden Eagle Protection Act
bgs	Below ground surface
BMP	Best management practice
BTPD	Black-tailed prairie dog
BUOW	Western burrowing owl
CAC	Corrective action complete
CAP	Corrective Action Plan
CATM	Combat arms training and maintenance
CEIE	Civil Engineering Installation Environmental
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CWA	Clean Water Act
DAGRE	Deployed Aircraft Ground Response Element
dB	Decibel
dBA	A-weighted decibel
DNL	Day-night sound level
DoD	Department of Defense
DP	Discharge Permit
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EO	Executive Order
ESA	Endangered Species Act
FD	Fire Department
FEMA	Federal Emergency Management Agency
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
GHG	Greenhouse gas
gpd	Gallons per day
HWMP	Hazardous Waste Management Plan
ICRMP	Integrated Cultural Resources Management Plan
IDP	Installation Development Plan
IPMP	Integrated Pest Management Plan
IRP	Installation Restoration Program
ISU	Internal Airlift/Helicopter Slingable-Container Unit
JAA	Jet A Aviation
kV	Kilovolt
LBP	Lead-based paint

MBTA	Migratory Bird Treaty Act
mcf	Million cubic feet
MMRP	Military Munitions Response Program
msl	Mean sea level
MW	Megawatt
N/A	Not applicable
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NOA	Notice of Availability
NO_X	Nitrogen oxides
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O_3	Ozone
OSH	Occupational safety and health
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated biphenyl
PEMB	Pre-engineered metal building
PFAS	Per-and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PM_{10}	Particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in diameter
POL	Petroleum, oil, and lubricants
PPE	Personal protective equipment
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RSL	Regional Screening Level
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SI	Site Inspection
SOCES	Special Operations Civil Engineer Squadron
SOF	Special Operations Forces
SOW	Special Operations Wing
SO_X	Sulfur oxide
SPR	Spill Prevention and Response
SWMU	Solid Waste Management Unit
tpy	Tons per year
UFGS	Unified Facilities Guide Specifications
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	Volatile organic compounds
WOTUS	Waters of the United States
WWTP	Wastewater treatment plant

PRIVACY ADVISORY

This EA was provided for public comment in accordance with the National Environmental Policy Act, Council on Environmental Quality regulations for implementing the National Environmental Policy Act (Title 40 Code of Federal Regulations Parts 1500–1508, as amended by 87 Federal Register 23453–23470), and 32 Code of Federal Regulations Part 989, *Environmental Impact Analysis Process*.

The Environmental Impact Analysis Process provides an opportunity for public input on USAF decision making and solicits comments on USAF's analysis of environmental impacts. Public commenting allows USAF to make better-informed decisions. Letters or other written comments provided may be published in the EA. As required by law, comments provided will be addressed in the Final EA and made available to the public. Providing personal information is voluntary. Private addresses may be compiled to develop a mailing list for those requesting copies of the EA. Only the names of the individuals making comments and specific comments will be disclosed in the EA. Personal information, home addresses, telephone numbers, and email addresses will not be published in the EA.

This document is compliant with Section 508 of the Rehabilitation Act. This allows assistive technology to be used to obtain the available information from the document. Due to the nature of graphics, figures, tables, and images occurring in the document, accessibility is limited to a descriptive title for each item.

FINDING OF NO SIGNIFICANT IMPACT/ FINDING OF NO PRACTICABLE ALTERNATIVE

for the Environmental Assessment Addressing Wastewater and Stormwater Infrastructure Improvements, Cannon Air Force Base, New Mexico

Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa at Cannon Air Force Base (AFB) in New Mexico. The need for the Proposed Action is to restore the integrity of the installation's wastewater and stormwater infrastructure to support current and future Air Force Special Operations Command missions and comply with the terms and conditions of Groundwater Discharge Permit (DP) 873. These areas pose a potential concern to the natural environment through both erosion and runoff. The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, thus requiring replacement. The current condition of the impoundment liners poses a concern due to the possible seepage of reclaimed water into the ground, which could potentially threaten area water quality and wildlife. Additionally, the replacement is a requirement outlined in DP-873 for the installation. Cannon AFB submitted a Corrective Action Plan (CAP), which was approved by the New Mexico Environment Department (NMED), for the replacement which must be completed by April 2025.

The culverts on the South Playa have undergone extensive erosion for many years. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70, *Environmental Quality,* which provide guidelines for managing water and wastewater systems at United States Air Force (USAF) installations. Additionally, if the culverts are not repaired, the area will continue to erode and the footprint of the South Playa will continue to expand, causing further detriment to the surrounding environment.

Description of the Proposed Action and Alternatives

Proposed Action. The Environmental Assessment (EA) supports a proposal by Cannon AFB to replace two golf course impoundment liners, installed in 1992, and repair the six stormwater outfall culverts on the South Playa. The Cannon AFB golf course (Whispering Winds), located in the northwestern portion of the installation, has two synthetically lined impoundments that store reclaimed water from the installation's wastewater treatment plan (WWTP) as well as stormwater during heavy rain events. Due to the low-lying topography of the area, stormwater naturally flows to the impoundments, mixes with the reclaimed water, and is then used to irrigate the golf course turf. The replacement of the liners would allow for the continued reuse of reclaimed water for irrigation at the installation.

The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, requiring replacement. Their current condition poses a concern due to possible seepage of reclaimed water into the ground, which violates DP-873. The existing liners require replacement no later than April 2025 as indicated in the CAP required by Term and Condition 57 of DP-873 as issued by NMED. The NMED-approved CAP suggests Cannon AFB do the work in phases, similar to those listed in the EA. However, the suggested phases are subject to change based on the final design developed by the contractor performing the work.

Repair of the Six Culverts on the South Playa. The South Playa is in the southwestern portion of the installation and serves as the installation's primary stormwater collection point. The South Playa has received stormwater runoff from portions of the flightline area since 1943. Solvents, fuels, oils, greases, and aqueous film forming foam (AFFF) potentially containing PFAS are all potential contaminants that could have been discharged to the playa from the flightline area. Documented releases of AFFF in the hangars on the flightline has resulted in AFFF entering the storm drains and being subsequently routed to the South Playa with stormwater. The Proposed Action includes repair of the six South Playa culverts to include the Southwest Culvert (Culvert 1), Western Culvert (Culvert 2), Northwest Culvert (Culvert 3), North-Northwest Culvert (Culvert 4), Northern Culvert (Culvert 5), and Eastern Culvert (Culvert 6). The conditions of the six culverts were last analyzed in June 2020 and erosion has continued to worsen over the past 3 years. It has been determined that the culverts would need to be re-engineered in order to fix the deficiencies of previous construction. Re-design of the culverts would consider current erosion concerns and techniques to avoid future erosion. Design reviews and related studies would be conducted to determine if elevations or velocities would affect upstream or downstream conditions.

The process of repairing the culverts would begin with flow diversion so work could be conducted in dry conditions. The contractor performing the work would be required to submit a plan for diverting or controlling the culvert flow. The plan could include a temporary conveyance of flow around or through the culvert or temporarily ponding flow upstream of the culvert. The chosen diversion method must not result in adverse effects on the surrounding environment. Culvert repairs would begin after the culvert flow has been diverted. The method of repair would be determined by the construction contractor and approved by Cannon AFB. The chosen repair method must not result in adverse effects on the surrounding environment. Once the culverts have been repaired, the areas around the culverts and culvert pipes would be backfilled with clean material to prevent further erosion. Potential culvert repair approaches are included in the EA.

Alternatives. Potential alternatives for both projects were considered but dismissed and not carried forward for full environmental analysis in the EA in accordance with the three selection standards discussed in **Section 2.2** of the EA.

No Action Alternative. The No Action Alternative is carried forward for further analysis in the EA to provide a baseline against which the effects of the Proposed Action can be assessed. The No Action Alternative would be "no change" from current practices or continuing with the present course of action until that action is changed. The No Action Alternative assumes that the Proposed Action would not occur.

Under the No Action Alternative, the significantly damaged golf course impoundment liners would not be replaced and would continue to be in violation of DP-873. Additionally, the six culverts on the South Playa would not be repaired, and the poor condition of the culverts would continue to deteriorate, worsening the already significant erosion.

Summary of Environmental Effects

The Proposed Action and alternatives have been reviewed in compliance with the National Environmental Policy Act, as implemented by Council on Environmental Quality and USAF regulations. The analysis focuses on the following environmental resources: noise, air quality, geological resources, water resources, biological resources, cultural resources, infrastructure, hazardous materials and wastes and other contaminants, and safety. The analysis in the EA for each of the environmental resource areas listed above identified negligible to moderate adverse impacts under the Proposed Action. Potential environmental impacts are not expected to be

significant for any of the resources. A summary of the environmental consequences is provided in **Table 2-1** of the EA.

Stakeholder Involvement

Based on the description of the Proposed Action as set forth in the EA, all activities have been found to comply with the criteria or standards of environmental quality. Coordination with appropriate federal, state, and local agencies regarding this EA has been completed. The attached EA and this Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA) were made available to the public for a 30-day review period on February 5, 2024. Agencies received coordination throughout the EA development process, and their comments were addressed as part of the analysis of potential environmental impacts performed in the EA.

Finding of No Practicable Alternative

Executive Order (EO) 11988, *Floodplain Management*, requires federal agencies to avoid, to the maximum extent possible, the short- and long-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of development in a floodplain wherever there is a practicable alternative. If it is found that there is no practicable alternative, the agency must minimize potential harm to the floodplain and circulate a notice explaining why the action is to be located in the floodplain prior to taking action. Additionally, new construction in a floodplain must apply accepted flood proofing and flood protection, such as diverting water away from the area of development and implementing stormwater best management practices (BMPs).

Although no Federal Emergency Management Agency (FEMA) 100-year or 500-year floodplains have been delineated on Cannon AFB, potential flooding areas and conceptual solutions to address flooding problems around the installation were identified in a 2009 drainage study for the installation. Significant flow of surface drainage from the north of Cannon AFB across the cantonment area and flightline toward the southeast occurs during heavy rain events. This flow area is identified in the 2009 study as the 100-year floodplain for Cannon AFB. Additionally, the 2009 study identified a proposed 10-year floodplain. The South Playa falls within this proposed 10-year floodplain.

Short-term, minor, adverse and beneficial impacts on the proposed 10- and 100-year floodplains would occur as a result of the Proposed Action. Construction activities would directly increase obstructions and impervious surfaces within the floodplains resulting in short-term, minor, adverse impacts; however, completion of the projects would improve stormwater flows into the South Playa resulting in long-term, minor, beneficial impacts. Implementation of appropriate BMPs during construction would limit short-term impacts, such as sediment and surface runoff. No impacts on FEMA floodplains would be expected as no FEMA floodplains have been officially designated on Cannon AFB.

EO 11990, *Protection of Wetlands*, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. If it is found there is no alternative, the agency must provide opportunity for early public review of any plans or proposals for such construction and minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's actions. Additionally, a proposed action in a

wetland must include all practicable measures to minimize harm to wetlands and consider the action's effect on the survival and quality of the wetland.

Short-term, minor to moderate, adverse impacts on surface waters and wetlands are anticipated during construction activities for the Proposed Action. Specifically, construction may result in the transportation of additional sediment and other materials into the golf course impoundments and South Playa. Furthermore, stormwater has the potential to carry sediment and hazardous substances into drainage ditches, which in turn connect to various surface water bodies across the installation. However, the implementation of standard stormwater protection BMPs and spill prevention and management plans would serve to reduce or eliminate any lasting detrimental effects on the quality of surface waters. Notably, the surface water bodies on Cannon AFB do not have connections to jurisdictional waters outside the installation. Consequently, the Proposed Action is not expected to have an impact on water bodies beyond the installation's boundaries.

A Notice for Early Public Review of a Proposed Action in a Wetland was published in *The Eastern New Mexico News* on 8 November 2023. No comments were received in response to this notice.

Because the proposed project areas that require repair are within wetlands and proposed 10- and 100-year floodplains, no practicable alternative is available that meets both the purpose and need for the Proposed Action. Therefore, pursuant to EOs 11988 and 11990, the authority delegated in Headquarters Air Force Mission Directive 1-18, and in consideration of the findings of the EA, I find that there is no practicable alternative to this action and that these projects include all practicable measures to minimize harm to the environment. This decision has been made after considering all submitted information and considering a range of reasonable alternatives that would meet project requirements and are within the legal authority of the USAF.

Finding of No Significant Impact

Based on the information and analysis presented in the EA and on review of the public and agency comments submitted during the 30-day public comment period, I conclude that the environmental impacts of implementing the above projects at Cannon AFB are not significant, that preparation of an Environmental Impact Statement is unnecessary, and that a FONSI/FONPA is appropriate.

KEVIN L. BROWN, Col, USAF
Chief, Installations Division

Date

Attachment: Environmental Assessment Addressing Wastewater and Stormwater Infrastructure Improvements, Cannon Air Force Base, New Mexico

COVER SHEET

DRAFT
ENVIRONMENTAL ASSESSMENT ADDRESSING WASTEWATER AND STORMWATER INFRASTRUCTURE IMPROVEMENTS AT CANNON AIR FORCE BASE, NEW MEXICO

Responsible Agencies: United States Air Force (USAF), Cannon Air Force Base (AFB), Air Force Special Operations Command (AFSOC), 27th Special Operations Wing (SOW).

Affected Location: Cannon AFB, New Mexico.

Proposed Action: Wastewater and Stormwater Infrastructure Improvements at Cannon AFB.

Report Designation: Draft Environmental Assessment (EA).

Abstract: This Draft EA was developed in compliance with the USAF's Environmental Impact Analysis Process (EIAP) in support of Cannon AFB, AFSOC, and 27 SOW. It supports a proposal by Cannon AFB to replace two golf course impoundment liners, installed in 1992, and repair the six stormwater outfall culverts on the South Playa. The two golf course impoundments are in the northwestern portion of the installation. These impoundments store reclaimed water from the installation's wastewater treatment plant as well as stormwater during heavy rain events. Due to the low-lying topography of the area, stormwater naturally flows into the impoundments, mixes with the stored reclaimed water, and is then used to irrigate the golf course turf. The structural integrity of the impoundment liners has been compromised and requires replacement no later than April 2025 as indicated in the Corrective Action Plan required by Groundwater Discharge Permit 873, Term and Condition 57, as issued by the New Mexico Environment Department for Cannon AFB.

The South Playa is approximately 1,300 feet south of the intersection of Runways 04/22 and 13/31 in the southwestern portion of the installation. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70, *Environmental Quality,* which provide guidelines for managing water and wastewater systems at USAF installations.

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APPENDICES

A. Interagency and Intergovernmental Coordination for Environmental Planning and Public Involvement Materials

B. Air Quality Support Documentation

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Cannon Air Force Base (AFB), home of the 27th Special Operations Wing (SOW), lies in the high plains of eastern New Mexico near the Texas Panhandle. The installation is 8 miles west of the town of Clovis on 3,789 acres of land at 4,295 feet above sea level (see **Figure 1-1**).

1.2 BACKGROUND

1.2.1 Cannon AFB History

Cannon AFB originated in the late 1920s as a civilian passenger facility, called Portair Field, a terminal for early commercial transcontinental flights. In the 1930s, Portair was renamed Clovis Municipal Airport. In August 1942, the airport was selected as one of three sites for a "superaerodrome." Construction for Clovis Army Air Base began in September 1942, and would eventually train B-24, B-17, and later B-29 aircrews in support of World War II efforts. In December 1944, the installation was renamed Clovis Army Air Field. Following the war in May 1947, Clovis Army Air Field was officially inactivated. Strategic Air Command took control of Clovis Army Air Field in August 1947 and its name changed to Clovis AFB. Then in April 1950, Air Training Command assumed control until July 1951, when the Tactical Air Command assumed ownership, reopening Clovis AFB as the 140th Fighter-Bomber Wing, an Air National Guard unit called to active duty for the Korean War. In June 1957, it was officially named Cannon AFB after the late General John K. Cannon, a former commander of the Tactical Air Command. In February 1959, Cannon AFB entered into a relationship with the 27th Fighter Wing under Air Combat Command.

The installation weathered base realignment and closure to become the home of the 27 SOW under the Air Force Special Operations Command (AFSOC) and a component of the United States Special Operations Command. The 27 SOW is tailored to support the unique missions of Special Operations Forces units, including the installation's two tenant units, the 26th Special Tactics Squadron and 43rd Intelligence Squadron. The Wing operates a number of highly specialized aircraft including the General Atomics MQ-9 Reaper, Lockheed Martin MC-130J Commando II, Lockheed Martin AC-130J Ghostrider, Bell Boeing CV-22B Osprey, and Pilatus U-28A Draco. The primary mission of the 27 SOW is to execute unconventional airpower any place, anytime, anywhere.

1.2.1 Project Background

The Proposed Action includes replacing two golf course impoundment liners, originally installed in 1992, and repairing the six stormwater outfall culverts on the South Playa (see **Figure 1-2**). The two golf course impoundments are in the northwestern portion of the installation. These impoundments store reclaimed water from the installation's wastewater treatment plant (WWTP) as well as stormwater during heavy rain events. Due to the low-lying topography of the area, stormwater naturally flows into the impoundments, mixes with the reclaimed water, and is then used to irrigate the golf course turf.

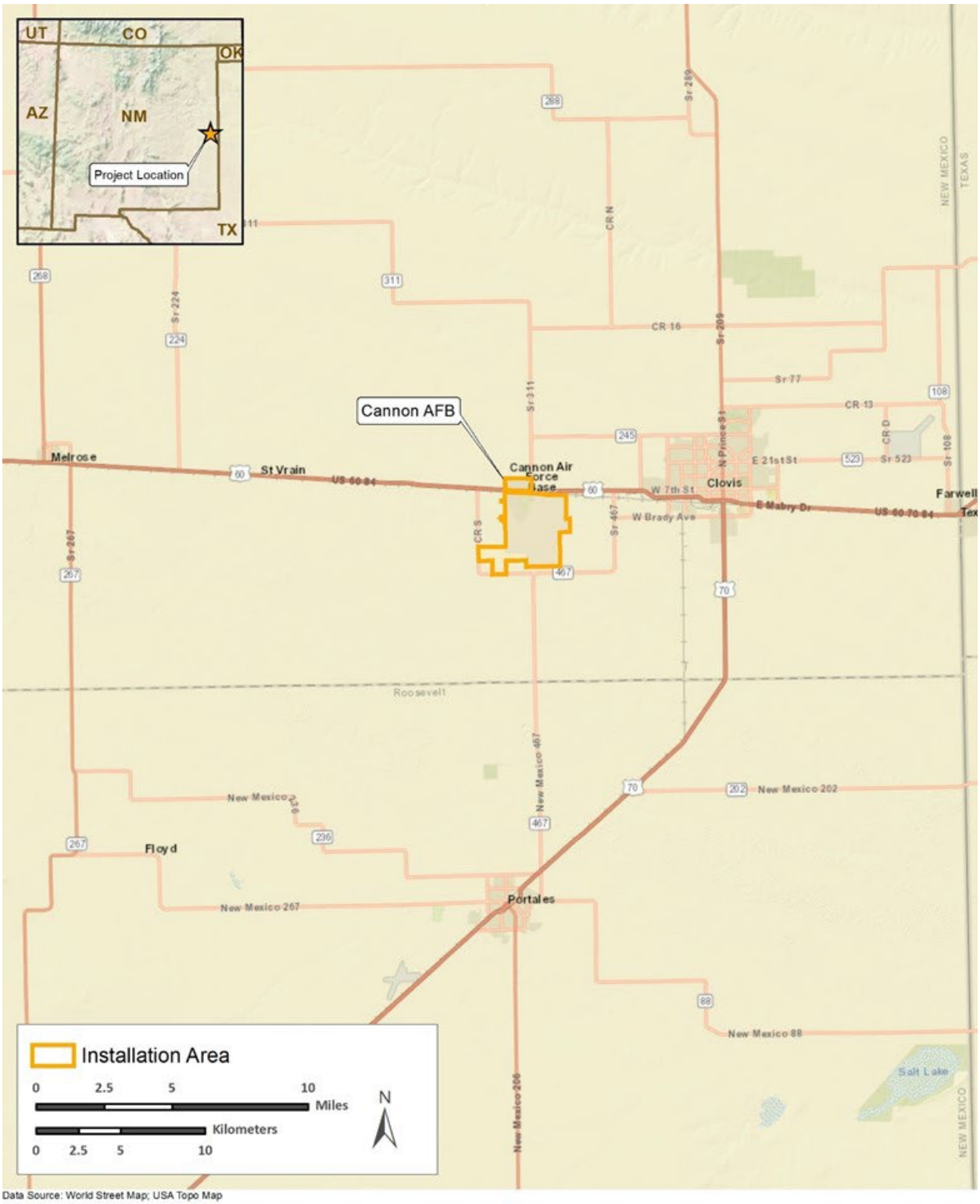

Figure 1-1. Cannon AFB Vicinity Map

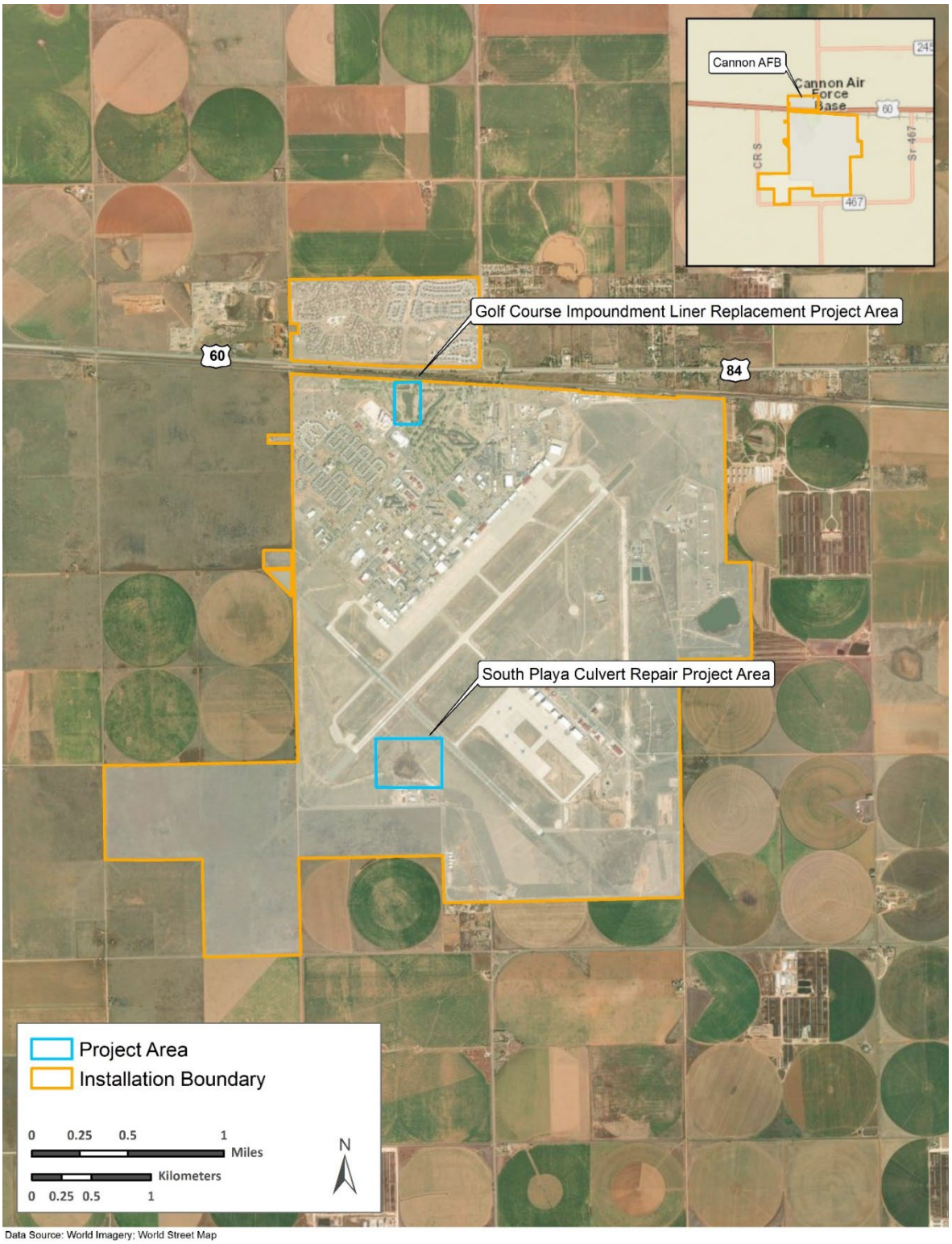

Figure 1-2. Project Areas Overview

The structural integrity of the impoundment liners has been compromised and requires replacement no later than April 2025 as indicated in the Corrective Action Plan (CAP) required by Groundwater Discharge Permit (DP) 873[1], Term and Condition 57, as issued by the New Mexico Environment Department (NMED) for Cannon AFB.

The South Playa is approximately 1,300 feet south of the intersection of Runways 04/22 and 13/31 in the southwestern portion of the installation. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70, *Environmental Quality*, which provide guidelines for managing water and wastewater systems at United States Air Force (USAF) installations.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. The need for the Proposed Action is to restore the integrity of the installation's wastewater and stormwater infrastructure to support current and future AFSOC missions and comply with the terms and conditions of DP-873. These areas pose a potential concern to the natural environment through both erosion and runoff. The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, thus requiring replacement. The current condition of the impoundment liners poses a concern due to the possible seepage of reclaimed water into the ground, which could potentially threaten area water quality and wildlife. Additionally, the replacement is a requirement outlined in DP-873 for the installation. Cannon AFB submitted a CAP, which was approved by NMED, for the replacement which must be completed by April 2025.

The culverts on the South Playa have undergone extensive erosion for many years. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with AFPD 32-10 and AFPD 32-70, which provide guidelines for managing water and wastewater systems at USAF installations. Additionally, if the culverts are not repaired, the area will continue to erode and the footprint of the South Playa will continue to expand, causing further detriment to the surrounding environment.

1.4 DECISION TO BE MADE

This Draft EA evaluates whether the Proposed Action would result in significant impacts on the environment. If significant impacts are identified, Cannon AFB would undertake mitigation to reduce impacts to below the level of significance, undertake the preparation of an Environmental Impact Statement addressing the Proposed Action, or abandon the Proposed Action. If significant impacts are not identified, then the EA would be finalized and a Finding of No Significant Impact (FONSI) would be signed. The decision would be made by the approving official and could incorporate the Proposed Action, its alternatives, or any combination of the Proposed Action and alternatives. This Draft EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] § 4331 et seq.), the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures (40 Code

[1] The USAF has filed an administrative appeal of DP-873 issued by NMED-WQB on 13 January 2022. That matter is still pending before the New Mexico Water Quality Control Commission. The USAF reserves all rights and claims with respect DP-873. Nothing herein is to be construed as an admission or acknowledgement of a requirement to comply with DP-873 or the state discharge permitting program pursuant to the New Mexico Water Quality Act and its implementing regulations (20.6.2 New Mexico Administrative Code).

of Federal Regulations [CFR] Parts 1500–1508), and the USAF Environmental Impact Analysis Process (EIAP) Regulations at 32 CFR Part 989.

Because this EA includes the evaluation of actions proposed to occur within three separate wetlands and a 10- and 100-year floodplain, if it is determined that a FONSI is appropriate, a Finding of No Practicable Alternative (FONPA) and approval from Headquarters AFSOC would be required. In accordance with 32 CFR Part 989 and Executive Order (EO) 11900, *Protection of Wetlands*, and EO 11988, *Floodplain Management*, because replacement of the golf course impoundment liners and repair of the six culverts on the South Playa would occur within three separate wetlands and a 10- and 100-year floodplain, a FONPA would need to accompany the FONSI to discuss why no other practicable alternatives exist to avoid impacts. Impacts would be reduced to the maximum extent practicable through project design and implementation of environmental protection measures. Additionally, appropriate permits would be obtained from applicable regulatory agencies to address impacts and determine potential mitigation measures, if required. As required by EO 11900, an early public notification for potential wetland impacts was published in *The Eastern New Mexico News* on 10 November 2023.

1.5 COORDINATION AND CONSULTATION

1.5.1 Interagency and Intergovernmental Coordination and Consultations

EO 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416, requires federal agencies to provide opportunities for consultation by elected officials of state and local governments that would be directly affected by a federal proposal. In compliance with NEPA, Cannon AFB notified relevant stakeholders about the Proposed Action and alternatives (see **Appendix A** for all stakeholder coordination materials). The notification process provides these stakeholders the opportunity to cooperate with Cannon AFB and provide comments on the Proposed Action and alternatives.

Per the requirements of Section 106 of the National Historic Preservation Act (NHPA) and implementing regulations (36 CFR Part 800), Section 7 of the Endangered Species Act (ESA) and implementing regulations (50 CFR Part 17) including the Migratory Bird Treaty Act (MBTA), findings of effect and a request for concurrence was transmitted to the State Historic Preservation Officer (SHPO) and the United States Fish and Wildlife Service (USFWS). A brief summary of comments received will be provided in the Final EA and all correspondence with the SHPO and USFWS will be included in **Appendix A**. Additionally, correspondence regarding the findings, concurrence, and resolution of any adverse effect will be included in **Appendix A**.

1.5.2 Government to Government Coordination and Consultations

Section 106 of the NHPA and implementing regulations 36 CFR Part 800 require federal agencies to consult with federally recognized tribes historically affiliated with the area of potential effects (APE) for the project to determine the presence of and resolve adverse effects to Traditional Cultural Properties. To comply with legal mandates, federally recognized tribes that are historically affiliated with the geographic region were invited to consult on all proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the tribes (see **Appendix A** for all tribal coordination materials).

Consultation letters were provided to Native American tribes whose ancestors were historically affiliated with the land underlying Cannon AFB, inviting them to consult on the proposed undertakings outlined within the EA.

1.6 PUBLIC AND AGENCY REVIEW OF DRAFT EA

A Notice of Availability (NOA) for the Draft EA was published in *The Eastern New Mexico News* announcing the availability of the Draft EA on 26 January 2024. Letters were provided to relevant federal, state, and local agencies and Native American tribal governments informing them that the Draft EA is available for review. The publication of the NOA initiated a 30-day comment period. Copies of the Draft EA were made available for review at the following libraries:

Clovis-Carver Public Library
701 N Main Street
Clovis NM 88101-6658

Portales Public Library
218 S Avenue B
Portales NM 88130-6248

A copy of the Draft EA was also made available for review online at https://www.cannon.af.mil under the Environmental tab. At the closing of the public review period, applicable comments from the general public and interagency and intergovernmental coordination and consultation will be incorporated into the analysis of potential environmental impacts performed as part of the EA, where applicable, and included in **Appendix A** of the Final EA.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

Cannon AFB proposes to replace two golf course impoundment liners and repair the six culverts on the South Playa.

2.2 SELECTION STANDARDS

The scope and location of each project and, where applicable, their alternatives, will undergo extensive review by AFSOC personnel, local government agencies, and supporting installation and USAF staff specialists. Potential alternatives were evaluated against the following selection standards:

- **Selection Standard 1.** The alternative(s) must meet the purpose of the Proposed Action to remedy deficiencies in the wastewater and stormwater infrastructure at Cannon AFB. The alternative(s) must also address the need to provide and maintain infrastructure that is adequate to support the installation's mission and applicable USAF, state, and federal requirements. Alternatives must also satisfy the purpose of and need for each individual project (see **Section 1.3**).
- **Selection Standard 2.** The alternative(s) must be consistent with all Cannon AFB internal planning documents and zoning requirements, applicable installation architectural compatibility guides, and relevant legal and regulatory requirements, and must accommodate applicable, known man-made and natural development constraints (e.g., Environmental Restoration Program sites, protected plant or animal species habitat, known cultural resources, or floodplains—the relevant constraints vary depending on the project).
- **Selection Standard 3.** The alternative(s) for the replacement of the golf course impoundment liners must follow the CAP approved by NMED to comply with DP-873 and be able to be completed by April 2025.

2.3 DETAILED DESCRIPTION OF THE ALTERNATIVES

2.3.1 Proposed Action

2.3.1.1 Replacement of the Golf Course Impoundment Liners

The Cannon AFB golf course (Whispering Winds), located in the northwestern portion of the installation, has two synthetically lined impoundments on the west side of the golf course that store reclaimed water from the installation's WWTP as well as stormwater during heavy rain events as this is a low-lying area (see **Figure 2-1**). The WWTP is designed to receive and treat domestic wastewater at a volume of up to 1.13 million gallons per day. The WWTP then discharges up to 165,000 gallons of reclaimed water per day to its various impoundments on the installation. From the golf course impoundments, the reclaimed water and stormwater is used to irrigate 108 acres of golf course turf and 7.5 acres of golf driving range turf. The replacement of the liners would allow for the continued reuse of reclaimed water at the installation.

Figure 2-1. Golf Course Impoundment Liner Project Area

The liners in these impoundments were originally installed in 1992 and have reached the end of their life cycle. Their structural integrity has been compromised, requiring repair. The degradation, tears, and general poor condition of the liners can be seen in **Photo 2-2** (North Impoundment) and **Photo 2-3** (South Impoundment) which show damaged portions of the exposed liners. Their current condition poses a concern due to possible seepage of reclaimed water into the ground, which violates DP-873. The existing liners require replacement no later than April 2025 as indicated in the CAP required by Term and Condition 57 of DP-873 as issued by NMED. The NMED-approved CAP suggests Cannon AFB do the work in phases, similar to those listed below. However, the suggested phases are subject to change based on the final design developed by the contractor performing the work.

Phase 1: Impoundment Drainage. Under Phase I, the impoundments would need to be drained, which would first require the removal and disposal of all fish, including large quantities of catfish, blue gill, bass fish, and possibly koi fish. Rough estimates show that there are at least 500 catfish. Draining the impoundments would also require the installation's WWTP to stop sending reclaimed water to the golf course impoundments for a specified period before construction could begin. During the approximate 9-month construction timeframe, treated wastewater would either be stored at the WWTP impoundment or sent to the North Playa until liner replacement is complete and the golf course impoundments are ready to receive reclaimed water. Additionally, during this timeframe, the golf course turf would either not be irrigated or effluent would be piped directly from the WWTP to the irrigation system. The existing water in the impoundments would be pumped out and used to irrigate the golf course turf. If wastewater could, for some reason, not be used to irrigate the golf course turf, it would be either (1) trucked back to the WWTP and discharged into the treated effluent basin, as long as there is concurrence from the WWTP and the Cannon AFB Contracting Officer, or (2) trucked to the North Playa and discharged, as long as there is enough space available. Both options would require the hose on the truck to eliminate disturbances while discharging, thus providing a low flow, consistent discharge so the system is not overwhelmed. Removal and transportation of this reclaimed water would comply with all terms and conditions listed in DP-873.

Existing surface aerators and their associated components in both impoundments would be temporarily disconnected, removed, and stored to be used again after the new liners are installed. Associated components include, but are not limited to, buried compressed air lines, distribution boxes, and electrical wiring. In addition to an aerator, the North Impoundment also has existing floating pumps used to pump water to the trees across the street. These pumps would be removed and disposed of along with the electrical lines that power them. All disposals would occur off installation in accordance with federal, state, and local regulations.

Phase 2: Vegetation Removal and Regrowth Prevention Measures. The two impoundments total approximately 5 acres. Vegetation was trimmed in early 2024 as part of maintenance activities on the installation. Under the Proposed Action, all tree stumps and cut vegetation would be removed extending out 10 feet from the edge of the impoundments. This would include 0.72 acres of vegetation common to the area, consisting primarily of American elm (*Ulmus americana*), willow (*Salix*), and ash (*Fraxinus*) trees, among others. Vegetation would not be replanted to reduce future degradation of the new liners, as required per DP-873 and consequently, the NMED-approved CAP. Regrowth prevention measures would be employed to reduce future degradation. Such measures could include (1) pouring concrete 5 feet out from the berm, (2) bringing the new liner up at least 5 feet above the berm, or (3) putting down a geotextile weed barrier and then putting riprap on top. Following implementation of regrowth prevention measures, seedlings found in the area would be removed immediately.

Photo 2-2. Degradation of the North Impoundment Liner

Photo 2-3. Degradation of the South Impoundment Liner

Phase 3: Sedimentation Removal. Under Phase 3, the sediment above the liner would be removed. A bathymetric survey of the impoundment completed in 2023 indicated that the sediment accumulation is up to 21 feet deep in some areas (Cannon AFB 2023a). Prior to removal, the sediment would be sampled and tested for per- and polyfluoroalkyl substances (PFAS) and hazardous waste characteristics. All material would then be removed and disposed of in accordance with Unified Facilities Guide Specifications (UFGS) 02 41 00, *Demolition and Deconstruction*, and UFGS 01 57 19, *Temporary Environmental Controls*, and all federal, state, and local regulations. Additionally, possible testing of the underlayment may be required if the sediment is found to be hazardous. To minimize future sediment accumulation, Cannon AFB would consider implementing potential mitigation measures such as installing a sediment forebay, or a settling basin or plunge pool constructed at incoming discharge points to catch sediment before it enters the impoundments.

Phase 4: Liner Replacement. To dispose of the existing liner, it must be pulled out from the impoundment basin and cleared of loose earth, then cut into manageable pieces and placed in roll-off dumpsters for disposal. The liner would be tested and disposed of in accordance with all federal, state, and local regulations. Site preparation and liner design would follow the *Groundwater Discharge Permit Guidance for Synthetically Lined Lagoons – Liner Material and Site Preparation* as outlined in DP-873, as well as the Groundwater Quality Bureau's minimum requirements for synthetically lined lagoons. Impoundment grading and earthwork would be done to allow for at least 24 inches of freeboard, with inside slopes ranging from 4:1 to 3:1 (horizontal:vertical). The impoundment base would be as uniform as possible and would vary no more than 3 inches from the average finished elevation. The sub-grade would consist of sand or fine soil, compacted to a minimum of 90 percent of standard proctor density, and free from sharp rocks, stubble, and vegetation to a depth of at least 6 inches below the liner. The sub-grade surface would be smooth and dry to allow for good contact with the liner during installation. The berms of the impoundments would have a minimum width of 8 feet to allow for maintenance vehicle traffic. Lagoon design would be certified by a New Mexico professional engineer and approved by Cannon AFB and NMED prior to installation.

In compliance with the *Groundwater Discharge Permit Guidance for Synthetically Lined Lagoons – Liner Material and Site Preparation* included in DP-873, the new liner material would be chemically compatible with the WWTP effluent, resistant to ultraviolet light deterioration, accommodate for shrinkage from temperature changes, and have sufficient thickness and tensile strength to resist tears and punctures. Although only 40-mil thickness is required per permit guidance, a liner thickness of 60 mil is generally recommended for adequate tensile strength and tear/puncture resistance. The liners would be installed in temperatures above freezing and no folds would be acceptable. Any opening where a pipe or other fixture protrudes through the liner would be detailed in the construction plans and record drawings to be properly sealed. A liner vent system would be required if the liner is installed over areas of decomposing organic matter or shallow groundwater.

The synthetic liner would be anchored in a trench on top of the berm at least 24 inches from the inside edge of the berm perimeter. The trench would have a minimum width of 12 inches and a minimum depth of 12 inches. After the trench is backfilled, a berm reinforcement would be installed above the trench to prevent soil erosion and sloughing into the impoundment. Options for berm reinforcement include (1) a poured concrete slab or (2) placement of larger rock slabs along the top of the berm. If future repairs to the liner are required, removal of this perimeter reinforcement may be required.

In compliance with the *Groundwater Discharge Permit Guidance for Synthetically Lined Lagoons – Liner Material and Site Preparation*, all materials would be certified by a licensed New Mexico professional engineer and approved by Cannon AFB and NMED prior to installation. Liner installation would follow the manufacturer's installation and field seaming guidelines and be supervised by someone with the necessary training and experience. The installer of the liner would field test the seams and submit the results to Cannon AFB along with the record drawings.

Phase 5: Refill Impoundments. Once the new liner is installed, the impoundments would be filled with reclaimed water, and the irrigation system at the golf course would resume using the water for the golf course turf. The estimated water storage capacity would be approximately 1,753,145 gallons in the North Impoundment and 12,981,660 gallons in the South Impoundment, for a total of 14,734,805 gallons.

2.3.1.2 Repair of the Six Culverts on the South Playa

The South Playa is in the southwestern portion of the installation and serves as the installation's primary stormwater collection point (see **Figure 1-2**). The South Playa has received stormwater runoff from portions of the flightline area since 1943. Solvents, fuels, oils, greases, and aqueous film forming foam (AFFF) potentially containing PFAS are all potential contaminants that could have been discharged to the playa from the flightline area (see **Section 3.9.1** for more information regarding PFAS). Documented releases of AFFF in the hangars on the flightline has resulted in AFFF entering the storm drains and being subsequently routed to the South Playa with stormwater. The Proposed Action includes repair of the six South Playa culverts to include the Southwest Culvert (Culvert 1), Western Culvert (Culvert 2), Northwest Culvert (Culvert 3), North-Northwest Culvert (Culvert 4), Northern Culvert (Culvert 5), and Eastern Culvert (Culvert 6) (see **Figure 2-4**). The conditions of the six culverts were last analyzed in June 2020 – the observations are as follows:

Culvert 1. Culvert 1 did not exhibit significant erosion issues; however, the culvert was constructed with riprap and geofabric at the apron/base of the retaining wall, which is approximately 17 feet wide. Due to the significant outflow from this culvert during rain events, the riprap has been washed away from the culvert and the geofabric left exposed, with the largest exposure being approximately 6.5 feet from the apron/base (see **Photos 2-5** and **2-6**).

Culvert 2. Culvert 2 had an erosion trench with a measured depth of approximately 2.5 feet (see **Photo 2-7**) and a 2.5-inch separation in the stormwater pipeline due to undermining (see **Photo 2-8**).

Culvert 3. Culvert 3 did not exhibit significant erosion; however, it was determined that grading would benefit the outfall (see **Photo 2-9**).

Culvert 4. Culvert 4 had significant erosion issues and a section of the stormwater sewer had broken off into the erosion ditch (see **Photo 2-10**). A 7-foot-deep erosion ditch that was approximately 10 feet wide was measured. The ditch ran into a 2.5-foot-deep erosion channel that contributes to the erosion issues of Culvert 5 (see **Photo 2-11**).

Culvert 5. Culvert 5 has undergone extensive erosion for many years. As of June 2020, the erosion ditch was approximately 11 feet deep (at its deepest point) and 23 feet wide (at the widest point) (see **Photo 2-12**); the trench coming out of the ditch was about 6 feet deep (at its deepest point) and 9.5 feet wide (at the widest point) and runs hundreds of feet in length (see **Photo 2-13**). An 8-inch separation was present in the length of pipe that the catwalk and flow meter are affixed to (see **Photo 2-14**).

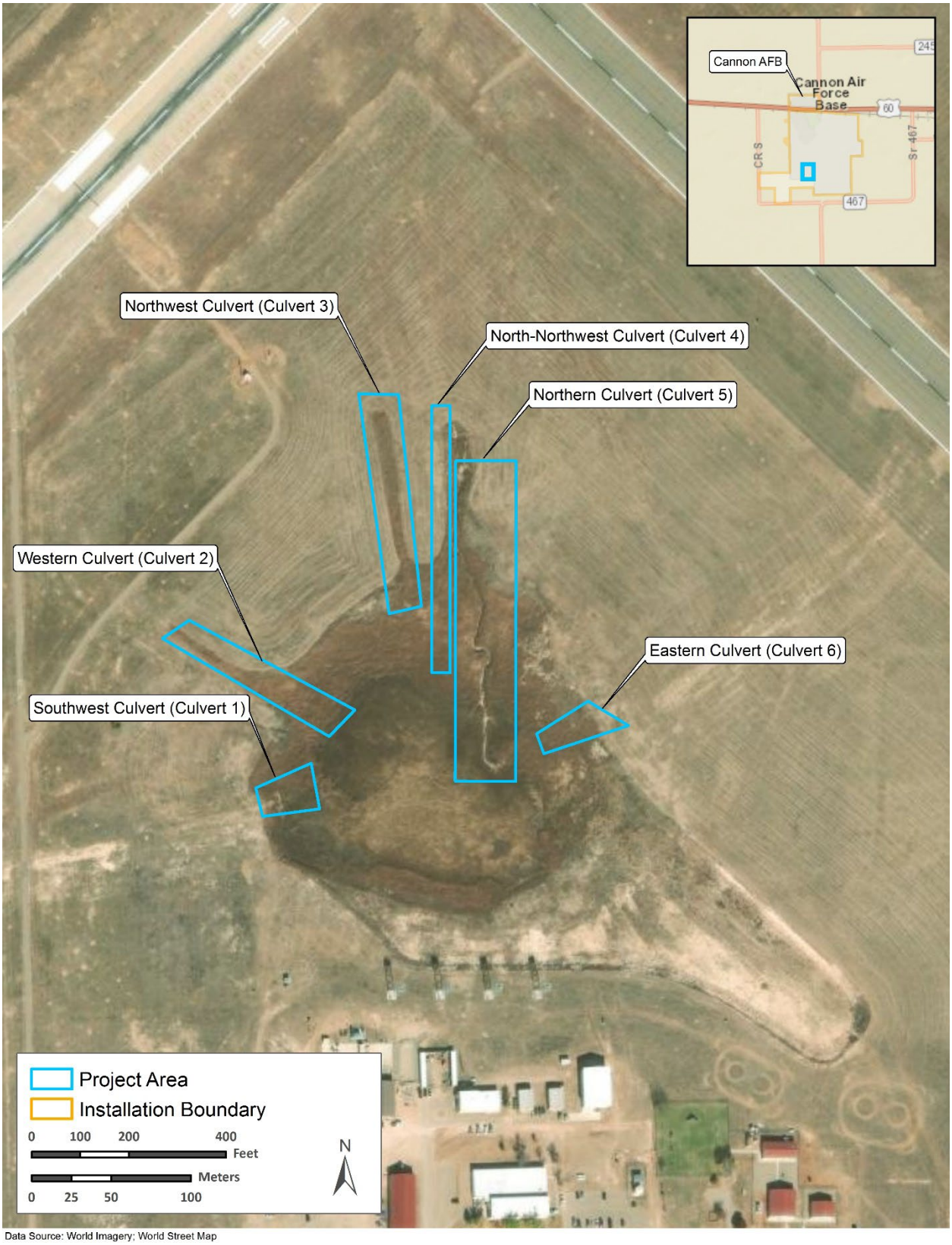

Figure 2-4. Culverts 1 through 6 on the South Playa

Photo 2-5. Washed-Out Riprap at Culvert 1

Photo 2-6. Riprap Washed Away from the Apron/Base of Culvert 1

Photo 2-7. Erosion Trench at Culvert 2

Photo 2-8. Separation in the Stormwater Line at Culvert 2

Photo 2-9. Culvert 3 in Overall Good Shape

Photo 2-10. Culvert 4 Lost Section Due to Erosion and Subsequent Undermining

Photo 2-11. Culvert 4 (left) and Culvert 5 (right) with Erosion and Subsequent Undermining

Photo 2-12. Erosion Around and Beneath Culvert 5

Photo 2-13. Culvert 5 and Erosion Trench

Photo 2-14. Separation in Culvert 5 Stormwater Line

Culvert 6. As of June 2020, Culvert 6 did not show significant erosion issues; however, this analysis occurred over 3 years ago, and erosion issues have significantly progressed for the other five culverts surveyed. Therefore, it is likely that erosion issues have occurred for this culvert as well and repairs will be necessary in the near future.

Due to continued erosion over the past 3 years, all June 2020 measurements noted above have grown. To fix the deficiencies from previous construction, it has been determined that the culverts would need to be re-engineered. Re-design of the culverts would consider current erosion concerns and techniques to avoid future erosion. Design reviews and related studies would be conducted to determine if elevations or velocities would affect upstream or downstream conditions.

The process of repairing the culverts would begin with flow diversion so work could be conducted in dry conditions. The contractor performing the work would be required to submit a plan for diverting or controlling the culvert flow. The plan could include a temporary conveyance of flow around or through the culvert or temporarily ponding flow upstream of the culvert. The chosen diversion method must not result in adverse effects on the surrounding environment. Culvert repairs would begin after the culvert flow has been diverted. The method of repair would be determined by the construction contractor and approved by Cannon AFB. The chosen repair method must not result in adverse effects on the surrounding environment. Once the culverts have been repaired, the areas around the culverts and culvert pipes would be backfilled with clean material to prevent further erosion and the area revegetated. Possible culvert repair approaches could include, but would not be limited to, the following:

- **Slipline or install a new internal pipe inside the existing culvert** — This approach could be used for any type of existing culvert and typically involves installing sections of new pipe that would be of a size that passes through the tightest obstructions and shape change locations yet provides the maximum flow capacity possible.
- **Spot patch and repair** — Localized repairs could be made to the culvert wall and to the coatings using spot patching. Under this approach, the section of culvert requiring repair would need to be cleaned, repaired, and then coated or painted.
- **Repair and modification to culvert end treatment** — This would take the form of a reinforced concrete cut-off wall combined with slope collars or slope paving to restore integrity to the fill slopes at the culvert ends. Other slope protection products and methods that could be considered include gabion walls, reinforced modular block walls, reinforced soil masses, and grouted riprap.
- **Apply internal bands or similar repairs to problem joints** — Joint problems occur in all types of culverts, involving misaligned or separated pipe ends, and can often be addressed with the use of internal bands combined with gaskets and sealing materials that would help restore uniformity of flow across the joints and seal the area against significant infiltration or exfiltration. Such bands could be pulled or moved into place and then expanded out against the pipe section to form a reasonable seal. Misaligned and separated joints in concrete pipe culverts could be improved through an injection grouting process.
- **Apply a shotcrete or gunite lining** — Such a lining system is applied pneumatically, using compressed air to force mixtures of cement plaster or concrete onto the surface of the culvert wall in a controlled and uniform manner. Such linings are typically in the 2- to 4-inch thickness range and provide a dense lining resistant to weathering and flow forces. Reinforcement could be added to improve the strength and durability of such a lining.

- **Replace the culvert** – If damages are too advanced for repair, replacement of damaged sections of the culvert or the entire culvert may be necessary.

2.3.2 No Action Alternative

Under the No Action Alternative, the significantly damaged golf course impoundment liners would not be replaced and would continue to be in violation of DP-873. Additionally, the six culverts on the South Playa would not be repaired, and the poor condition of the culverts would continue to deteriorate, worsening the already significant erosion. The USAF EIAP (32 CFR § 989.8[d]) requires consideration of the No Action Alternative; therefore, this alternative will be carried forward for detailed analysis in the EA. However, the No Action Alternative would not meet the purpose of or need for the Proposed Action as described in **Section 1.3**.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

The following alternatives were considered but eliminated from further consideration based on the selection standards outlined in **Section 2.2** and other reasons as explained below.

2.4.1 Overlay a New Liner over the Old Liner within the Golf Course Impoundments

This alternative would have consisted of overlaying new impoundment liners over the old liners in both the North and South Impoundments at the golf course. This alternative would not have included removal of the old liners. This alternative was eliminated after coordination with NMED, as they did not concur that this was a viable option to comply with DP-873, thus not complying with Selection Standards 1 or 3. Therefore, this alternative was eliminated from further consideration.

2.4.2 Closure of the Golf Course Impoundments

This alternative would have consisted of filling both the North and South Impoundments with soil and closing them, resulting in treated wastewater no longer being sent to the impoundments. However, this alternative would have resulted in various other direct and indirect adverse impacts. This alternative would have required the installation to block the stormwater runoff that originates from the off-installation area north of the impoundments, resulting in additional potential impacts on water resources and the floodplain. This alternative would have resulted in adverse impacts on the golf course irrigation system, potentially requiring the installation to find an alternative source of water to replace what is currently drawn from the impoundments. Additionally, this alternative could adversely impact the storage capacity for effluent on Cannon AFB, potentially resulting in the need to find or create additional effluent storage space elsewhere on the installation. This alternative also does not follow with the CAP approved by NMED, thus not complying with Selection Standards 1 or 3. Due to the greater potential for adverse environmental impacts as well as not meeting Selection Standards 1 or 3, this alternative was eliminated from further consideration.

2.4.3 Revert the Golf Course Impoundments Back to Natural Wetlands

This alternative would have consisted of removing the liners in both the North and South Impoundments and reverting them back into natural, functioning wetlands. However, this alternative would have resulted in adverse impacts on the golf course irrigation system, requiring the installation to find an alternative source of water to replace what is currently drawn from the impoundments. Additionally, this alternative could have adversely impacted the storage capacity

for effluent on Cannon AFB, potentially resulting in the need to find or create additional effluent storage space elsewhere on the installation. This alternative also does not follow with the CAP approved by NMED, thus not complying with Selection Standards 1 or 3. Therefore, this alternative was eliminated from further consideration.

2.4.4 Filling Erosion around the South Playa Culvert with Soil without Resizing the Pipes

This alternative would have consisted of filling the eroded areas on the South Playa with soil and not repairing the culverts. However, this alternative would not have solved the original problem, and the new soil would continue to erode, resulting in further repairs being required in the future. It was determined that the South Playa culverts would need to be re-engineered in order to fix the deficiencies of the previous construction. Therefore, this alternative was eliminated from further consideration as it does not meet Selection Standard 1.

2.5 COMPARATIVE SUMMARY OF IMPACTS

Table 2-1 below presents a summary of the impacts anticipated under the Proposed Action and No Action Alternative.

Table 2-1. Summary of Potential Impacts

Affected Resource	Proposed Action	No Action Alternative
Noise	Short-term, minor, adverse impacts would occur. The intermittent increases in construction noise would temporarily increase the sound levels of the ambient noise environment in the project areas. To reduce adverse impacts on the ambient noise environment, construction equipment would use noise abatement components and other best management practices (BMPs) would be implemented. No long-term impacts would occur because the Proposed Action does not include operational activities.	Existing conditions would remain unchanged.
Air Quality	Short-term, minor, adverse impacts would occur. Emissions of criteria pollutants and greenhouse gases (GHGs) would occur during construction; however, such emissions would be temporary in nature. Construction activities would incorporate BMPs and environmental control measures to minimize adverse impacts. No long-term impacts would occur because the Proposed Action does not include sources of operational air emissions.	Existing conditions would remain unchanged.
Geological Resources	Short-term, negligible, adverse impacts on topography would be expected from earthmoving and grading activities. Short-term, minor to moderate, adverse impacts on soils would result from the removal of all tree stumps and cut vegetation extending 10 feet from the edge of the impoundments. Removal of vegetation and subsequent root structures would lead to short term de-stabilization of the soils. No long-term impacts would occur because the Proposed Action does not include operational activities.	Existing conditions would remain unchanged.
Water Resources	Short-term, minor, adverse impacts on groundwater and floodplains would be expected during construction due to ground disturbance from the use of heavy equipment. Short-term, minor to moderate, adverse impacts on surface waters and wetlands would also be anticipated during construction. Construction could result in the transportation of additional sediment and other materials into the golf course impoundments and South Playa. Additionally, stormwater would have the potential to carry sediment and hazardous	The No Action Alternative would result in long-term, minor to moderate, adverse impacts on groundwater and floodplains. If the golf course impoundment liners are not replaced, the already poor condition of the liners would continue to deteriorate. It could be assumed that if there are no holes in the liner allowing for effluent to seep into the soil below the liner, holes would develop as the liners continue to deteriorate. This could

Affected Resource	Proposed Action	No Action Alternative
	substances into drainage ditches, which in turn connect to various surface water bodies across the installation. There is the potential for long-term, minor to moderate, beneficial impacts to result from the Proposed Action for the golf course impoundment liner replacement. With the current poor condition of the liners, it is possible that effluent from the wastewater treatment plant that currently fills the impoundments could be leaching into the soil through the liners and thus contaminating the groundwater. With the replacement of the liners, effluent would no longer be able to penetrate the liners and potentially contaminate the groundwater.	directly result in contamination of groundwater in the project area. Additionally, if the culverts on the South Playa are not repaired and reengineered, stormwater flows would continue to adversely impact the South Playa.
Biological Resources	Short- and long-term, negligible to moderate, adverse impacts and potential long-term, negligible, beneficial impacts on vegetation would occur. The removal of all tree stumps and cut vegetation extending 10 feet from the edge of the golf course impoundments would result in long-term, moderate, adverse impacts. Additionally, the potential clearing of vegetation in select areas of the South Playa to conduct repair activities for the Proposed Action would result in short-term, negligible to minor, adverse impacts. Long-term, negligible, beneficial impacts would result if these disturbed sites were replanted with native species supporting the native plant community on the installation. Short- and long-term, moderate, adverse impacts would occur due to the drainage of the North and South Impoundments. The impoundments currently provide habitat for large quantities of catfish, blue gill, bass fish, and possibly koi fish. Rough estimates show that there are at least 500 catfish alone in the impoundments. With the drainage of the impoundments, all fish would be removed and disposed of. No impacts on federally or state listed threatened or endangered species or critical habitat would be expected. There is the potential for short-term, negligible to minor, adverse impacts on the sensitive species of concern.	Existing conditions would remain unchanged.
Cultural Resources	No short- or long-term impacts would occur. No known historic properties are present within the APE for the Proposed Action.	Existing conditions would remain unchanged.

Affected Resource	Proposed Action	No Action Alternative
	Should inadvertent discoveries be made during project activities, standard operating procedures for inadvertent discoveries outlined in the installation's Integrated Cultural Resources Management Plan (ICRMP) would be implemented.	
Infrastructure	Intermittent, short-term, negligible, adverse impacts on area roadways could occur from a temporary increase in the number of construction-related vehicles accessing the installation. Short-term, negligible to minor, adverse impacts on the wastewater system/collection system could occur. Replacement of the golf course impoundment liners would require the WWTP to temporarily send effluent to other impoundments on the installation. Repair of the six culverts on the South Playa would have short-term, minor, adverse impacts on the stormwater system when repairs are occurring as flow would need to be diverted temporarily. Additionally, construction activities would potentially result in adverse impacts on stormwater handling by disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading. Long-term, beneficial impacts on the stormwater system would occur from the mitigation of potential future damages that could occur from the continued erosion, specifically further expansion of the South Playa and deterioration of surrounding utilities. The Proposed Action would result in a negligible increase in the overall amount of solid waste generated at the installation but would not significantly alter the existing waste and recycling streams maintained by the installation.	Under the No Action Alternative, the already poor condition of the six culverts on the South Playa would continue to deteriorate, further weakening the stormwater discharge/collection system on the installation resulting in a long-term, moderate, adverse impact.
Hazardous Materials and Wastes and Other Contaminants	Short- and long-term, negligible to minor, adverse impacts would occur from the use of hazardous materials and petroleum products and the generation of hazardous wastes during construction and maintenance. Implementation of BMPs and environmental protection measures would reduce the potential for an accidental release of materials. All materials and wastes used or generated would be contained, stored, and managed in accordance with installation plans and federal, state, and local regulations to minimize the potential for releases. Short-term, negligible to minor, adverse impacts could occur from the potential to encounter PFAS. Before sediment is removed from the	The potentially contaminated sediment would not be disturbed. Long-term, negligible to minor, adverse impacts would be expected to occur from the continued deterioration of the pond liner.

Affected Resource	Proposed Action	No Action Alternative
	project areas, the sediment would be sampled and tested for PFAS and hazardous waste characteristics. Appropriate measures would be taken to reduce the potential for exposure and release of the sediment and contractors would wear appropriate PPE and adhere to the installation's HWMP and all applicable federal, state, and local regulations. Additionally, construction contractors would wear appropriate personal protective equipment (PPE) and coordinate all ground-disturbing activities in the project areas with installation's restoration personnel and implement all recommended guidelines.	
Safety	Short-term, negligible to minor, adverse impacts on the health and safety of construction and military personnel would occur from the slight risk increase to personnel within the project areas. Additionally, short-term, negligible, adverse impacts on the health and safety of the public would be expected. Replacement of the golf course impoundment liners would occur on Cannon AFB's Whispering Winds Golf Course. However, construction areas would be appropriately delineated during repair activities and posted with access limited to construction and site personnel only.	Existing conditions would remain unchanged.

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 SCOPE OF THE ANALYSIS

3.1.1 Resources Analyzed

Resources in the project area that were analyzed include noise, air quality, geological resources, water resources, biological resources, cultural resources, infrastructure, hazardous materials and wastes and other contaminants, and safety. The following sections provide a characterization of the affected environment and an analysis of the potential direct and indirect impacts each alternative would have on the affected environment. Cumulative and other impacts are discussed in **Section 4.0**. All potentially relevant resource areas were considered in this EA. The following discussion elaborates on the characteristics that might relate to impacts on resources:

- **Short-term or long-term.** These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity, for a finite period, or only during the time required for construction or installation activities. Long-term impacts are those that are more likely to be persistent and chronic.
- **Direct or indirect.** A direct impact is caused by and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters near the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.
- **Negligible, minor, moderate, or major.** These relative terms are used to characterize the magnitude or intensity of an impact. Negligible impacts are generally those that might be perceptible but are at a lower level of detection. A minor impact is slight but detectable. A moderate impact is readily apparent. A major impact is one that is severely adverse or exceptionally beneficial.
- **Adverse or beneficial.** An adverse impact is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.
- **Significance.** Significant impacts are those that, in their context and due to their intensity (severity), meet the thresholds for significance set forth in CEQ regulations (40 CFR § 1508.27).
- **Context.** The context of an impact can be localized or more widespread (i.e., regional).
- **Intensity.** The intensity of an impact is determined through consideration of several factors, including whether an alternative might have an adverse impact on the unique characteristics of an area (e.g., historical resources or ecologically critical areas), public health or safety, or endangered or threatened species or designated critical habitat. Intensity of impacts are also considered in terms of their potential for violation of federal, state, or local environmental laws; their controversial nature; the degree of uncertainty or unknown impacts, or unique or unknown risks; if there are precedent-setting impacts; and their cumulative impacts (see **Section 4.0**).

In accordance with NEPA, CEQ regulations, and 32 CFR Part 989, the following evaluation of environmental impacts focuses on those resources and conditions potentially subject to impacts.

3.1.2 Resources Considered but Eliminated from Detailed Analysis

Based on the scope of the Proposed Alternative, environmental resources with few to no impacts were identified and removed from detailed analysis. The following describes those resource areas and why they were eliminated.

- **Airspace Management.** Under the Proposed Action, no changes to current airspace types, flight activities, or training would occur. Similarly, the No Action Alternative would not change any current flight patterns for aircraft in the area. No short- or long-term impacts on airspace management would result from the Proposed Action; therefore, the discussion has been eliminated from detailed analysis in this EA.
- **Environmental Justice.** EO 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*; EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*; and EO 13985, *Executive Order on Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, require that federal agencies address the potential effects of policies on minorities, low-income populations, and children. Because of the distance of the project areas from populated off-installation areas, no off-installation minority, low income, or youth populations would be adversely impacted by the Proposed Action. Thus, they would not experience disproportionately high and adverse impacts. Therefore, environmental justice has been eliminated from detailed analysis in this EA.
- **Socioeconomics.** Construction and improvements associated with the Proposed Action would result in temporary increases in payroll tax revenue from hired construction workers and the purchase of construction materials and goods in the local area. No adverse impacts on socioeconomics would be expected from the Proposed Action. Because the expected beneficial impacts are negligible and there would be no adverse impacts, socioeconomics has been eliminated from detailed analysis in this EA.
- **Land Use.** The projects under the Proposed Action fall within various planning districts and land use designations, including the Community District, Airfield District, and Southwest Development District. The proposed golf course impoundment project area covers 5.56 acres of the Community District, which permits outdoor recreation (Cannon AFB 2016). The proposed culvert repair project area covers 14.50 acres of both the Airfield and Southwest Development Districts. The Airfield District permits airfield operations and maintenance and industrial land uses, while the Southwest Development District permits low-density, low-intensity industrial and manufacturing land uses (Cannon AFB 2016). Therefore, implementation of the Proposed Action would not change land use designations for either project. Because there would be no impacts on land use, this resource has been eliminated from detailed analysis in this EA.

3.2 NOISE

3.2.1 Definition of the Resource

Noise is defined undesirable sound that interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Sensitive noise receptors could include specific locations (e.g.,

churches, schools, hospitals) or an expansive area (e.g., nature preserves, conservation areas) in which occasional or persistent sensitivity to noise above ambient levels exist.

Sound intensity is quantified using a measure of sound pressure level called decibels (dB). The A-weighted decibel (dBA) is a measurement in which "A-weighting" is applied to the dB to deemphasize the higher and lower frequencies that the human ear does not perceive well in order to approximate a frequency response representing the human perception of sound. The range of audible sound for humans is considered to be 1 to 130 dBA and the threshold of audibility id generally within the range of 5 to 25 dBA (USEPA 1981a, USEPA 1981b). The threshold for perception of a sound change is 5 dBA. A sound level that increases is 10 dBA is perceived as being twice as loud, while a sound level that decreases by 10 dBA is perceived as being half as loud (USEPA 1971). Day-night sound level (DNL) is used to describe the average sound energy in a 24-hour period with 10 dB added to nighttime (10 p.m. to 7 a.m.) levels.

The Noise Control Act of 1972 (42 USC § 4901 et seq.) directs federal agencies to comply with federal, state, and local noise control regulations. Neither the state of New Mexico nor Curry County maintain a noise ordinance. The city of Clovis, approximately 8 miles east of Cannon AFB, maintains a nuisance ordinance; however, the ordinance does not contain specific "not-to-exceed" noise levels (City of Clovis Code Part 9.40.010).

Air Force Instruction (AFI) 32-1015, *Integrated Installation Planning*, instructs air installations to maintain an active and compliant Air Installation Compatible Use Zone Program to ensure land use compatibility with aircraft noise levels. Generally, most land uses exposed to noise levels below 65 dB DNL are considered compatible with airfield operations (Air Force Handbook 32-7084). According to the United States Environmental Protection Agency (USEPA), continuous and long-term noise exposure to levels in excess of 65 dB is normally incompatible with noise-sensitive land uses such as residences, schools, churches, and hospitals (USEPA 1974). According to the United States Department of Housing and Urban Development, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where noise exposure exceeds 65 dBA, and "normally acceptable" in areas where noise exposure is 65 dBA or less (24 CFR Part 51).

3.2.2 Affected Environment

Cannon AFB is in rural eastern New Mexico where ambient noise levels are estimated at 40 dBA in the daytime, 34 dBA at night, and 42 dB DNL overall (ANSI 2013). The ambient noise environment at Cannon AFB is influenced mainly by noise from military aircraft overflights. Noise from aircraft operations typically occurs beneath main approach and departure corridors and in areas immediately adjacent to runways, aircraft parking ramps, and aircraft staging areas. As aircraft take off and gain altitude, their contribution to the nose environment drops to indistinguishable levels from the background. Other existing noise sources at Cannon AFB include vehicular traffic, landscaping equipment, and routine grounds and infrastructure maintenance activities.

Noise from aircraft operations at the golf course impoundments is below 70 dB DNL and noise at the South Playa culvert repair area ranges from 65 to 80 dB DNL. The closest on-installation noise sensitive receptors to the golf course impoundments include the 27th Special Operations Medical Group medical campus approximately 400 feet to the southwest, the Chavez Manor residential community and park approximately 700 feet to the north, the Cannon AFB Child Development Center approximately 1,200 feet to the southwest, the Cannon AFB School Age Care Facility approximately 1,100 feet to the southwest, and the Joe Cannon residential community

approximately 1,300 feet to the southwest. The 27th Special Operations Medical Group medical campus, School Age Care Facility, and a portion of the Joe Cannon residential community are within the 65 to 70 dB DNL noise contour, while the other on-installation noise sensitive receptors are outside the 65 dB DNL noise contour (Cannon AFB 2016). The closest off-installation noise sensitive receptors to the golf course impoundments are more than 2,500 feet to the north and are outside the 65 dBA DNL noise contour. There are no noise sensitive receptors near the South Playa culvert repair area.

The Occupational Safety and Health Administration (OSHA) sets legal limits on construction noise exposure levels. Permissible noise exposure levels for construction workers must not exceed 90 dBA over an 8-hour period. The maximum allowable noise level to which construction workers can be constantly exposed is 115 dBA; however, exposure at this level must not exceed 15 minutes within an 8-hour period.

3.2.3 Environmental Consequences

3.2.3.1 Proposed Action

Construction noise from impoundment liner replacement and culvert repairs would result in short-term, minor, adverse impacts on the ambient noise environment. The use of heavy construction equipment would generate intermittent, temporary increases in ambient noise levels during the construction period. Noise levels associated with common types of construction equipment are listed in **Table 3-1**. Noise generated by construction equipment typically exceeds ambient levels by 20 to 35 dBA in rural areas. The use of exhaust mufflers and other noise dampening equipment could reduce the noise level by up to 10 dBA (USEPA 1974).

Table 3-1. Average Noise Levels for Common Construction Equipment

Construction Category and Equipment	Predicted Noise Level at 50 feet (dBA)	Predicted Noise Level at 250 feet (dBA)	Predicted Noise Level at 500 feet (dBA)	Predicted Noise Level at 1,000 feet (dBA)
Clearing and Grading				
Grader	80 to 93	66 to 79	60 to 73	54 to 67
Truck	83 to 94	69 to 80	63 to 74	57 to 68
Backhoe	72 to 93	58 to 79	52 to 73	46 to 67
Construction				
Concrete Mixer	74 to 88	60 to 74	54 to 68	48 to 62
Dozer/Tractor	60 to 89	46 to 75	40 to 69	34 to 63
Front Loader	70 to 90	56 to 76	50 to 70	44 to 64
Crane	63 to 88	49 to 74	43 to 68	37 to 62

Sources: USEPA 1974, TRS Audio 2023, FHWA 2007

As shown in **Table 3-1**, individual pieces of equipment would produce noise levels between 60 and 94 dBA at a distance of 50 feet. Construction typically requires several pieces of equipment to be used simultaneously. In general, the addition of a piece of equipment with identical noise levels to another piece of equipment would increase the overall noise environment by 3 dB (USEPA 1974). Therefore, additive noise associated with multiple pieces of construction equipment operating simultaneously would increase the overall noise environment by a few dB over the noisiest equipment. Construction noise would occur for the duration of the construction period and would be confined to daytime working hours (i.e., 7 a.m. to 5 p.m.). Noise beyond ambient levels would cease following the construction period.

Construction for the Proposed Action would occur within Cannon AFB, where noise levels from aircraft operations regularly exceed 65 dBA. During construction, increases in trucks transiting through Cannon AFB would occur; however, vehicular traffic is a common noise source at the installation and the noise from additional truck traffic would be negligible. Construction equipment would remain at the project areas during construction; therefore, increased noise levels from truck traffic would occur only when construction vehicles are required to enter and exit the project areas.

Construction noise levels would mostly be limited to the immediate vicinity of the construction area where the primary receptors would be construction workers. Any noise generated would decrease with increasing distance from the construction activities and these noise levels would noticeably attenuate to below 65 dBA between approximately 500 and 1,500 feet from the source. Construction contractors would adhere to appropriate OSHA standards (29 CFR § 1910.95) to protect the workforce from excessive noise. In addition, workers are recommended to use proper personal hearing protection to limit exposure to high noise levels.

Noise sensitive receptors within 1,000 feet of the Proposed Action include the 27th Special Operational Medical Group medical campus and the Chavez Manor residential community, which are 400 and 700 feet from the golf course impoundments and are outside the 65 dBA DNL noise contour. Noise levels from impoundment liner replacement at these noise sensitive receptors could reach levels above 65 dBA. Noise levels at noise sensitive receptors that is above ambient levels would be temporary and would last only during the 9-month liner replacement period. To minimize impacts on the ambient noise environment and limit noise exposure to noise sensitive receptors, the following BMPs would be implemented:

- Ensure that all heavy construction equipment includes all factory-equipped noise abatement components such as muffler, engine enclosures, engine vibration isolators, or other sound dampening supplements.
- Turn off all idling equipment when not in use.
- Maintain uniform noise levels and avoid impulsive noises.
- Maintain good relationships with the community, publish/distribute notices before noisy operations occur, and provide the community with frequent updates as to when and where construction actions would occur.
- Limit construction to normal workdays and working hours (i.e., 7 a.m. to 5 p.m.).

The Proposed Action does not include operational activities; therefore, long-term impacts on the ambient noise environment would not occur.

3.2.3.2 No Action Alternative

Under the No Action Alternative, the golf course impoundment liners would not be replaced, and the South Playa culverts would not be repaired. The existing conditions discussed in **Section 3.2.2** would remain unchanged and no impacts on the ambient noise environment would occur.

3.3 AIR QUALITY

3.3.1 Definition of the Resource

Air quality is defined by the concentration of various pollutants in the atmosphere at a given location. Air pollution occurs when one or more pollutants (e.g., dust, fumes, gas, mist, odor, smoke, vapor) are present in the outdoor atmosphere in quantities great enough to cause harm to the natural environment, including human, plant, and animal life. Under the Clean Air Act, the six pollutants defining air quality, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide, nitrogen dioxide, ozone (O_3), suspended particulate matter (measured less than or equal to 10 microns in diameter and less than or equal to 2.5 microns in diameter), and lead. CO, sulfur oxides, and some particulates are emitted directly into the atmosphere from emissions sources. Nitrogen oxides (NO_X), O_3, and some particulates are formed through atmospheric and chemical reactions that are influenced by weather, ultraviolet light, and other atmospheric processes. Volatile organic compounds and NO_X emissions are precursors of O_3 and are used to represent O_3 generation.

Under the Clean Air Act (42 USC § 85 *et seq.*), the USEPA has established National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) for criteria pollutants. Areas that are and have historically been in compliance with the NAAQS or have not been evaluated for NAAQS compliance are designated as attainment areas. Areas that violate an air quality standard are designated as nonattainment areas. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment.

The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emissions thresholds that trigger requirements for a general conformity determination are called *de minimis* levels and are specified at 40 CFR § 93.153. *De minimis* levels (in tons per year [tpy]) vary by pollutant and also depend on the severity of the nonattainment status for the air quality management area in question. The General Conformity Rule does not apply to federal actions occurring in attainment or unclassified areas.

Climate Change and GHGs. Global climate change refers to long-term fluctuations in temperature, precipitation, wind, sea level, and other elements of Earth's climate system. Of particular interest, GHGs are gas emissions that trap heat in the atmosphere. GHGs include water vapor, carbon dioxide (CO_2), methane, nitrous oxide, tropospheric O_3, and several fluorinated and chlorinated gaseous compounds. Most GHGs occur naturally in the atmosphere but increases in concentrations result from human activities such as burning fossil fuels. Scientific evidence indicates a trend of increasing global temperature over the past century because of an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to cause negative economic and social consequences across the globe.

EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, signed 20 January 2021, reinstated the *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*, issued on 5 August 2016, by CEQ that required federal agencies to consider GHG emissions and the effects of climate change in NEPA reviews, and directs federal agencies to determine an appropriate method for analyzing such emissions (CEQ 2016). The CEQ *National Environmental Policy Act Interim Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*, issued on 9 January 2023, recommends

quantifying a proposed action's GHG emissions in appropriate context (CEQ 2023). In accordance with the 2016 Final Guidance and the 2023 Interim Guidance, estimated carbon dioxide equivalent (CO_2e) emissions associated with the Proposed Action are provided in this EA for informative purposes.

EO 14008, *Tackling the Climate Crisis at Home and Abroad*, further strengthens EO 13990 by implementing objectives to reduce GHG emissions and bolster resilience to the impacts of climate change, and requiring federal agencies to develop and implement climate action plans. The *Department of the Air Force Climate Action Plan* recognizes the department's role in contributing to climate change and aims to address the challenges and risks posed by climate change through the implementation of climate priorities, including making climate-informed decisions and optimizing energy use, and pursuing alternative energy sources (DAF SAF/IE 2022). The USAF also follows the *Department of Defense Climate Adaptation Plan* and considers the *Department of Defense Climate Risk Analysis* for climate change planning*. The Long-term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050* sets target benchmarks to achieve net-zero GHG emissions by no later than 2050 (DOS and EOP 2021).

3.3.2 Affected Environment

Cannon AFB is in Curry County, New Mexico, which is within the Pecos-Permian Basin Intrastate Air Quality Control Region (40 CFR § 81.242). USEPA Region 6 and NMED regulate air quality in New Mexico. USEPA has designated Curry County as in attainment or unclassified for all criteria pollutants (40 CFR § 81.332). As a result, the General Conformity Rule is not applicable to federal actions occurring in the county. There are no existing sources of air emissions within the areas containing the golf course impoundments and the South Playa culverts.

Climate Change and GHGs. Ongoing global climate change in the southwestern United States, including Curry County, has contributed to increased drought severity, increased frequency of devastating wildfires, and more intense heat and arid weather conditions. These regional climate changes could lead to damaged infrastructure, decreased availability of water supplies in the future, and greater risk of agriculture failure (Gonzalez et al. 2018, USEPA 2016). Higher air temperatures can cause adverse health effects such as heat stroke and dehydration, especially in vulnerable populations, which can affect cardiovascular and nervous systems. Warmer air also can increase the formation of ground-level O_3, which can lead to a variety of health effects, including aggravation of lung diseases and increased risk of death from heart or lung disease (USEPA 2016). Climate change effects linked to Cannon AFB include increased temperature and drought potential, which could increase dust generation, damage infrastructure, and decrease mission capabilities.

In 2021, New Mexico produced 45.9 million metric tons of CO_2 emissions, and was ranked the 37th highest producer of CO_2 in the United States (USEIA 2023). Cannon AFB produced a total of approximately 7,348 metric tons of CO_2e from stationary sources in 2022, while the total CO_2e emissions for Curry County were 455,503 tons in 2020 (Cannon AFB 2023b, USEPA 2023a).

3.3.3 Environmental Consequences

3.3.3.1 Proposed Action

Based on Curry County's compliance with the NAAQS, the General Conformity Rule is not applicable to emissions of criteria pollutants from the Proposed Action. Per the *Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II – Advanced Assessments*, the USAF applies insignificance indicators to actions occurring in areas designated

as attainment or unclassified to provide an indication of the significance of potential impacts on air quality. The insignificance indicator used by the USAF is the 250 tpy Prevention of Significant Deterioration (PSD) major source thresholds, as defined by USEPA, and is applied to emissions of all criteria pollutants, except lead, that have been designated attainment or unclassified. The PSD thresholds for lead is 25 tpy. The PSD thresholds do not denote a significant impact; however, they do provide a threshold to identify actions that have insignificant impacts on air quality. Any action with net emissions below the insignificance indicators is considered so insignificant that the action will not cause or contribute to an exceedance of one or more NAAQS (AFCEC 2020).

The USAF Air Conformity Applicability Model, version 5.0.18a, was used to estimate the annual air emissions from the Proposed Action. The potential for air quality impacts was assessed in accordance with Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the EIAP (32 CFR Part 989); and the General Conformity Rule (40 CFR Part 93 Subpart B). For the purposes of this analysis, a 9-month construction period was assumed for the golf course impoundment liner replacements, and a 1-year construction period was assumed for the culvert repairs. A surrogate year of 2024 was used for all construction activities. The Air Conformity Applicability Model report with detailed emissions calculations is included in **Appendix B**.

Table 3-2 provides the estimated annual net air emissions that would result from the Proposed Action. Short-term, minor, adverse impacts on air quality would occur from construction activities required for impoundment liner replacement and culvert repairs. Emissions of criteria pollutants would be directly produced from operation of heavy construction equipment, heavy duty diesel vehicles hauling fill material and debris to and from the construction areas, workers commuting daily to and from the construction areas in their personal vehicles, and ground disturbance. All such emissions would be temporary in nature and only produced during the construction period. The annual air emissions from construction would not be expected to exceed the insignificance indicator of 250 tpy (25 tpy for lead). Therefore, short-term, adverse impacts on air quality would not be significant.

Table 3-2. Estimated Annual Air Emissions from the Proposed Action

Year	NO_X (tpy)	VOC (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Lead (tpy)	CO_2e (tpy)
2024	3.110	0.529	3.878	0.010	33.187	0.113	<0.001	1,093.8
PSD Threshold	250	250	250	250	250	250	25	N/A
Exceeds PSD Threshold?	No	No	No	No	No	No	No	N/A

N/A = not applicable; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound

When considering all criteria pollutants, it is estimated that most pollutant emissions would be from particulate matter, such as fugitive dust, which would be generated from earth moving activities and vehicles/equipment traveling over unpaved ground surfaces. Construction activities would incorporate BMPs and environmental control measures (e.g., wetting the ground surface) to minimize fugitive dust emissions. In addition, work vehicles would be well-maintained and use diesel particulate filters to reduce emissions of criteria pollutants. These BMPs and environmental control measures could reduce particulate matter emissions from a construction site by approximately 50 percent depending on the number of BMPs and environmental control measures required and the potential for particulate air emissions (USEPA 1985).

The Proposed Action does not include operation of new stationary air emissions sources, such as emergency generators or boilers, nor new activities that would result in increases of emissions from mobile sources. Therefore, the Proposed Action would not result in long-term (i.e., after 2024) impacts on air quality.

Climate Change and GHGs. Consistent with EO 14008 and the 2016 Final Guidance, this EA examines GHGs as a category of air emissions. It also examines potential future climate scenarios to determine whether elements of the Proposed Action would be affected by climate change. This analysis does not attempt to measure the actual incremental impacts of GHG emissions from the Proposed Action, as there is lack of consensus on how to measure such impacts. Global and regional climate models have substantial variation in output and do not have the ability to measure the actual incremental impacts of a project on the environment.

Construction activities required for impoundment liner replacement and culvert repairs would produce an estimated 1,093.8 tons of direct CO_2e, which is the approximate GHG footprint of 221 passenger vehicles driven for 1 year or 125 homes' energy use for 1 year (USEPA 2021). CO_2e emissions from construction would represent approximately 0.2 percent of the total CO_2e emissions from 2020 in Curry County. As such, GHG emissions from the Proposed Action would not meaningfully contribute to the potential effects of global climate change and would not considerably increase the total CO_2e emissions produced by Curry County or the state. No new long-term GHG emissions would result from the Proposed Action. Therefore, Alternative 1 would result in short-term, negligible, adverse impacts from GHGs.

Ongoing changes to climate patterns in the southwestern United States are described in **Section 3.3.2**. These climate changes are unlikely to affect the USAF's ability to implement the Proposed Action. At the time of this analysis, no future climate scenario or potential climate stressor would have appreciable effects on any element of the Proposed Action. In accordance with the USAF *Climate Action Plan*, design of new and upgraded infrastructure would incorporate features to improve resilience against the potential future effects of climate change such as increased temperatures and drought severity.

3.3.3.2 No Action Alternative

Under the No Action Alternative, the golf course impoundment liners would not be replaced, and the South Playa culverts would not be repaired. No new air emissions or changes to air quality conditions would occur. Therefore, the existing conditions discussed in **Section 3.3.2** would remain unchanged.

3.4 GEOLOGICAL RESOURCES

3.4.1 Definition of the Resource

Geological resources are comprised of Earth's surface and subsurface materials. Within a given physiographic province, these resources are typically described in terms of geology, topography and physiography, soils and soil quality, farmland productivity, and where applicable, geologic hazards.

Geology is a synthesis of many sciences that study the Earth's composition and provides information on structural observations of surface and subsurface features. Field analyses gather information on the configuration and characterization of such features and can be used to understand the processes that enacted themselves on the landscape during a generalized time. Different field techniques are used to gather information necessary to the area of study, such as

boreholes or geophysical methods to understand subsurface bedrock and groundwater interactions, or soil methods that can determine the structural integrity of a landscape.

Soils are the unconsolidated materials overlying bedrock or other geologic parent material, and they were formed by chemical and physical weathering forces that modified rock and sediments by breaking them down into smaller and smaller debris. Over time, this debris is subject to different soil-forming processes, and soils then develop horizons, which are zones of material characterized by differing compositions of organic, clay, silt, and sand particles. All soils are usually described in terms of their complex type, slope, and physical characteristics. Their differences, however, are described in terms of their elasticity, strength, shrink-swell potential, drainage, and erosion potentials, all of which affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with different types of land uses, such as construction activities.

When soils become so unconsolidated that they lose their structural integrity, whether it be to rainfall events, lack of vegetation, or temporal patterns of weathering, mass wasting events can occur. These events are classified as geological hazards and occur when mass amounts of soil and debris move downslope in one bulk mass due to gravity. All types of hazards, which can additionally include earthquakes and sinkholes, among others, can endanger human and animal lives and threaten property.

3.4.2 Affected Environment

Regional Geology. The project areas for the Proposed Action are within the Great Plains physiographic region of New Mexico. This region is characterized by flat “high plains,” bordered to the west by the Rocky Mountains. There is one distinct geologic unit underlying the entire installation, consisting of older alluvial deposits of upland plains and piedmont areas dating to the middle to lower Pleistocene epoch. This geologic unit also contains calcic soils and eolian cover sediments of the High Plains region, and although these calcic soils are common throughout the arid and semiarid parts of the southeastern United States, they do not appear to be found within the soils of Cannon AFB. Eolian cover sediments are wind deposited materials with textural variances of sand or silt-sized particles (USGS 2023a).

Topography. The installation is flat topographically, and elevation is approximately 4,300 feet above mean sea level (msl) (Google Earth 2023.). The South Playa culvert repair project area has an approximate elevation of 4,250 feet above msl and the golf course impoundment liner replacement project area has an approximate elevation of 4,300 feet above msl.

Soils. Five different soil types are present within the project areas (see **Figure 3-1**). The characteristics of these soils are provided in **Table 3-3**. Overall, soil associations found within the project areas can be divided into two distinct soil textural categories: soils with loamy components and soils with clay components. The three soils with loamy characteristics are considered farmland of statewide importance, indicating that if these soils were treated and managed to acceptable farming methods, they could economically produce high yields of crops. In contrast, the Randall and Ranco clay soils within the project area are within playa floors, and their clay content causes water to pond frequently on the surface. Therefore, they do not have important farmland designations. Regardless of soil category, all five soils have depths to about 80 inches below ground surface (bgs) to restrictive subsoils (USDA 2023).

Table 3-3. Soil Characteristics

Map Unit	Soil Name	Depth (inches)	Farmland Designation	Soil Characteristics	Approx. acreage
AfA	Amarillo fine sandy loam, 0 to 1 percent slopes	0–80	Farmland of statewide importance	Fine sandy loam to sandy clay loam; well drained	4,143.0
AnB	Amarillo loamy fine sand, 0 to 3 percent slopes	0–80	Farmland of statewide importance	Loamy fine sand to sandy clay loam; well drained	86.1
EsB	Estacado loam, 1 to 3 percent slopes	0–80	Farmland of statewide importance	Loam to clay loam; well drained	84.2
RaA	Randall clay, 0 to 1 percent slopes, frequently ponded	0–80	Not prime farmland	Clay; poorly drained	13.7
RcA	Ranco clay, 0 to 1 percent slopes, frequently ponded	0–80	Not prime farmland	Clay; poorly drained	15.2
Total approximate acreage					**4,342.30**

Source: USDA 2023

Geologic Hazards. Rockfalls, sinkholes, and minor earthquakes are common in some areas of New Mexico. However, the lithology of the project areas is constituted by unconsolidated alluvial deposits, indicating that the historic material of these areas was transported by a river, either in the riverbed itself or on its floodplain and riverbanks (USGS 2023b). These alluvial sediments likely originated from the Rocky Mountains and were deposited in the area by east flowing streams. Due to the unconsolidated nature of these alluvial sediments, the composition of these areas does not make the project areas susceptible to most geologic hazards. Although karstic landscapes exist within New Mexico, sink holes are not common in the eastern portion of the state. Cannon AFB has experienced two voids within the installation boundaries; however, these can be attributed to poor compaction of the subgrade materials used during construction activities and were not caused by dissolution of carbonate rock at depth. Additionally, earthquakes are mildly common in New Mexico, but most of them occur along the Rio Grande rift in the south-central area of the state, not near Cannon AFB (NMBGMR 2009).

3.4.3 Environmental Consequences

Protection of unique geological features, minimization of soil erosion, and siting of facilities in relation to potential geologic hazards are considered when evaluating potential effects of a proposed action on geological resources. Generally, adverse effects can be avoided or minimized if proper techniques, erosion-control measures, and structural engineering design are incorporated into project development.

Effects on geology and soils would be major and adverse if they would alter the lithology (i.e., the character of a rock formation), stratigraphy (i.e., the layering of sedimentary rocks), and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure, or function within the environment.

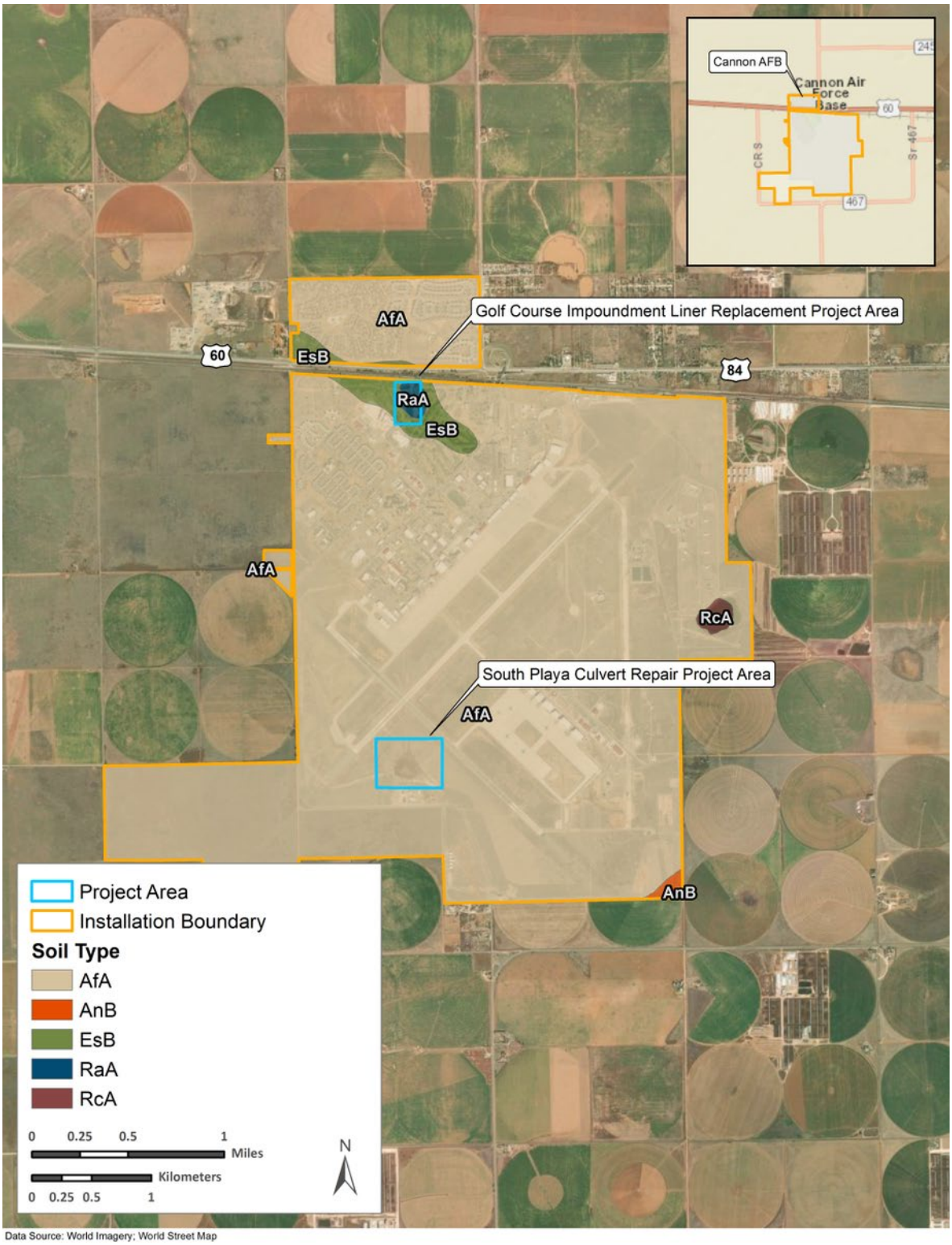

Figure 3-1. Soil Types Within the Project Area

3.4.3.1 Proposed Action

3.4.3.1.1 Replacement of the Golf Course Impoundment Liners

Regional Geology. No impacts on regional geology would be expected. No activities would alter lithology, stratigraphy, or the geological structures underlying the golf course impoundments.

Topography. Short-term, negligible, adverse impacts on topography would be expected from earthmoving and grading activities within the golf course impoundment project area. Potential regrowth prevention measures relating to vegetation circumventing the liner edges could include pouring concrete 5 feet out from the impoundment berm; however, this potential addition would not create significant impacts on topography as these concrete borders would be constructed flush with the surrounding topography. Additional BMPs for erosion control relating to construction operations could be applied, such as silt/filter socks and fences or wood chip berms.

Soils. Short-term, minor to moderate, adverse impacts on soils would result from the removal of all tree stumps and cut vegetation extending 10 feet from the edge of the impoundments. Although soils rely on internal structure and aggregates to maintain soil structure, root systems also play a large role in the structural stability of soil. Removal of vegetation and subsequent root structures would lead to short-term de-stabilization of the soils, and without revegetation, could lead to erosion problems surrounding the impoundments.

The use of heavy machinery for vegetation removal would also degrade the soil through soil compaction, potentially altering the soil structure. Such activities could harm soil health and increase the potential for erosion in these areas. Specific construction limitations and considerations regarding subsurface composition and soil rehabilitation would be incorporated into project design.

In general, accelerated erosion of soils would be temporary, during construction activities, and minimized by appropriately siting and designing infrastructure taking into consideration soil limitations, employing construction and stabilization techniques appropriate for the soil and climate, and implementing BMPs and erosion control measures. Potential BMPs could include the installation of silt fencing and sediment traps, application of water to disturbed soil to reduce dust, and revegetation of disturbed areas as soon as possible following ground disturbance, as appropriate. Preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) would be required to mitigate erosion during construction and maintenance.

Geologic Hazards. No geologic hazards would be expected from the Proposed Action.

3.4.3.1.2 Repair of the Six Culverts on the South Playa

Regional Geology. No impacts on regional geology would be expected. No activities would alter lithology, stratigraphy, or the geological structures within the areas of the six culverts on the South Playa.

Topography. Short-term, negligible, adverse impacts on topography would be expected from construction equipment and machinery repairing the existing culverts and bringing in materials. Once the culverts have been repaired, the areas around the culverts and culvert pipes would be backfilled with clean fill material to prevent further erosion and to reduce the likelihood of any void development due to piping or joint infiltration. These areas have eroded due to water flow and culvert failure; therefore, the topography in these areas would be slightly changed to support the new infrastructure.

Soils. Short-term, minor, adverse impacts on soils would result from the operation of construction equipment within the South Playa. This could lead to soil compaction and potential alteration of the soil structure, which could harm soil health and increase the potential for erosion in these areas. Specific construction limitations and considerations regarding subsurface composition and soil rehabilitation would be incorporated into project design.

As previously stated, accelerated erosion of soils during construction would be temporary. Impacts would be minimized by appropriately siting and designing facilities, taking into consideration soil limitations, employing construction and stabilization techniques appropriate for the soil and climate, and implementing BMPs and erosion control measures.

Geologic Hazards. Short and long-term, minor, adverse impacts could occur if piping or joint infiltration occurred after the installation of the new culverts. Piping is a process of subsurface erosion in which water runoff flows along the outside of a culvert and, with sufficient hydraulic gradient, erodes and carries away soil around or beneath the culvert. This process is referred to as piping since a hollow, similar to pipe-shaped, tube is often formed. Joint infiltration occurs when groundwater or surface water flows into the culvert through joints that are not sealed. The culvert backfill is brought into the culvert with the flow. Void development is a serious condition that can lead to dangerous settlement and sinkholes and such situations should be addressed immediately. Proactive construction measures would be taken to reduce the likelihood of piping, joint infiltration, and void development. These measures include, but are not limited to, mortar and polymer products to line and seal the culvert as well as structural support under and around the culvert where voids are likely to develop.

3.4.3.2 No Action Alternative

Under the No Acton Alternative, the proposed wastewater and stormwater infrastructure improvements would not be implemented, and the existing conditions discussed in **Section 3.4.2** would remain unchanged. No new impacts on geological resources would occur under the No Action Alternative.

3.5 WATER RESOURCES

3.5.1 Definition of the Resource

Water resources are natural and man-made sources of water that are available for use by, and for the benefit of, humans and the environment. Water resources relevant to Cannon AFB in New Mexico include groundwater, surface water, wetlands, and floodplains.

Groundwater. Groundwater is water that exists in the saturated zone beneath the Earth's surface that collects and flows through aquifers and is used for drinking, irrigation, and industrial purposes. Groundwater typically can be described in terms of depth from the surface, aquifer or well capacity, water quality, and recharge rates.

Surface Water and Wetlands. Surface water includes natural, modified, and man-made water confinement and conveyance features above groundwater that may or may not have a defined channel and discernable water flow. Stormwater is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade surface waters, such as lakes, rivers, or streams. The Energy Independence and Security Act Section 438 (42 USC § 17094) establishes into law stormwater design requirements for federal development projects that disturb a footprint of greater than 5,000 square feet. Under these requirements, pre-development site hydrology must be maintained or restored to the

maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow.

The Clean Water Act (CWA) establishes federal limits for regulating point and non-point discharges of pollutants into Waters of the United States (WOTUS) and quality standards for surface waters. WOTUS has a broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats (including wetlands and playas). EO 11990, *Protection of Wetlands*, requires federal agencies to determine whether a proposed action would occur within a wetland and to avoid new construction in wetlands wherever there is a practicable alternative. It is USAF policy to avoid construction within areas containing wetlands where possible per Air Force Manual 32-7003, *Environmental Conservation*, and EO 11990. A FONPA would need to be prepared for all projects impacting wetland areas.

Wetlands are considered jurisdictional WOTUS if they are deemed "navigable waters" as defined in the CWA as "the waters of the United States." Jurisdictional WOTUS determinations are vested with the United States Army Corps of Engineers (USACE). Under the CWA, the definition of WOTUS includes federal waterways and wetlands that are "relatively permanent, standing or continuously flowing bodies of water," and also have a "continuous surface connection to bodies of water that are 'waters of the United States' in their own right."

Floodplains. Floodplains are any land area that are susceptible to being inundated by floodwaters from any source (FEMA 2011). Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain as an area within which there is a 1 percent chance of inundation by a flood event in a given year, or a flood event in the area once every 100 years. Similarly, a 500-year flood is defined as flood levels that have a 0.2 percent chance of occurring in any given year. EO 11988, *Floodplain Management*, requires federal agencies to determine whether a proposed action would occur within a floodplain and to avoid floodplains to the maximum extent possible wherever there is a practicable alternative. EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, requires agencies to prepare for and protect federally funded buildings and projects from flood risks. More specifically, it requires agencies to determine specific federal building or project dimensions (i.e., how high, wide, and expansive a building or project should be) in order to manage and mitigate any current or potential flood risks. Additionally, Directive-type Memorandum 22-003, *Flood Hazard Area Management for Department of Defense Installations*, directs the Department of Defense (DoD) to avoid development within a flood hazard area to the maximum extent practicable. It is USAF policy to avoid construction within a floodplain, if possible, per AFMAN 32-7003 and EO 11988. A FONPA would need to be prepared for all projects impacting floodplain areas.

3.5.2 Affected Environment

Groundwater. Cannon AFB overlies the Curry County Groundwater Basin within the Southern High Plains Aquifer (Langman 2006). The Southern High Plains Aquifer underneath Cannon AFB is part of the larger High Plains Aquifer System commonly referred to as the Ogallala Aquifer. The Ogallala Aquifer is the principal aquifer system underlying the region and provides the primary source of water for public supply, irrigation, and industrial purposes (Rawling 2016). The Ogallala Aquifer is located approximately 270 feet bgs and covers an area of approximately 174,000 square miles, spanning eight states including South Dakota, Wyoming, Nebraska, Kansas, Colorado, Oklahoma, Texas, and New Mexico (Taghvaeian et al. 2017). Due to extensive withdrawals for agricultural and municipals uses, as well as high evaporation rates and minimal recharge through precipitation, the Ogallala Aquifer continues to experience significant declines

in water levels (Rawling 2016). The estimated recharge rate of the aquifer is less than 1 inch per year (Langman 2006, Hart and McAda 1985).

Regional groundwater flow direction of the Southern High Plains Aquifer is generally to the east and southeast (Langman 2006). Numerous cones of depression created by 50 years of groundwater pumping have modified and, in some cases, reversed groundwater flow gradients around heavily irrigated areas (Musharrafieh and Logan 1999).

Cannon AFB draws its water supply from the High Plains Aquifer underlying the installation via wells located on the installation (Cannon AFB 2018). Water depth in these production wells ranges between 380 and 420 feet bgs. Cannon AFB holds water rights to approximately 2,450 acre-feet of groundwater. The groundwater supply in the source aquifer is diminishing primarily because of drawdown from irrigated agriculture and municipal consumption. Groundwater in certain areas of the aquifer has high concentrations of calcium, magnesium, and bicarbonate, as well as fluoride and chloride (Hart and McAda 1985). The 2020 Drinking Water Quality Report shows acceptable levels of contaminants are present in drinking water (Cannon AFB 2021).

Surface Water and Wetlands. Surface waters at Cannon AFB are predominantly associated with playa wetland ecosystems. Fringe wetlands occur below the ordinary high-water marks along gently sloping areas bordering the North and South Playas. Playas lack a surface outlet, and any water they collect is ultimately lost through evaporation, infiltration, or absorbed by local flora and fauna (USAF 2017). Due to limited annual precipitation and high evaporation rates, minimal or no surface water extends beyond the installation's borders (USAF 2017).

No naturally occurring surface water bodies, significant drainage channels, perennial streams, or jurisdictional waters are found on the installation (Cannon AFB 2019). Water bodies and drainage systems within Cannon AFB are isolated and lack a connection to WOTUS, thus exempt from regulation under the CWA (USAF 2017). Nevertheless, the installation features various artificial water bodies, including several impoundments on the golf course and the North and South Playas (see **Figure 3-2**), which are periodically inundated (USAF 2017, Cannon AFB 2019). The North Playa, situated in the eastern portion of the installation, gathers stormwater runoff from the northeastern corner of the installation and a portion of the treated effluent from the WWTP. In contrast, the South Playa, located in the southwestern portion of the installation, is primarily sustained by surface water runoff from the impervious surfaces of the runways (Cannon AFB 2019, Cannon AFB 2018). Stormwater generally flows south and east across the installation. During precipitation events, significant amounts of surface water collect on the South Playa, forming temporary ponds. Because the Proposed Action occurs within three separate wetlands (see **Figure 3-2**), this EA will require a FONPA.

Floodplains. There are no FEMA floodplains officially designated on Cannon AFB; however, a 2009 drainage study for the installation (see **Figure 3-3**) identified potential flood-prone areas and proposed conceptual solutions to address flooding issues (FEMA 2023, HDR 2011). During heavy rain events, a substantial surface drainage flow originates from the northern portion of Cannon AFB, crossing the cantonment and flightline areas as it moves towards the southeast. This area of flow was recognized in the 2009 study as the proposed 100-year floodplain for Cannon AFB (Cannon AFB 2018). The golf course impoundment project area falls within this proposed 100-year floodplain. Additionally, the 2009 study identified a proposed 10-year floodplain. The South Playa project area falls within this proposed 10-year floodplain (see **Figure 3-3**). Because the Proposed Action would occur within a 10- and 100-year floodplain, this EA will require a FONPA.

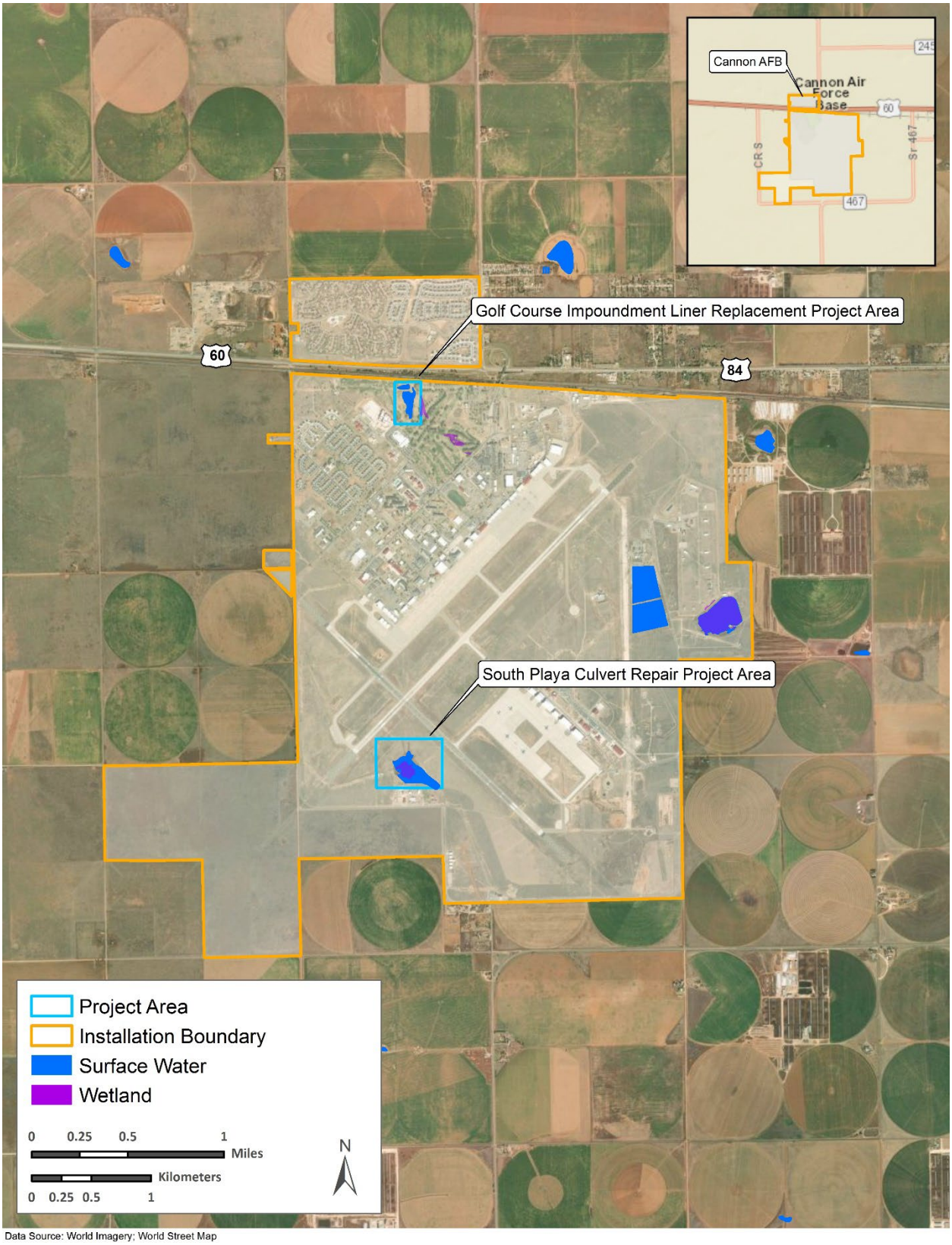

Figure 3-2. Surface Hydrology Overview for Cannon AFB

3.5.3 Environmental Consequences

3.5.3.1 Proposed Action

Groundwater. Short-term, minor, adverse impacts would be expected during construction due to ground disturbance from the use of heavy equipment. During construction, soil disturbances could lead to increased sediment transportation during rainfall events that could eventually enter groundwater through recharge points. Implementation of BMPs and planning during construction would minimize such impacts by controlling the movement of surface water runoff and ensuring no direct access to recharge points. BMPs could include using temporary barriers such as fiber logs or silt fences, which would be placed based on site-specific evaluations on an as-needed basis.

Vehicles and equipment used during construction could increase the potential for petroleum or hazardous material spills, typically due to leaks or accidents at the work site. Any such leaks or spills could be transported to groundwater either by surface water runoff or by soil leaching. Proper housekeeping, maintenance of equipment, and containment of fuels and other potentially hazardous materials would be implemented to minimize the potential for a release of fluids. With the implementation of BMPs and minimal groundwater recharge in the area, implementation of the Proposed Action would not be expected to result in a significant impact on groundwater.

There is a potential for long-term, minor to moderate, beneficial impacts to result from the implementation of the Proposed Action for the golf course impoundment liner replacement. With the current poor condition of the liners, it is possible that effluent from the WWTP that currently fills the impoundments could be seeping into the soil through the liners and thus contaminating the groundwater. With replacement of the liners, effluent would no longer be able to penetrate the liners and potentially contaminate the groundwater.

Surface Water and Wetlands. Short-term, minor to moderate, adverse impacts on surface waters and wetlands are anticipated during construction activities. Specifically, construction may result in the transportation of additional sediment and other materials into the golf course impoundments and South Playa. Additionally, stormwater has the potential to carry sediment and hazardous substances into drainage ditches, which in turn connect to various surface water bodies across the installation. However, implementation of standard stormwater protection BMPs and spill prevention and management plans, including a SWPPP and its related conditions, would reduce or eliminate any lasting detrimental effects on the quality of surface waters. Notably, the surface water bodies on Cannon AFB do not have connections to jurisdictional waters outside the installation. Therefore, the Proposed Action is not expected to have an impact on water bodies beyond the installation's boundaries.

Floodplains. Short-term, minor, adverse and beneficial impacts on the proposed 10- and 100-year floodplains would occur. Construction activities would directly increase obstructions within the floodplains resulting in short-term, minor, adverse impacts. However, completion of the proposed projects would improve stormwater flows into the South Playa resulting in long-term, minor, beneficial impacts. Implementation of appropriate BMPs during construction would limit short-term impacts, such as sediment and surface runoff. No impacts on FEMA floodplains would be expected as no FEMA floodplains have been officially designated on Cannon AFB.

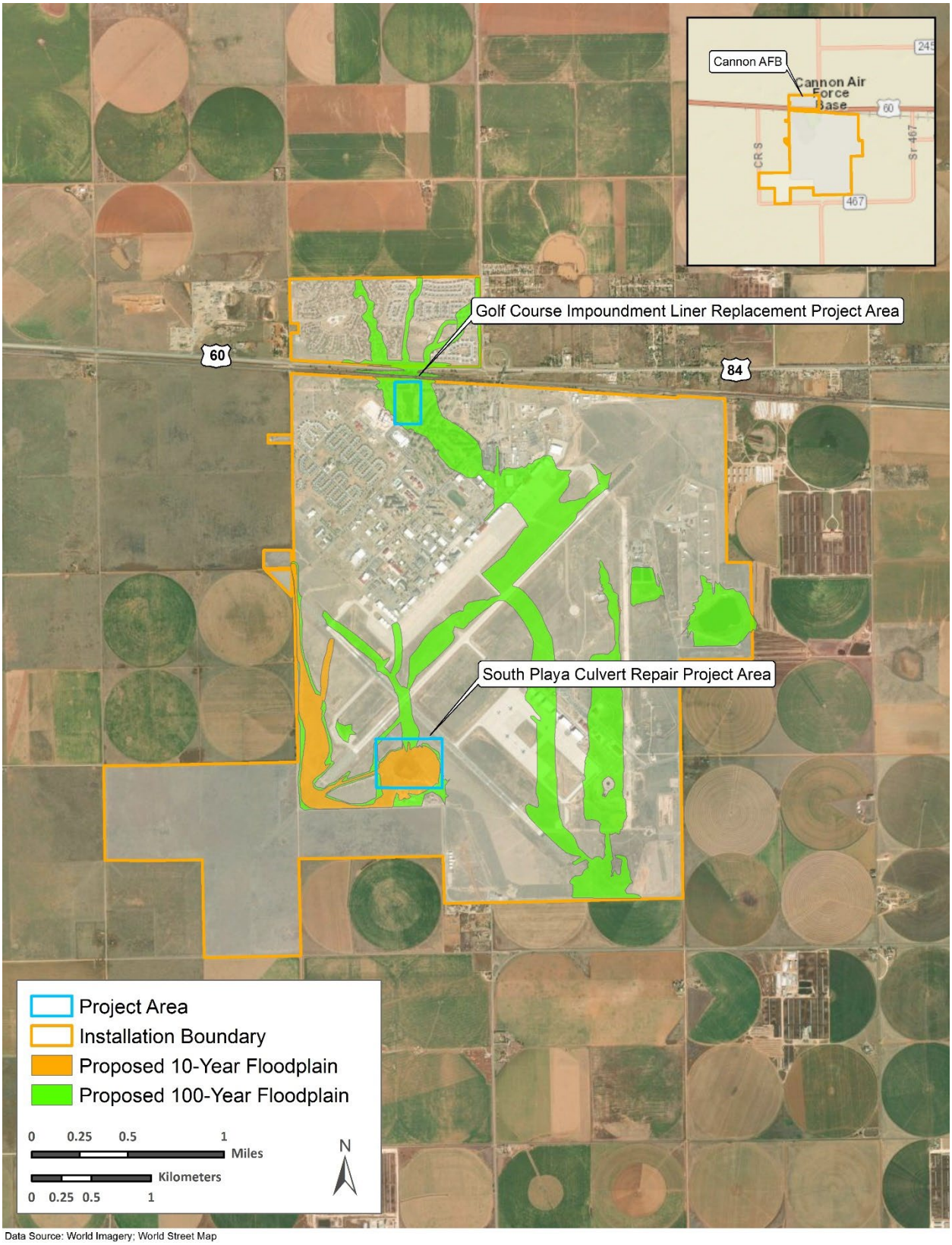

Figure 3-3. Floodplain Overview for Cannon AFB

3.5.3.2 No Action Alternative

Under the No Action Alternative, the proposed wastewater and stormwater infrastructure improvements would not be implemented, and the existing conditions discussed in **Section 3.5.2** would remain unchanged. The No Action Alternative has the potential to result in long-term, minor to moderate, adverse impacts on groundwater and floodplains. If the golf course impoundment liners are not replaced, the already poor condition of the liners would continue to deteriorate. It could be assumed that if there are no holes in the liner allowing for effluent to seep into the soil below the liner, holes could develop as the liners continue to deteriorate. This could directly result in contamination of groundwater in the project area. Additionally, if the culverts on the South Playa are not repaired and reengineered, stormwater flows would continue to adversely impact the South Playa. Therefore, implementation of the No Action Alternative would adversely impact water resources on Cannon AFB.

3.6 BIOLOGICAL RESOURCES

3.6.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats in which they occur, and native or introduced species found in landscaped or disturbed areas. Protected species are defined as those listed as threatened, endangered, proposed, or candidate for listing by the USFWS or New Mexico Department of Game and Fish (NMDGF). Federal species of concern and candidate species are not protected by the ESA; however, these species could become listed, and therefore are given consideration when addressing impacts on biological resources.

Section 7 of the ESA of 1973 requires all federal agencies to use their authorities to conserve endangered and threatened species in consultation with the USFWS. The ESA gives the Secretary of the Interior the responsibility of deciding whether a species' survival has been so jeopardized that it warrants conservation actions. Authority for administering the ESA has been delegated to the USFWS. Under the ESA, when a species is formally "listed" (i.e., added to the Federal List of Endangered and Threatened Wildlife and Plants) federal agencies are directed to use their legal authorities to carry out conservation programs to support continued survival of the species. The New Mexico Wildlife Conservation Act (17-2-40.1 New Mexico Statutes Annotated 1978) has similar provisions and covers species that are native to New Mexico.

Sensitive habitats include those areas designated by the USFWS as critical habitat under the ESA and sensitive ecological areas as designated by state or federal rulings. Sensitive habitats also include wetlands/playas, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer or winter habitats). Additionally, the USAF is responsible for the protection of migratory birds under the MBTA and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

3.6.2 Affected Environment

3.6.2.1 Ecoregion

Cannon AFB encompasses 3,789 acres in a rural area of Curry County, New Mexico, and is located within the High Plains Ecoregion. This ecoregion is higher and drier than the Central Great Plains to the east, and in contrast to the mostly grassland of the Northwestern Great Plains to the north, much of the High Plains is characterized by smooth to slightly irregular plains with a high percentage of cropland (USEPA 2013). Thousands of playas, ranging in size from a few acres to

over 200 acres, occur in this region and serve as recharge areas for the important Ogallala Aquifer. Playas are shallow lakes that collect water during rain events and often contain wetland or hydrophytic vegetation during wet seasons. Playas play an essential role in this region and are important waterfowl wintering grounds for the North American Central Flyway (TPWD 2023). Cannon AFB also falls within a sub-ecoregion of the High Plains known as the Llano Estacado or "Staked Plains." This name is believed to refer to the first European settlers who drove stakes into the ground to help guide them across the featureless region. These early pioneers found a vast carpet of short grasses that were home to enormous herds of buffalo (*Bison bison*) and pronghorn antelope (*Antilocapra americana*) (TPWD 2023).

Cannon AFB is located on a southeastward-sloping regional plateau known as the Southern High Plains. Within this area of the plateau, the topography is characterized by flat, featureless terrain having almost no relief. Characteristically, the High Plains have a smooth and gently sloping or undulating surface on which scattered, normally dry, flat-bottomed depressions are the dominant relief feature. The highest elevation on Cannon AFB is 4,330 feet above msl in the northwestern portion of the installation and the lowest point is 4,260 feet above msl in the southeastern portion. The natural land surface is flat, sloping to the southeast. The only topographical features are several small, shallow playas. The climate is arid to semiarid, with light precipitation, a high percentage of clear days, low relative humidity, and a relatively large change in diurnal temperatures (Karelus et al. 2021).

3.6.2.2 Vegetation

The High Plains Ecoregion has been described as a sea of waving grasslands. Classified as mixed plain and short-grass prairie, vegetation in this ecoregion varies and is highly dependent on location. The original character of the ecoregion has been forever changed by agriculture; however, some unique areas remain. Meager water sources along the Canadian and Red Rivers once sustained lush growths of tall willows (*Salix sp*.) and cottonwoods (*Populus sp*.). Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix sp*.), two introduced species from the Old World, now replace these native trees along the rivers, altering the natural habitat of kingbirds (*Tyrannus sp*.) and phoebes (*Sayornis sp*.). Grasses still provide cover and nesting habitats for a myriad of other birds, and belts of trees planted in the 1930s provide shelter to a large diversity of wildlife (TPWD 2023).

The northwest quadrant of Cannon AFB, which contains the flightline, installation operations, residential areas, and golf course, is predominantly covered by improved/landscaped habitat. Vegetation in these areas consists primarily of cultivated landscape plants. On the contrary, vegetation on the South Playa remains relatively untouched, allowing for native plants and tall grasses to grow mostly unimpeded. A walking survey for vegetation in and around the project areas was conducted in October 2023. **Table 3-4** presents all species observed during the survey. No federal- or state-listed threatened or endangered species or species of concern were observed.

Table 3-4. Vegetation Observed During October 2023 Walking Survey

Common Name	Scientific Name
Golf Course Impoundments Project Area	
Barnyard grass	*Echinochloa crus-pavonis*
Bermuda grass	*Cynodon dactylon*
Bindweed	*Convolvulus arvensis*
Blueweed	*Helianthus ciliaris*
Buffalo grass	*Buchloe dactyloides*

Common Name	Scientific Name
Chocolate daisy	*Berlandiera lyrata*
Common witchgrass	*Panicum capillare*
Curly dock	*Rumex crispus*
Dandelion	*Taraxicum officinale*
Fescue	*Fescue sp.*
Goathead	*Tribulus terrestris*
Green ash	*Fraxinus pennsylvanica*
Green pigweed	*Amaranthus hybridus*
Knotgrass	*Panicum distichum*
Kochia*	*Bassia scoparia*
Marsh spikerush	*Eleocharis palustris*
Musk thistle*	*Carduus nutans**
Plains bristlegrass	*Setaria leucopila*
Poison milkweed	*Asclepias subverticullata*
Purslane	*Portulaca oleracea*
Red stemmed filaree	*Erodium cicutarium*
Russian thistle*	*Salsola kali**
Siberian elm*	*Ulmus pumila**
Smartweed	*Persicaria lepathifolia*
Spiney-leaf sow thistle	*Sonchus asper*
Undifferentiated aster species	*Aster sp.*
Unidentified spurge	*Chamaesyce spp*
Vine mesquite	*Panicum obtusum*
Willow	*Salix sp.*
South Playa Project Area	
Alkali sacaton	*Sporobolus airoides*
Barnyard grass	*Echinochloa crus-pavonis*
Bermuda grass	*Cynodon dactylon*
Blue grama	*Bouteloua gracilis*
Blueweed	*Helianthus ciliaris*
Broom groundsel	*Senecio spartoides*
Broom snakeweed	*Gutierrezia sarothrae*
Buffalo grass	*Buchloe dactyloides*
Chocolate daisy	*Berlandiera lyrata*
Common sunflower	*Helianthus annuus*
Cooley’s bundleflower	*Desmanthus cooleyi*
Dotted gayfeather gaura	*Liatris punctata*
Englemann’s daisy	*Engelmannia peristenia*
Fall witchgrass	*Digitaria pubiflora*
Five eyes	*Chamaesaracha sp.*
Goathead	*Tribulus terrestris*
Green ash	*Fraxinus pennsylvanica*
Green pigweed	*Amaranthus hybridus*
Hall’s panicum	*Panicum halli var. halli*
Harry woollygrass	*Enioneuron pilosum*
Honey locust	*Gleditsia triacanthos*
Honey mesquite	*Prosopis glandulosa*
Hopi-tea	*Thelesperma megapotamicum*
Johnson grass*	*Sorghum halepense*
Kochia*	*Bassia scoparia*

Common Name	Scientific Name
Lambsquarters	*Chenopodium album*
Lizard-tail, velvet weed	*Oenothera curtiflora*
Many-flower scurf-pea, scurfy pea	*Psoralidium tenuiflorum*
Marsh spikerush	*Eleocharis palustris*
Milkvetch/locoweed sp.	*Astragalus sp.*
Milkweed	*Asclepias syriaca L.*
Narrowleaf four o'clock	*Mirabilis linearis*
Plains bristlegrass	*Setaria leucopila*
Plains zinnia	*Zinna grandiflora*
Poison milkweed	*Asclepias subverticullata*
Prairie coneflower	*Ratibida columnaris*
Prairie three-awn	*Aristida oligantha*
Purslane	*Portulaca oleracea*
Russian thistle*	*Salsola kali**
Sand dropseed	*Sporobolus cryptandrus*
Saw-leaf daisy	*Grindelia papposa*
Saw-tipped frogfruit	*Phyla cuneifolia*
Scapose bitterweed	*Tetraneuris scaposa*
Scarlet beeblossom	*Oenothera suffrutescens*
Scarlet globemallow	*Sphaeralcea coccinea*
Short-rayed coneflower	*Ratibida tagetes*
Siberian elm*	*Ulmus pumila**
Side oats grama	*Bouteloua curtipendula*
Silver bluestem	*Bouteloua laguroides*
Silverleaf nightshade	*Solanum elaeagnifolium*
Slender goldenweed	*Xanthisma gracile*
Smartweed	*Persicaria lepathifolia*
Soapweed yucca	*Yucca glauca*
Tahoka daisy	*Machaeranthera tanacetifolia*
Texas sleepy daisy	*Xanthisma texanum*
Thistle cholla	*Cylindropuntia davisii*
Tobosa	*Pleuraphis mutica (Hilaria mutica)*
Tourist plant, spectacle pod	*Dimorphocarpa wislizeni*
Tree cholla	*Cylindropuntia imbricata*
Tumble windmill grass	*Chloris verticillata*
Undifferentiated aster species	*Aster sp.*
Undifferentiated prickly-pear cactus species	*Opuntia sp.*
Unidentified blue flowered mint	*Salvia sp.*
Unidentified spurge	*Chamaesyce sp.*
Unidentified three-awn	*Aristida sp.*
Vine mesquite	*Panicum obtusum*
Western ragweed	*Ambrosia psilostachya*
White tridens	*Tridens albescens*
Wire lettuce, skeleton plant	*Stephanomeria pauciflora*
Witchgrass	*Panicum capillare*
Wooly paper flower	*Psilostrophe tagetinae*
Yellow bluestem/King Ranch bluestem*	*Bothriochloa ischaemum var. songarica*
Yellow sundrops	*Oenothera serrulata*
Yellowspine thistle	*Cirsium ochrocentrum*

1 Source: Dixon 2023
2 * Indicates an invasive species.

3.6.2.3 Wildlife Species and Habitat

While gray wolves (*Canis lupus*) and elk (*Cervus canadensis*) no longer occur in the High Plains Ecoregion, mountain lions (*Puma concolor*), coyotes (*Canis latrans*), red-tailed hawks (*Buteo jamaicensis*), and swift foxes (*Vulpes velox*) now crown the food chain. While greatly reduced, scattered populations of the lesser prairie-chicken (*Tympanuchus pallidicinctus*) can still be found across the region and flocks of lark buntings (*Calamospiza melanocorys*) and horned larks (*Eremophila alpestris*) can still be seen overhead (TPWD 2023).

Most of Cannon AFB is highly modified from its natural state. Despite this fact, the installation provides habitat to a variety of resident, transitory, and migrant wildlife species (Cannon AFB 2023c). Large animals are seldom present on Cannon AFB due to several factors, primarily a fence constructed around the installation to prevent unauthorized access. Large animals present a hazard if they wander onto the runways. Pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) have been photographed along the boundary fence and sometimes find their way onto the installation. Cannon AFB does not contain suitable mule deer habitat, but if they, or any other large animal, do wander onto the installation, they are removed to eliminate runway hazards (Cannon AFB 2023c).

3.6.2.3.1 Federally Listed Threatened and Endangered Species

According to the USFWS's Information for Planning and Consultation data, two federally listed endangered and proposed endangered species have the potential to occur on the installation, the lesser prairie-chicken and tricolored bat (*Perimyotis subflavus*), respectively (USFWS 2023a). Additionally, the monarch butterfly (*Danaus plexippus*), a candidate species under the ESA, has been observed on the installation (USFWS 2023a). It should be noted that candidate species have no legal protections under the ESA. However, to ensure no significant impacts, an updated species list from the USFWS would be required to be obtained within 90 days of starting any repair activities. Only one of these three species has been observed on Cannon AFB, the monarch butterfly (Dixon 2023).

The monarch butterfly is among the most easily recognizable of the butterfly species in North America. Their wings are a deep orange with black borders and veins, and white spots along the edges. Monarch butterflies are found across North America wherever suitable feeding, breeding, and overwintering habitat exists. Whether monarchs are present in a given area within their range depends on the time of year. They are one of the few migratory insects, traveling great distances between summer breeding habitat and winter habitat where they spend several months inactive. As caterpillars, monarchs feed exclusively on the leaves of milkweed. As adults, monarchs feed on nectar from a wide range of blooming native plants, including milkweed (NWF 2023). Milkweed is present on the South Playa and monarch butterflies have recently been observed in the area (Dixon 2023). Due to the lack of both milkweed and other suitable habitat, it is unlikely that the species would inhabit the golf course project area.

3.6.2.3.2 State Listed Threatened and Endangered Species

According to the NMDGF's Biota Information System of New Mexico data, four species listed as threatened or endangered have the potential to occur on the installation (BISON-M 2023). These species include the peregrine falcon (*Falco peregrinus*), least shrew (*Cryptotis parva*), gray-checkered whiptail (*Aspidoscelis tesselata*), and western ribbon snake (*Thamnophis proximus*). However, the results of biological surveys conducted from 2015 to 2016 on Cannon AFB did not document any of these species on the installation (Cannon AFB 2023c). Species listings are frequently reviewed and updated; however, continued surveying on the installation is a priority.

Similarly, the mobility of avian species could allow for incidental or migratory occurrences of listed species on the installation.

3.6.2.3.3 Critical Habitat

Critical habitats are those areas of land, air, and/or water that are essential for maintaining or restoring threatened or endangered plant or animal populations. Neither the NMDGF nor the USFWS has designated or identified any critical habitat on Cannon AFB. Although not considered critical habitat, surveys and literature indicate that important habitats on the installation include prairie dog towns, which provide nesting habitat for the Western burrowing owl (BUOW) (*Athene cunicularia)* (Pence et al. 2022).

3.6.2.3.4 Sensitive Species

Three New Mexico Species of Greatest Conservation Need (SGCN) are also known to be present on the installation, including the black-tailed prairie dog (BTPD) (*Cynomys ludovicianus*), BUOW, and plains leopard frog (*Lithobates blairi)*. Golden eagles (*Aquila chrysaetos*) (which are protected by the Bald and Golden Eagle Protection Act [BGEPA], MBTA, and Lacey Act) have also been observed on the installation (Cannon AFB 2023c).

Black-Tailed Prairie Dog. The BTPD is one of the most visible species and is present across much of the installation. Their abandoned burrows are used by BUOWs, cottontail rabbits, snakes, lizards, and other wildlife. BTPDs shape the landscape through the creation of communal habitats known as “prairie dog towns.” BTPD populations vary drastically from year to year with births, deaths, disease, and precipitation. These towns provide habitat for numerous other species through the creation of burrows and relatively vegetation free areas that are exploited by numerous other species. Killdeer (*Charadrius vociferus*) prefer the openness of these areas for nesting, rearing young, and obtaining food. BUOWs almost exclusively use abandoned burrows for nesting and brood rearing. Desert cottontails (*Sylvilagus audubonii*), plus numerous small mammals and reptiles, utilize the areas for their numerous abandoned burrows. Prairie dog towns attract predators such as the American badger (*Taxidea taxus*), coyote, gray fox (*Urocyon cinereoargenteus*), ferruginous hawk (*Buteo regalis*), and red-tailed hawk (Cannon AFB 2023c).

According to the *Western Burrowing Owl and Black-tailed Prairie Dog Assessment, Cannon Air Force Base and Melrose Air Force Range, New Mexico*, BTPD population estimates declined roughly 55 percent on Cannon AFB from 2021 to 2022. The decline of prairie dogs observed in this time span (332 to 149 individuals) is presumably a result of population control measures enacted by the Civil Engineering Squadron to maintain infrastructure integrity and mission safety as well as a lack of population supporting environmental factors. Known control measures implemented on Cannon AFB include deployment of bait containing Rozol and habitat manipulation discouraging the expansion of colonies. With BTPDs actively consuming vegetation and the establishment and expansion of their colonies, the current airfield management practice of shredding vegetation to a height no greater than 14 inches may facilitate increased occupancy by prairie dogs. Should this vegetation maintenance practice be continued, chemical and mechanical control methods should continue to be enacted as necessary to protect infrastructure and mission activities (Pence et al. 2022). There are no known prairie dog towns within either of the project areas (see **Figure 3-4**) (Cannon AFB 2023c).

Western BUOW. The BUOW is a small ground owl that is very closely associated with prairie dog colonies on the installation, as they use abandoned prairie dog burrows for nesting. The owls generally occur on Cannon AFB between March and October before migrating south, although a few birds may remain on the installation during mild winters. BUOWs are found within developed

areas where grasses are less dense. According to the *Western Burrowing Owl and Black-tailed Prairie Dog Assessment, Cannon Air Force Base and Melrose Air Force Range, New Mexico*, BUOW populations on Cannon AFB declined roughly 77 percent from 2021 to 2022 (48 to 11, respectively). This decline could be due to natural population fluctuations but are more likely an unintended result of prairie dog control measures or high-intensity disturbance incurred during infrastructure development. Five towns from 2021 were active in 2022, with the addition of Town 11 near the southwestern corner of the airfield (see **Figure 3-4**). BUOWs frequently exhibit annual site and burrow fidelity, so the potential return of owls that fledge from towns on Cannon AFB could occur if conditions on the installation become favorable for rearing young and could result in future increases in population counts and nesting attempts (Pence et al. 2022). Since no prairie dog towns are known to exist within either of the project areas, it is unlikely that BUOWs would inhabit either area (Cannon AFB 2023c). BUOW sightings have, however, been recorded near the South Playa (see **Figure 3-4**).

Plains Leopard Frog. The plains leopard frog is common in or near water in the Southern Great Plains of the United States, from eastern Colorado and New Mexico to northwestern Indiana, from southern South Dakota to Texas, and along the Mississippi River to Missouri. The species is found in a variety of aquatic habitats, including streams, reservoirs, ponds, marshes, wetlands, and irrigation ditches in prairie, former prairie, and desert grasslands. Plains leopard frogs are more tolerant of dry landscapes than other leopard frogs and occasionally travel short distances across land, especially after rain. Some individuals will migrate across upland and riparian habitat to new breeding areas. They are generally found within 3 miles of perennial water (NMDGF 2023). The plains leopard frog was not observed on Cannon AFB during the most recent 2015 to 2016 surveys. Due to the lack of suitable habitat, they would not be anticipated to inhabit the South Playa. The species could potentially inhabit the areas near the golf course impoundments; however, it would not be preferred habitat.

Golden Eagle. Golden eagles, along with bald eagles, are protected by three federal laws: the BGEPA, MBTA, and Lacey Act. These laws prohibit the possession, use, and sale of eagles or their feathers and parts. Several other activities, to include the transportation of eagles, feathers, and parts that have been illegally obtained, are also prohibited under these laws. The BGEPA has prohibited the take of bald eagles since 1940 and golden eagles since 1962. Take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. Such restrictions help to ensure the future viability of eagles in the wild (USFWS 2023b).

Since 2007, Cannon AFB has been conducting aerial surveys to determine the presence/absence of golden eagles and bald eagles (*Haliaeetus leucocephalus*) on the installation. These surveys allow comprehensive coverage and include potential feeding areas (e.g., carcasses). Surveys are conducted by flying a standardized grid pattern over the entire installation. The last aerial surveys were conducted in spring 2016 and fall 2016. During the spring 2016 survey, four detections of golden eagles were recorded. During the fall 2016 survey, two detections of two golden eagles and four additional observations that were likely one or more additional golden eagles were recorded (noted as “unknown large raptor” during flight; subsequent discussions post flight revealed unanimous agreement that these detections were likely golden eagles based on size) (Cannon AFB 2023c). Additionally, migratory bird surveys in 2020 and 2021 detected four golden eagle individuals on three different point count routes (Cannon AFB 2023c). In the fall of 2020, one golden eagle was observed on Cannon AFB defending its meal from three ferruginous hawks (Dixon 2023). There is a potential for this species to occur within the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.

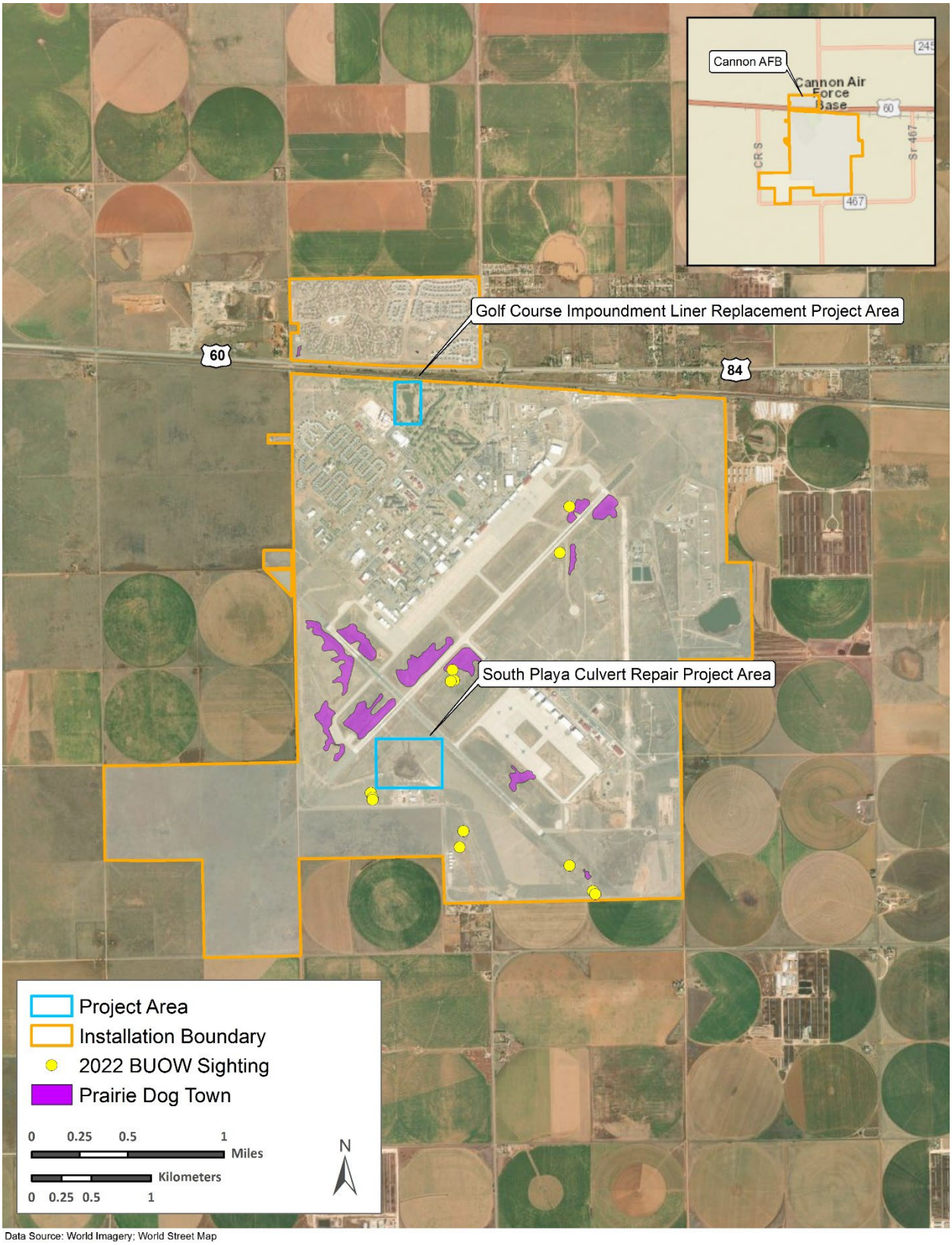

Figure 3-4. 2022 BUOW Sightings on Cannon AFB

Table 3-5 summarizes the species identified as federally and/or state listed as well as species of concern potentially occurring at Cannon AFB.

3.6.3 Environmental Consequences

3.6.3.1 Proposed Action

3.6.3.1.1 Vegetation

Short- and long-term, negligible to moderate, adverse impacts as well as potential long-term, negligible, beneficial impacts on vegetation. The removal of all tree stumps and cut vegetation extending 10 feet from the edge of the golf course impoundments would result in long-term, moderate, adverse impacts. This would include the removal of 0.72 acres of vegetation (see **Table 3-5** for species list). Due to the need to adhere to the requirements of DP-873 as well as the need to reduce the potential for future liner deterioration, these areas around the impoundments would not be replanted. Instead, regrowth prevention measures would be implemented.

Additionally, the potential clearing of vegetation in select areas of the South Playa to conduct repair activities would result in short-term, negligible to minor, adverse impacts. Long-term, negligible, beneficial impacts would result if these disturbed sites were replanted with native species supporting the native plant community on the installation.

Indirect effects from soil compaction and the potential for establishment of invasive species would also occur. Crushing and soil compaction would occur when vehicles and equipment access, park, and maneuver around the project areas during repair activities. Additionally, ground disturbance and transportation of equipment could increase the potential for the establishment of invasive plant species. Adverse impacts on vegetation would be minimized with the use of appropriate BMPs, such as cleaning equipment prior to entering the project areas. In accordance with EO 13112, *Invasive Species*, active measures would be implemented to help prevent and control dissemination of invasive plant species during ground-disturbing activities. Additionally, revegetation of disturbed sites with native vegetation would further reduce the establishment of invasive species.

3.6.3.1.2 Wildlife Species and Habitat

Short- and long-term, moderate, adverse impacts would occur due to the drainage of the North and South Impoundments. The impoundments currently provide habitat for large quantities of catfish, blue gill, bass fish, and possibly koi fish. Rough estimates show that there are at least 500 catfish alone in the impoundments. With the drainage of the impoundments, all fish would be removed and disposed of.

Temporary displacement of mobile wildlife from noise, lighting, and other disturbances would occur from repair activities. High-impact activities that require heavy equipment could cause more-mobile mammals, reptiles, and birds, including breeding migratory birds, to temporarily relocate to nearby similar habitat. This disturbance is expected to be minor, and it is assumed that displaced wildlife would return soon after activities concluded. However, in order to avoid nest abandonment and other adverse impacts, surveys would be conducted prior to the start of repair activities. If any active nests are found in the project area, they would be avoided until nesting is complete. Additionally, project activities would be scheduled to occur outside of the nesting season (1 March to 30 September) in order to reduce impacts on migratory birds. Impacts would be short-term and BMPs would be implemented whenever possible to minimize any adverse impacts.

Table 3-5. Federally Listed, State Listed, and Species of Concern at Cannon AFB

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
Mammals						
Black-tailed Prairie Dog (*Cynomys ludovicianus*)	-	-	X	Grassy plains and prairie ecosystem	Currently present on Cannon AFB.	This species is unlikely to occur within the project areas due to the lack of suitable habitat (consistent human activity on the golf course and consistent aircraft activity near the South Playa). See **Figure 3-4** for known prairie dog towns.
Least Shrew (*Cryptotis parvus*)	-	T	X	Dense ground cover in mesic habitats	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Tricolored Bat (*Perimyotis subflavus*)	PE	-	-	Landscapes that are partly open, with large trees and plentiful woodland edges; found in a variety of terrestrial habitats, including grasslands, old fields, suburban areas, orchards, urban areas and woodlands, especially hardwood woodlands	Not known to occur on Cannon AFB.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Birds						
Baird's Sparrow (*Centronyx bairdii*)	-	T	X	Migration and Winter: Desert to upland grasslands	Not observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Bald Eagle (*Haliaeetus leucocephalus*)	-	T	X	Nesting: Large trees near or along rivers and lakes Migration and Winter: Rivers, lakes, ponds, and reservoirs; sometimes wanders through plains and	Not observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
				grasslands searching for carrion and/or prairie dog towns, far from water		
Bank Swallow (*Riparia riparia*)	-	-	X	All Year: Areas of open water, mudflats, and sites containing extensive cover; breed in open country and savannas, especially near running water; usually found where insect prey is abundant and in association with dirt or sand banks where it digs its burrows	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Cassin's sparrow (*Peucaea cassinii*)	-	-	X	Nesting and Migration: shortgrass prairie with scattered shrubs, sometimes in shrublands with grassy openings. Territory composition: 20% to 35% bare ground, 40% to 80% shortgrass/mixed grass, >4% shrub cover	Observed on the installation during 2015–2016 surveys.	Due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Common Nighthawk (*Chordeiles minor*)	-	-	X	Nesting: Generally, uses and inhabits open or semi-open areas	Observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Eared Grebe (Podiceps nigricollis)	-	-	X	All year: Vegetated lakes at middle elevations; rest in waters where they feed; prefer undisturbed bodies of water during migration	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
Golden Eagle (*Aquila chrysaetos*)	-	-	-	Nesting: On cliffs near open habitats Migration and Winter: Cliffs and in large expanses of dry treeless grassland	Have been recently observed near the South Playa.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Least Tern (*Sternula antillarum*)	-	E	X	Nesting: River sand bars; islands, ponds, and/or lakes with gravel and/or sand bars, often surrounded by water Migration: Thought to use river corridors, but may travel across terrestrial terrain using other aquatic habitats (lakes, ponds, reservoirs) in-route to nesting area	Not observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Lesser Prairie-chicken (*Tympanuchus pallidicinctus*)	E	T	X	All Year: Arid natural grasslands with interspersed shrubs three feet tall or less; in New Mexico, the species is normally found with shinnery oak	Not observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Lewis's Woodpecker (*Melanerpes lewis*)	-	-	X	Migration and Winter: Vagrant to open country with scattered trees; in fall areas must have fruits/berries and in winter needs oaks with acorns	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Loggerhead Shrike (*Lanius ludovicianus*)	-	-	X	All Year: Open country with scattered brush and trees, with a mix of short (less than 4 inches) and tall grasses (greater than 8 inches)	Observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
Long-billed Curlew (*Numenius americanus*)	-	-	X	Nesting: Shortgrass and mixed grass prairie usually less than 12 inches and often less than 4 inches with a total ground cover of 50% to 95%; occasionally within wheat stubble (often within 0.25 miles of water) Migration: Similar to nesting habitat but also includes open fields and shores of freshwater lakes	Observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Mountain Plover (*Charadrius montanus*)	-	-	X	Nesting: Shortgrass prairie on flat and gently sloping topography with sparse vegetation cover (greater than 30% bare ground and very short grass [less than 2 inches]) Migration and Winter: Alkali flats, plowed or burned fields, fallow fields, sod farms, heavily grazed grassland	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Neotropic Cormorant (*Phalacrocorax brasilianus*)	-	T	X	Coasts, bays, lakes, rivers; very adaptable, may be found in almost any aquatic habitat, from rocky northern coasts to mangrove swamps to large reservoirs to small inland ponds; nests in trees near or over water, on sea cliffs, or on ground on islands	Not known to occur on Cannon AFB.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Peregrine Falcon (*Falco peregrinus*)	-	T	X	Nesting: High cliffs, bluffs, slopes, cutbanks, building	Not observed on the installation	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
				ledges with nearby abundant prey Migration and Winter: Areas with abundant prey	during 2015–2016 surveys.	
Piñon Jay (*Gymnorhinus cyanocephalus*)	-	-	X	Nesting: Grasslands with nearby tall, woody vegetation Migration: Areas of desert/rocky slopes, woodlands, and scrub habitat	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	-	-	X	All Year: Riparian woodlands, planted trees, anthropogenic structures; forage over grasslands and woodlands	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Sagebrush Sparrow (*Artemisiospiza nevadensis*)	-	-	X	All Year: Sagebrush grassland habitat at lower (2,800-5,500 feet) and middle (5,000-7,500 feet) elevations	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Snowy Plover (*Charadrius nivosus*)	-	-	X	Migration: Alkali flats, sandy shores, dried/wet mud flats, around lakes, reservoirs, ponds	Not observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas. However, due to the lack of suitable habitat, it is unlikely that the species would nest within the project areas.
Sprague's Pipit (*Anthus spragueii*)	-	-	X	Migration: Extensive grasslands that are dominated by medium height grasses; also, in shortgrass areas in fields grazed by cattle, and grassy shorelines	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Vesper Sparrow (*Pooecetes gramineus*)	-	-	X	Migration: Prefers open grassy fields, often in rather	Not observed on the installation	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
				dry situations with much open soil	during 2015–2016 surveys.	
Western Burrowing Owl (*Athene cunicularia*)	-	-	X	Nesting, Migration, Winter: Treeless areas with short vegetation (less than 4 inches tall) within and adjacent to prairie dog colonies; nests only in prairie dog, badger, fox burrows	Observed on the installation during 2015–2016 surveys.	This species was observed in a different area of the installation in the 2015–2016 surveys. This species is unlikely to occur within the project areas due to the lack of suitable habitat (consistent human activity on the golf course and consistent aircraft activity near the South Playa). See **Figure 3-4** for recent BUOW sightings.
Williamson's Sapsucker (*Sphyrapicus thyroideus*)	-	-	X	Nesting and Migration: Riparian areas adjacent to forested habitat	Not observed on the installation during 2015–2016 surveys.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Amphibians						
Plains Leopard Frog (*Lithobates blairi*)	-	-	X	Permanent and intermittent water sources and flooded prairie habitats	Not observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas.
Reptiles						
Gray-Checkered Whiptail (*Aspidoscelis tesselata*)	-	E	X	Rocky, semi-arid areas with sparse vegetation	Not known to occur on Cannon AFB.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Ornate Box Turtle (*Terrapene ornata ornata*)	-	-	X	Desert and Semi-desert grasslands	Observed on the installation during 2015–2016 surveys.	There is a potential for this species to occur in the project areas.
Fishes						
Beavertail Fairy Shrimp (*Thamnocephalus platyurus*)	-	-	X	Temporary wetlands such as rock pools, vernal pools, seasonal wetlands, alpine pools and alkali lakes.	Not known to occur on Cannon AFB.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.
Versatile Fairy Shrimp (*Branchinecta lindahli*)	-	-	X	Temporary wetlands such as rock pools, vernal pools,	Not known to occur on Cannon AFB.	Due to a lack of suitable habitat, this species is unlikely to occur within the project areas.

Species Name	Federal Status	State Status	SGCN	Habitat	Presence at Cannon AFB	Potential to Occur in Project Area
				seasonal wetlands, alpine pools and alkali lakes.		
Insects						
Monarch Butterfly (*Danaus plexippus*)	C	-	-	Milkweed and flowering plants are needed for monarch habitat; adult monarchs feed on the nectar of many flowers during breeding and migration, but they can only lay eggs on milkweed plants	Known to occur on Cannon AFB. Several habitats on the installation support diverse forb communities that are highly likely to provide resources for these pollinators.	There is a potential for this species to occur on the South Playa due to the presence of milkweed. No suitable habitat exists on the golf course.

Sources: BISON-M 2023, Cannon AFB 2023c, Karelus et al. 2021, USFWS 2023a
Key – T = Threatened, E = Endangered, C = Candidate, PE = Proposed Endangered

Individuals of smaller, less-mobile species could be inadvertently killed or injured during ground-disturbing activities or transportation of equipment and personnel. Burrowing animals, such as rodents and reptiles, could be impacted. However, vehicles associated with repair activities would be used primarily on established roads, which limits the potential for impacts on burrowing species.

Repair activities could result in a temporary increase in fugitive dust in the area, which can hinder plant growth and have an overall negative impact on wildlife foraging habitat. Dust suppressants or adhesive soil stabilizers, covering, landscaping, continuous wetting, detouring, barring access, or other acceptable means of reducing airborne dust would be implemented whenever possible to reduce or eliminate this impact. Additionally, chemical spills or leaks, including those of petroleum products or other hazardous materials used during construction, could kill or contaminate wildlife if leached into the soil and surface water sources. However, impacts on wildlife in the surrounding area or in adjacent open space areas are not anticipated. Any impacts on wildlife from the Proposed Action, such as impacts from chemical spills or lighting, would be restricted to the area immediately surrounding the project areas and would not extend into offsite habitat.

An increase in traffic in the general vicinity of the project areas during construction could result in an increase in animal-vehicle collisions. This would affect mainly small mammals (as larger mammals are not usually found in the installation for reasons previously stated) as well as avian species. The increase in traffic and associated animal-vehicle collisions is expected to be short-term and negligible.

Federally Listed Threatened and Endangered Species. No impacts on federally listed threatened or endangered species would be expected to occur from the Proposed Action as none have been identified within either of the project areas. However, short-term, adverse impacts to the monarch butterfly, a candidate species under the ESA, would be expected to occur as their presence is known within the South Playa. Cannon AFB would closely monitor the species status under the ESA and implement BMPs whenever possible. With the implementation of these BMPs, such impacts would be expected to be minor. Potential BMPs could include the following:

- Avoid conducting culvert repair activities during the period of the year when the South Playa is in use by monarchs (1 November through 1 April).
- Survey the project area for the presence of eggs and larvae before undertaking culvert repair activities.
- Establish protective buffers around areas identified as important for monarch breeding and nectar sources.
- Maintain a variety of disturbance states in monarch breeding habitat such that habitat structure (trees and shrubs for shade, and water), host plants (milkweed), and nectar plants are maintained across the installation.
- Include milkweed in revegetation planting/seed mix.

State Listed Threatened and Endangered Species. No impacts on state listed threatened or endangered species would be expected to occur from the Proposed Action as none have been identified within either of the project areas.

Critical Habitat. No impacts on any critical habitat would be expected to occur from the Proposed Action as none has been identified on the installation.

Sensitive Species. There is the potential for the Proposed Action to result in short-term, negligible to minor, adverse impacts on the sensitive species of concern listed above in **Section 3.6.1.3.4**. The noise and increased human activity on the South Playa from repair activities could directly impact nearby BUOWs and cause temporary, minor degradation of their habitat. To help mitigate these impacts on BUOWs, Cannon AFB would implement the following BMPs whenever possible:

- Conduct BUOW surveys during the breeding season, and if found, implement one of the following mitigation measures (1) seasonal avoidance measures until owls have vacated the affected burrows (i.e., repair activities to not occur during the breeding season of 1 March to 1 August), (2) spatial buffers of at least 0.25 miles from repair activities, or (3) relocation activities using USFWS-recommended relocators.
- Have a biological monitor onsite during repair activities to observe the owls' response and ensure their safety.
- Add traffic signage for speeding.

Additionally, impoundment drainage for the liner replacement could have short-term, minor, adverse impacts on potential plains leopard frog habitat. To help mitigate these impacts, Cannon AFB would implement the following BMPs whenever possible: (1) conduct surveys prior to any repair activities taking place and (2) have a biological monitor onsite during such activities.

The Proposed Action has the potential to result in short-term, negligible, adverse impacts on avian species of concern including the golden eagle. While there is a potential for this species to occur within the project areas, due to the lack of suitable nesting habitat it is unlikely that the species would nest in these areas. To mitigate any impacts on these sensitive species, an updated species list from the USFWS would be required to be obtained within 90 days of starting any repair activities.

3.6.3.2 No Action Alternative

Under the No Acton Alternative, the proposed wastewater and stormwater infrastructure improvements would not be implemented, and the existing conditions discussed in **Section 3.6.2** would remain unchanged. No new impacts on biological resources would occur under the No Action Alternative.

3.7 CULTURAL RESOURCES

3.7.1 Definition of the Resource

Cultural resources are any prehistoric or historic remains or indicators of past human activities, including artifacts, sites, structures, landscapes, and objects of importance to a culture or community for scientific or traditionally important reasons. Inventories of the following resources are maintained by the installation:

- Archaeological sites
- Buildings and structures
- Traditional cultural properties and sacred sites
- Cultural landscapes

Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., projectile points and bottles), but standing structures do not remain. Architectural resources include standing buildings, bridges, dams, other structures, and designed landscapes of historic or aesthetic significance. Resources of traditional, religious, and cultural importance can include archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitat, plants, animals, or minerals considered essential for the preservation of traditional culture.

The National Register of Historic Places (NRHP) defines historic properties as buildings, structures, sites, districts, or objects listed in or eligible for listing in the NRHP. Historic properties are generally 50 years of age or older, are historically significant, and retain sufficient integrity to convey their historic significance. Such resources might provide insight into the cultural practices of previous civilizations, or they might retain cultural and religious significance to modern groups. Resources less than 50 years of age may be eligible for NRHP listing if they meet NRHP criteria and are exceptionally significant. Cultural resources listed as National Historic Landmarks are historic properties of exceptional national significance.

Cultural resources management includes compliance with applicable historic preservation laws and regulations. Federal laws that pertain to cultural resources management include the NHPA (1966), the Archeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). Under Section 110 of the NHPA, federal agencies are required to locate, inventory, and nominate to the NRHP, all resources eligible for inclusion in the NRHP under their jurisdiction. The ICRMP for Cannon AFB and Melrose Air Force Range is the guidance document for cultural resources for planning and proposed activities at Cannon AFB (Cannon AFB 2022).

Under Section 106 of the NHPA, federal agencies must consider the effect of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Under this process, the federal agency evaluates the NRHP eligibility of resources within the proposed undertaking's APE and assesses the possible effects of the proposed undertaking on historic properties in consultation with the SHPO and other consulting or interested parties, including the public.

The APE is defined as the geographic area or areas within which an undertaking (project) may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The APE for the Proposed Action is defined as the combined project areas of the two golf course impoundments and the six stormwater outfall culverts.

3.7.2 Affected Environment

Cannon AFB is a 4,362-acre installation that consists of a developed landscape with operations buildings, housing areas, flightline, and recreational areas. The installation is on the western edge of the Southern High Plains of the Llano Estacado, an expansive mesa stretching from eastern New Mexico to the middle of the Texas Panhandle. The landscape bears rich cultural resources spanning over 12,000 years. Archaeologists typically organize the archaeological record of the Llano Estacado into five major periods:

- Paleo-Indian: 10,000–5500 BC
- Archaic: 5500 BC–AD 900

- Ceramic: AD 600–1540
- Protohistoric: 1540–1650
- Historic 1650–present

An overview of the prehistory and history of Cannon AFB, as well as a list of recorded resources and previous cultural resource investigations, is provided in the 2022 ICRMP for Cannon AFB and Melrose Air Force Range.

A review was conducted of the New Mexico Cultural Resources Inventory System database as well as Cannon AFB records to identify all historic properties within the APE. According to the ICRMP, all of Cannon AFB has been surveyed for cultural resources. Archaeological investigations on the installation were completed in 1981, 1988, 1994, 2012, 2014, 2015, 2016, 2017, 2018, and 2022. These investigations have documented four archaeological sites on Cannon AFB. These include one prehistoric lithic artifact scatter, one historic homestead, and two historic artifact scatters. Of these, two sites have been determined not eligible for listing in the NRHP and two sites have been determined eligible for NRHP-listing under Criterion D. None of the recorded sites are within the vicinity of the APE.

Architectural inventories of Cannon AFB were completed in 1996, 1997, 1999, 2004, 2005, 2006, 2021 and 2022. Cultural resources investigations documented 58 architectural resources, including buildings and structures, on Cannon AFB. Twenty-four of these were associated with World War II aviation activities and the remaining resources are associated with the Cold War era. Fifteen built resources have been recommended eligible for listing in the NRHP, including 13 buildings and a flagpole recommended eligible under Criterion C for their association with World War II military activities from 1942 to 1946 and one Prisoners of War Monument erected in 1972 (Cannon AFB 2023d). None of these recorded architectural resources are within the APE.

Consultations to comply with Section 106 of the NHPA are currently underway. Seven federally recognized American Indian Tribes have historical connections with the southern plains of eastern New Mexico and the Texas Panhandle and may consider themselves affiliated with lands controlled, used, or overflown by Cannon AFB. Previous consultations with the tribes have not identified any traditional cultural properties or cultural landscapes within the APE. Cannon AFB will continue to consult with the tribes regarding their concerns about properties of traditional cultural and religious importance that may be present.

[[Preparer's note: Section 106 of the NHPA consultations are currently ongoing and this section will be updated in subsequent versions as those consultations are completed.]]

3.7.3 Environmental Consequences

3.7.3.1 Proposed Action

The proposed projects at the two golf course impoundments and six culverts are anticipated to have no impacts on cultural resources. Project components would occur in previously disturbed areas where the existing impoundments and culverts would be renovated and repaired. Significant new ground disturbance is not anticipated. Under the ICRMP guidelines, archaeological surveys should be conducted every 10 years to account for the current understanding of archaeology in the region and environmental changes that may alter or uncover new archaeological sites. Although areas of the APE have not been surveyed in the last 10 years,

no archaeological sites are within the APE and the probability of encountering archaeological deposits is low based on the nature of the Proposed Action.

Should accidental or unanticipated discoveries of archaeological resources occur during project activities, the standard operating procedures for inadvertent discoveries outlined in the installation's ICRMP would be implemented to minimize damage to these resources. USAF or contractor personnel that make or become aware of a potential archaeological discovery on installation lands should immediately cease all potentially damaging activities and notify the installation's cultural resources manager.

[[Preparer's note: Section 106 of the NHPA consultations are currently ongoing and this section will be updated in subsequent versions as those consultations are completed.]]

3.7.3.2 No Action Alternative

Under the No Action Alternative, the impoundment liners would not be replaced, and the six culverts would not be repaired, and the existing conditions discussed in **Section 3.7.2** would remain unchanged. The No Action Alternative would have no impact on cultural resources.

3.8 INFRASTRUCTURE

3.8.1 Definition of the Resource

Infrastructure encompasses the fundamental systems that provide water, sewer, and electrical and heating/cooling capability, as well as roads, parking, paths, and land. Most infrastructure maintenance is supervised by the 27 Special Operations Mission Support Group and local private utility systems with whom Cannon AFB has partnered.

Infrastructure consists of the manmade systems and physical structures that enable a population in a specified area to function. Infrastructure components at Cannon AFB include transportation, utilities, and solid waste management. Transportation includes major and minor roadways that feed into the installation and the security gates, roadways, parking areas, and pedestrian networks on the installation. Utilities include electrical supply, liquid fuel supply, natural gas supply, water supply, sanitary sewer and wastewater systems, stormwater drainage, communications systems, and solid waste management.

3.8.2 Affected Environment

Transportation. There are approximately 70 miles of paved roads and 0.5 miles of unpaved roads at Cannon AFB. In the 2016 Installation Development Plan (IDP), deteriorated primary pavement was noted and identified as requiring future remediation at the following locations: Aderholt Loop, Chindit Boulevard, Eagle Claw Boulevard, Ingram Boulevard, Liberator Avenue, and several Munitions Storage Area pavements. There are currently two gated entrances to Cannon AFB. Vehicles enter and exit the installation through the Main and Portales Gates. The Main Gate is immediately south of US Highway 60/84 and connects the off-installation housing area and the US Highway 60/84 traffic to the installation. The Portales Gate is on the south side of the installation and is the designated commercial gate and performs commercial/contractor access vehicle inspections (Cannon AFB 2016).

Electrical System. Electrical power is provided to Cannon AFB by a local utility. A 115-kilovolt (kV) transmission circuit is energized by substations east and south of the installation. At capacity, 56 megawatts (MW) of electricity can be supplied to Cannon AFB. Peak electrical energy demand

averages 12.5 MW and occurs during the summer (Cannon AFB 2016). The Proposed Action is not anticipated to result in any changes to the installation's electrical system. Therefore, the electrical system is not discussed further.

Natural Gas System. Natural gas is supplied to Cannon AFB through the Public Service of New Mexico transmission/distribution pipeline system. There is a network of natural gas lines, comprised of 1- to 6-inch polyethylene pipes, on the western side of the flightline. Natural gas is delivered to the installation's master meter at an approximately 55 to 60 pounds per square inch. There are three natural gas storage facilities located on the installation. The current daily average demand at Cannon AFB is 44.4 million cubic feet (mcf). Most of the annual natural gas demand is consumed in January, with the peak demand of 10,800 mcf. The annual average demand is 16,000 mcf. The capacity provided by the Public Service of New Mexico is unknown; however, they are generally able to provide the required demand. Distribution mains follow the installation roadway network (Cannon AFB 2016). The Proposed Action is not anticipated to result in any changes to the installation's natural gas system. Therefore, the natural gas system is not discussed further.

Petroleum, Oils, and Lubricants/Liquid Fuel Systems. Liquid fuel is procured by DLA-Energy and delivered to the installation by commercial tank truck. Liquid fuels at Cannon AFB are primarily used to power military aircraft and ground-based vehicles. Liquid fuels are stored at the fuel storage complex, which is located on the north side of the installation. The fuel storage complex includes two Jet A Aviation (JAA) fuel tanks, one motor gasoline tank, one bio-diesel tank, one ethanol gasoline tank, and one ultra-low-sulfur diesel tank. A 6-inch JAA pipeline physically exists between the city of Clovis and Cannon AFB, but it has not been used since the mid-1990s and it is no longer in serviceable condition (Cannon AFB 2016). The Proposed Action is not anticipated to result in any changes to the installation's petroleum, oils, and lubricants (POL) or liquid fuel systems, and equipment and construction vehicles would not utilize the installation's fuel supply. Therefore, the liquid fuel system is not discussed further.

Water Supply System. Cannon AFB is independent from outside water sources. Water is supplied via seven potable water wells on the installation. The wells draw water from the Ogallala Aquifer, which provides the groundwater supply to the surrounding South Plains region. Average current demand is 571,600 gallons per day (gpd) with the peak demand being 1,671,000 gpd (Cannon AFB 2016). The Proposed Action is not anticipated to result in any changes to the installation's water supply system. Therefore, the water supply system is not discussed further.

Wastewater System/Collection System. The wastewater treatment and collection system at Cannon AFB is comprised of 13 lift stations, 14 septic tank systems, 584 sewer manholes, and 57.59 miles of collection pipeline. Domestic and industrial wastewater is discharged to an on-installation WWTP through a gravity sewer system. Up to 7,500 gpd of domestic wastewater is authorized to be discharged to septic systems and holding tanks. The WWTP has an average daily flow of 165,000 gallons per day with a peak flow of 1.13 million gallons per day. Reclaimed water from the WWTP is regulated by DP-873 and discharged into the North Playa and the golf course impoundments (Cannon AFB 2016).

Stormwater Discharge/Collection System. Stormwater runoff on Cannon AFB is controlled by a drainage system. Surface runoff is directed to a network of culverts, storm sewers, and ditches. Stormwater runoff generated on the installation primarily drains to the south and southwest and collects at the South Playa, where it is allowed to infiltrate and evaporate via natural processes. Developed areas on the installation have underground storm drainage piping with associated catch basins, drain inlets, manholes, and similar drainage appurtenances. Surface runoff from the

flightline is conveyed through storm sewers on the southwestern and northeastern portions of the installation and enters natural stormwater watercourses (Cannon AFB 2016).

The Master Draining Study, conducted in 2009, noted the flooding issues that Cannon AFB experiences during intense rainfall events. The following recommendations were made in the report pertaining to stormwater infrastructure at Cannon AFB (PBS&J 2009):

- Evaluate problematic stormwater sub-basins and collection of data to prepare stormwater drainage system model.
- Model the stormwater drainage system to identify those areas requiring maintenance, upgrade, or replacement.
- Develop an inventory and operations and maintenance plan for stormwater pumps.

Heating/Cooling Distribution Systems. There are no centralized heating and cooling systems in place at Cannon AFB. Facilities are served by localized heating/cooling systems. There is an Energy Management Control System; however, not all facilities are compatible with this system and rely instead on localized control systems (Cannon AFB 2016). The Proposed Action is not anticipated to result in any changes to the installation's heating and cooling systems. Therefore, the heating/cooling distribution systems is not discussed further.

Communications System. The communication network at Cannon AFB consists of telephone, unclassified network, classified network, and defense messaging systems. There are diverse paths for critical voice and data circuits in place. A wireless/wired network is in place at all dormitories (Cannon AFB 2016). The Proposed Action is not anticipated to result in any changes to the installation's communication systems. Therefore, the communication system is not discussed further.

Solid Waste Management. Reducing waste streams minimizes environmental compliance requirements, disposal and transportation costs, and long-term liabilities. Solid wastes can be solid, semi-solid, liquid, or a contained gas. Nonhazardous solid wastes include household solid waste, construction and demolition debris, inert sludge, worn out materials, discarded products, and manufacturing byproducts. Nonhazardous solid waste is collected by a contractor and transported to the Clovis Regional Landfill (Cannon AFB 2017b). Hazardous wastes are discussed in **Section 3.9.**

3.8.3 Environmental Consequences

3.8.3.1 Proposed Action

Transportation. Short-term, negligible, adverse impacts on the transportation system would occur. Construction activities associated with the Proposed Action would be expected to result in intermittent, short-term, negligible, adverse impacts on area roadways from a temporary increase in the number of construction-related vehicles accessing the installation. However, early coordination with Cannon AFB organizations would ensure necessary safety precautions are taken and would allow ample advance notice to affected commuters and personnel. If any intermittent road closures are required for construction activities, closures and potential installation-wide traffic changes would be communicated to installation staff via electronic signs, bulletins, and memos. Additionally, construction-related traffic would be timed to not occur during peak travel periods. Typical construction-related traffic would include delivery trucks, haul trucks, and passenger vehicles.

Wastewater System/Collection System. Short-term, minor, adverse impacts on the wastewater system/collection system would occur. Replacement of the golf course impoundment liners would require the WWTP to temporarily send effluent to other impoundments on the installation, resulting in negligible to minor, adverse impacts on the system. However, these impacts would be expected to be short-term, as the WWTP would resume sending effluent to the golf course impoundments after repairs are completed.

Stormwater Discharge/Collection System. Short-term, minor, adverse, and long-term, minor to moderate, beneficial impacts on the stormwater discharge/collection system would occur. Repair of the six culverts on the South Playa would have short-term, minor, adverse impacts on the system during repairs as flow would need to be diverted temporarily. Additionally, construction activities could result in adverse impacts on stormwater handling by disruption of the natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading.

Long-term, minor to moderate, beneficial impacts on the system would occur by mitigating potential future damages that could occur as a result of the continued erosion, specifically further expansion of the South Playa and deterioration of surrounding utilities. With implementation of BMPs in accordance with the installation's Sustainable Landscape Development Plan, disturbed areas on the South Playa would be revegetated reducing adverse impacts.

Solid Waste Management. Short- and long-term, negligible, adverse impacts on solid waste management would occur. Construction activities would generate negligible amounts of solid waste, primarily recyclable and reusable building materials (e.g., concrete, metals). Waste disposal would be conducted in accordance with all federal, state, and local laws and regulations. To reduce the amount of waste disposed of at the landfill, materials that could be recycled or reused would be diverted from landfills to the greatest extent possible. The weights of all materials diverted for recycling or reuse would be reported to the Cannon AFB Quality Recycling Program to be credited toward the DoD-mandated construction and demolition diversion rate of 60 percent. Currently, Cannon AFB has a construction debris diversion rate of 92 percent (Cannon AFB 2016).

Nonhazardous construction waste that is not recyclable or reusable would be disposed of at an offsite permitted landfill facility which would have a long-term, negligible, adverse impact on solid waste management. Whenever possible, clean construction debris (e.g., concrete, asphalt) would be reused for fill and road work, rather than disposed of in a landfill. The Proposed Action would negligibly increase the overall amount of solid waste generated at Cannon AFB and would not significantly alter the existing waste streams managed by the installation.

3.8.3.2 No Action Alternative

Under the No Acton Alternative, the proposed wastewater and stormwater infrastructure improvements would not be implemented, and the existing conditions discussed in **Section 3.8.2** would remain unchanged. The already poor condition of the six culverts on the South Playa would continue to deteriorate, further weakening the installation's stormwater discharge/collection system resulting in a long-term, moderate, adverse impact. Without repair to the six culverts, severe erosion on the South Playa would continue, resulting in further expansion of the South Playa and deterioration of surrounding utilities.

3.9 HAZARDOUS MATERIALS AND WASTES AND OTHER CONTAMINANTS

3.9.1 Definition of the Resource

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Hazardous materials, as defined by 49 CFR § 171.8, are hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR § 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR Part 173. Petroleum products include crude oil or any derivative thereof, such as gasoline, diesel, or propane. They are considered hazardous materials because they present health hazards to users in the event of incidental releases or extended exposure to their vapors. Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) at 42 USC § 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating, reversible illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." Certain types of common hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and the standards for managing them are established in 40 CFR Part 273. Wastes covered under the universal waste standards include batteries, pesticides, mercury-containing equipment, lamps, and aerosol cans.

Evaluation of hazardous materials, petroleum products, and hazardous wastes focuses on the storage, transportation, handling, and use of hazardous materials and petroleum products, as well as the generation, storage, transportation, handling, and disposal of hazardous wastes. In addition to being a threat to humans, the improper release or storage of hazardous materials, hazardous wastes, and petroleum products can threaten the health and well-being of wildlife species, habitats, soil systems, and water resources.

Toxic Substances. Toxic substances are substances that might pose a risk to human health and are addressed separately from hazardous materials and hazardous wastes. Toxic substances include asbestos-containing materials (ACMs), lead-based paint (LBP), and polychlorinated biphenyls (PCBs), all of which are typically found in buildings and utilities infrastructure.

Asbestos is regulated by the USEPA under the Clean Air Act; Toxic Substances Control Act; and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The USEPA has established that any material containing more than 1 percent asbestos by weight is considered an ACM. The USEPA has implemented several bans on various ACMs between 1973 and 1990, so ACMs are most likely found in older buildings (i.e., constructed before 1990). LBP was commonly used prior to its ban in 1978; therefore, buildings constructed prior to 1978 may contain LBP. PCBs are man-made chemicals that persist in the environment and were widely used in building materials (e.g., caulk) and electrical products prior to 1979. Structures constructed prior to 1979 potentially include PCB-containing building materials.

PFAS. The DoD has identified certain PFAS as emerging contaminants of concern that have affected USAF installations. PFAS are a class of synthetic compounds that possess a chemical structure that gives them unique properties, including thermal stability and the ability to repel both water and oil. This class of chemicals was developed in the 1940s and includes the chemicals perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid, and perfluorohexane sulfonate. AFFF-containing PFAS was

developed in the early 1960s and used at airports, municipal fire stations, petroleum facilities, and in other industries in the United States to extinguish hydrocarbon-based fires effectively. Firefighters at military installations regularly used AFFF in emergencies or were trained with AFFF in an unconfined manner. The USAF began using PFAS in 1970. As awareness of PFAS-related health risks has increased, USAF has limited the use of PFAS at its installations and continues to investigate and mitigate PFAS-related environmental impacts under CERCLA.

Environmental Restoration Program. CERCLA governs response or cleanup actions to address releases of hazardous substances, pollutants, and contaminants into the environment. Congress formally established the Defense Environmental Restoration Program in 1986 to provide for the cleanup of DoD property at active installations, Base Realignment and Closure installations, and formerly used defense sites throughout the United States and its territories. The two significant restoration programs under the Defense Environmental Restoration Program are the Installation Restoration Program (IRP) and Military Munitions Response Program (MMRP). The IRP addresses contaminated sites, while the MMRP addresses nonoperational military ranges and other sites suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituents. Each site at Cannon AFB is investigated under RCRA, and appropriate remedial actions are taken, under the supervision of applicable federal and state regulatory programs. When no further remedial action is necessary for a given site, the site is closed, and it no longer represents a threat to human health.

3.9.2 Affected Environment

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Contractors proposing to use hazardous materials on the installation are required to coordinate with the 27th Special Operations Civil Engineer Squadron (SOCES)/Civil Engineering Installation Environmental (CEIE) Hazardous Materials Program Manager. Hazardous materials and petroleum products are used throughout Cannon AFB for various functions and include petroleum, oil, and lubricants (POL); solvents; pesticides and herbicides; paints and thinners; antifreeze; deicing compounds; and acids. All pesticides, including herbicides, used at Cannon AFB must be on the DoD Approved Pesticides List or approved by the Installation Pest Management Consultant. All USAF pest management personnel who apply or supervise the application of pesticides at Cannon AFB must comply with the installations Integrated Pest Management Plan (IPMP) and be DoD certified within 2 years of employment. Additionally, DoD-certified pest management personnel monitor all contractor pesticide applications and chemical utilization is reported. Pesticide use is conducted in strict accordance with the manufacturer's label and applied by certified personnel (Cannon AFB 2023e).

The Cannon AFB Spill Prevention and Response (SPR) Plan documents storage locations of POL and provides inspection, testing, and maintenance procedures for proper handling. Additionally, to minimize adverse impacts, the plan outlines procedures for reporting and responding to a spill (Cannon AFB 2017a).

The 27 SOCES/CEIE is responsible for implementing the hazardous waste management program at Cannon AFB through waste characterization; establishing collection sites; receiving and processing hazardous waste for turn-in; reporting, tracking logs, and manifesting; regulatory interface; recordkeeping; and hosting and conducting inspections (Cannon AFB 2021). The installation's Hazardous Waste Management Plan (HWMP) establishes procedures to comply with applicable federal, state, and local standards for solid waste and hazardous waste management. Cannon AFB is a large-quantity generator of hazardous waste (USEPA ID #NM7572124454). No hazardous materials, petroleum products, or hazardous wastes are stored or generated within the project areas.

Toxic Substances. There are no structures within the project areas. Therefore, toxic substances are not discussed further.

PFAS. AFFF use at Cannon AFB began in 1970. It was used for on-installation fire training exercises and suppressing aircraft and other fires. The USAF began phasing out AFFF containing PFAS in August 2016. The phase out of AFFF containing PFAS at Cannon AFB was completed in August 2018 (AFCEC 2021). Through investigations pursuant to CERCLA, the USAF has identified 10 potential AFFF release areas on Cannon AFB for the potential presence of PFAS in the soil and/or groundwater. Two of the potential AFFF release areas are within the footprint of the Proposed Action – AFFF Area 7 at the South Playa and AFFF Area 8 at the as golf course impoundments (see **Figure 3-5** and **Figure 3-6**) (AFCEC 2023). These PFAS sites are described below:

- AFFF Area 7, South Playa Lake Outfall, serves as the installation's primary stormwater collection pond and has received stormwater runoff from portions of the flightline area since 1943. Solvents, fuels, oils, greases, and AFFF are potential contaminants that could have been discharged from the flightline area. Additionally, documented releases of AFFF in the hangars resulted in AFFF entering storm drains with liquid subsequently being routed to South Playa Lake. Media evaluated at AFFF Area 7 during the Site Inspection (SI) included surface and subsurface soil. Nine soil samples were collected for PFAS analysis during the SI. At AFFF Area 7, PFOS and PFOA were detected in soil at concentrations below screening levels. PFBS was not detected in surface or subsurface soil (AFCEC 2023, AFCEC 2018a). AFFF Area 8, Whispering Winds Golf Course Outfall, began receiving a portion of treated effluent from the WWTP to fill the North and South Impoundments and irrigate the greens in approximately 2002. The golf course is irrigated 5 nights a week for approximately 4 hours per night using a sprinkler system. Therefore, any wastewater collected at the WWTP containing AFFF has the potential to be released at the golf course. Media evaluated at AFFF Area 8 during the SI included sediment and surface water. Three sediment samples and two surface water samples were collected for PFAS analysis during the SI. At AFFF Area 8, PFOS was detected in sediment and surface water at concentrations below screening levels and PFOA and PFBS were not detected in either sediment or surface water (AFCEC 2023, AFCEC 2018a).

Environmental Restoration Program. The 2018 NMED RCRA Permit for Cannon AFB lists 38 active IRP sites that include known and suspected soil and groundwater contamination associated with POL storage areas, oil/water separators, drainage areas, septic systems, fire training areas, and spill areas. Of these, 14 are in "deferred" status, which means these sites are deferred from full investigation or remediation until the sites are no longer in use and can be investigated and remediated as applicable. Two IRP sites are within the footprint of the Proposed Action, and they are described as follows:

- The South Impoundment at the golf course is listed as SD013 (Solid Waste Management Unit [SWMU] 75), which was closed as corrective action complete (CAC) without controls in January 2015 (see **Figure 3-5**). The chemicals of concern at SD013 included purgeable aromatics, halocarbons, oil and grease, and metals. The IRP Phase II Stage 1 Study noted that no chemicals of concern were detected, and it was determined that there are no unacceptable risks to human health or the environment. Therefore, no further action was necessary and SD013 was closed as CAC without controls (USACE 1990, NMED 2018).

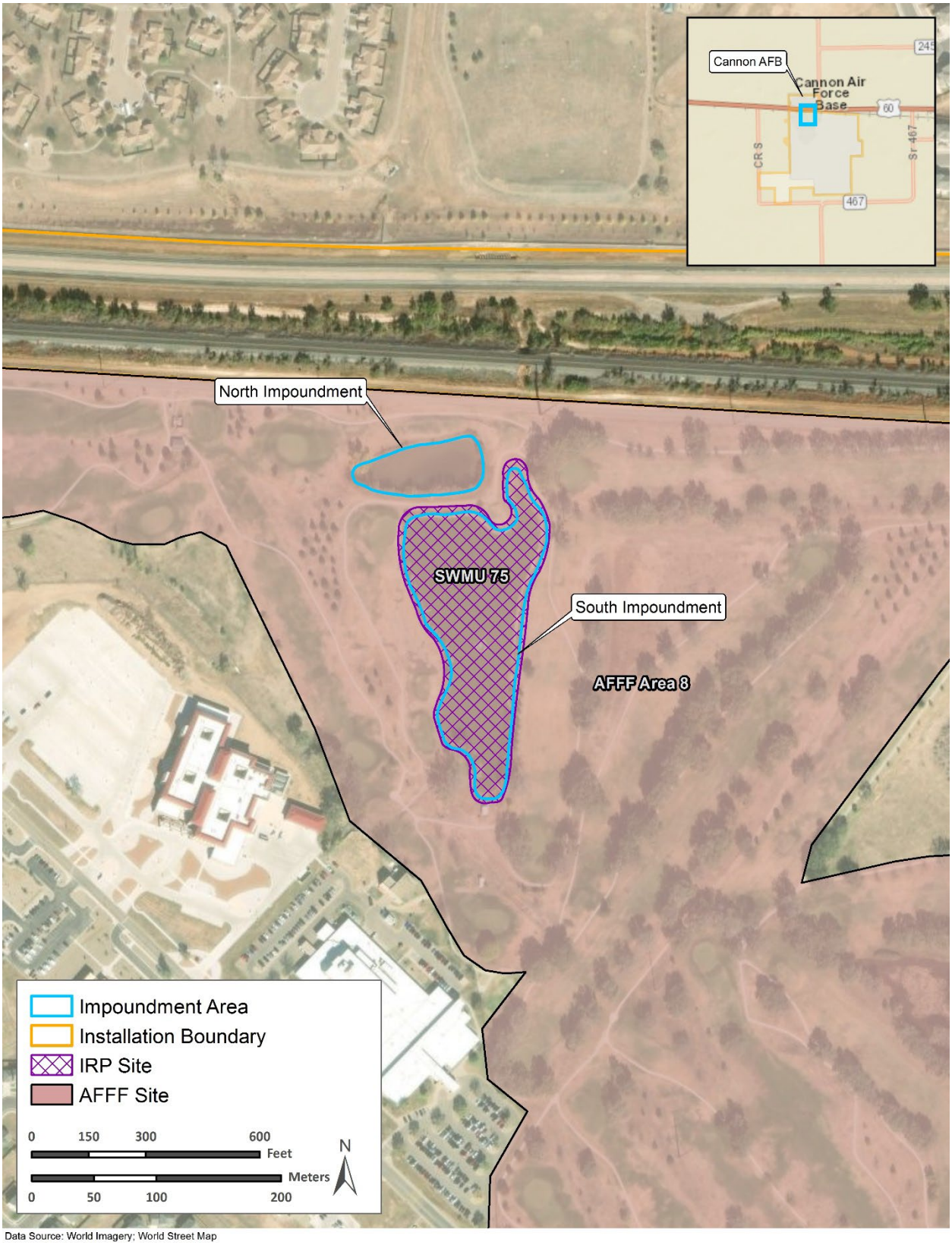

Figure 3-5. PFAS and IRP Sites within and adjacent to the Golf Course Impoundment Area

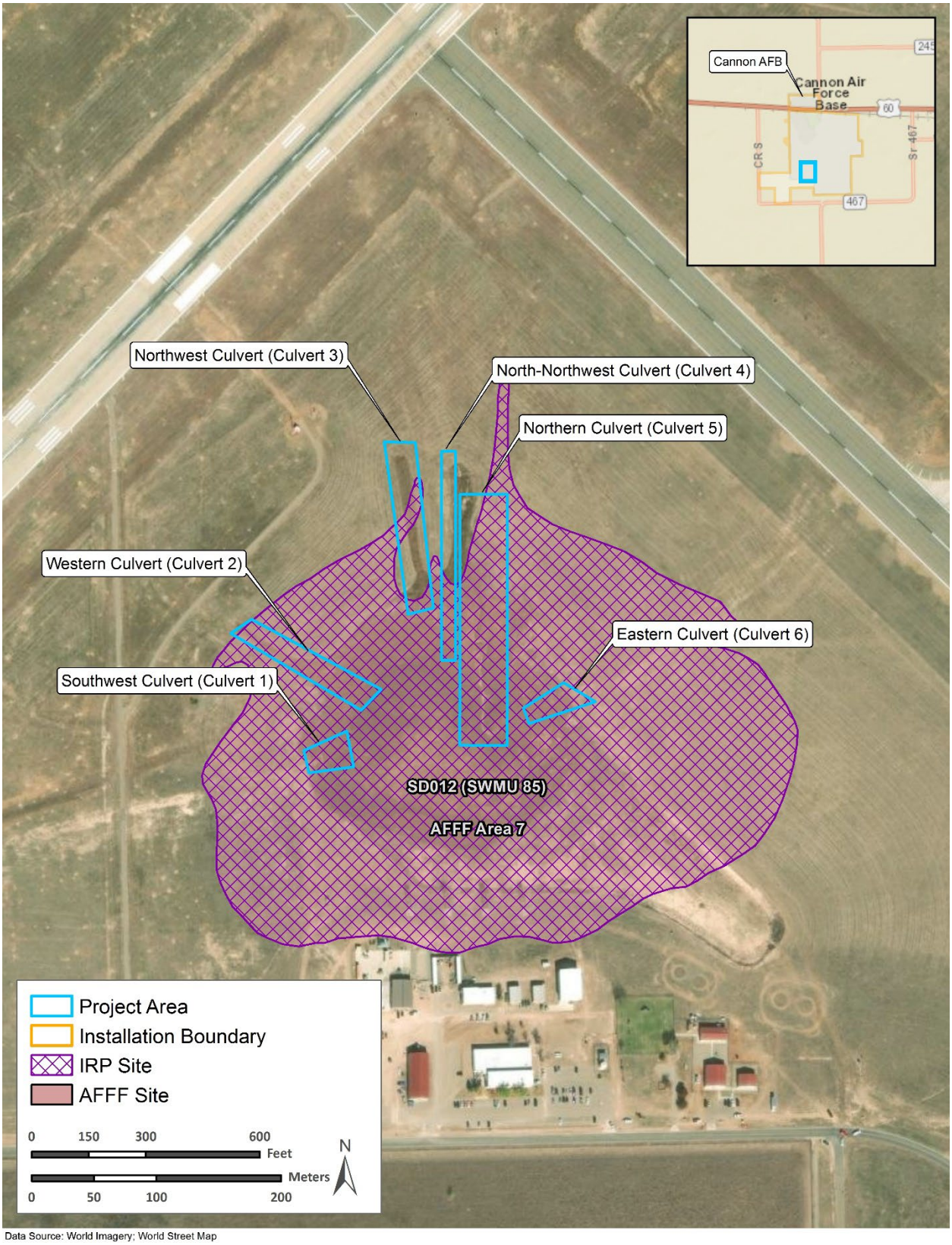

Figure 3-6. PFAS and IRP Sites within and adjacent to the South Playa Project Area

- The South Playa is listed as SD012 (SWMU 85), which was closed as CAC with controls status in January 2015 (see **Figure 3-6**) (NMED 2018). The chemical of concern at SD012 was arsenic. The RCRA Field Investigation noted that no chemicals of concern were detected above screening levels, and it was determined that there are no unacceptable risks to human health or the environment. Therefore, no further action was necessary and SD012 was closed as CAC without controls (AFCEC 2017, NMED 2018).

Table 3-6 presents the status of the IRP and PFAS sites that occur within or adjacent to the project areas.

Table 3-6. Status of IRP and PFAS Sites within or Adjacent to the Project Areas

IRP/PFAS Site No.	Site Title	Site Status	Site Status Date
Golf Course Impoundments			
SD013 (SWMU 75)	Sanitary Sewage Lift Station Overflow Pit	CAC without controls	January 2015
AFFF Area 8	Whispering Winds Golf Course Outfall	PFAS area of interest	Identified in October 2015 PA
South Playa			
SD012 (SWMU 85)	Stormwater Collection Point	CAC with controls Cannon AFB recommended CAC without controls	January 2015 September 2017
AFFF Area 7	South Playa Lake Outfall	PFAS area of interest	Identified in October 2015 PA

Source: AFCEC 2023, AFCEC 2018a, NMED 2018, AFCEC 2017

Because of the closed status of SD013 (SWMU 75) and SD012 (SWMU 85), no impacts on or from these IRP sites are expected. Therefore, these IRP sites are not discussed further in this EA. No monitoring wells are present within the project areas. Additionally, there are no active MMRP sites on Cannon AFB. Therefore, MMRP is not discussed further in this EA (AFCEC 2018b).

3.9.3 Environmental Consequences

3.9.3.1 Proposed Action

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Short- and long-term, negligible to minor, adverse impacts would occur from the use of hazardous materials and petroleum products and the generation of hazardous wastes during construction and maintenance of the project areas. Hazardous materials that could be used include concrete, solvents, pesticides and herbicides, preservatives, and sealants. Petroleum products such as hydraulic fluid, oils, lubricants, diesel, and gasoline would be used in vehicles and equipment supporting construction. Implementation of BMPs and environmental protection measures would reduce the potential for an accidental release of these materials. All construction equipment would be maintained according to manufacturer's specifications, and drip mats would be placed under parked equipment as needed. Additionally, all hazardous materials; petroleum products; pesticides; and hazardous, universal, and petroleum wastes used or generated during construction and maintenance would be contained, stored, and managed in accordance with the

installation's HWMP; SPR Plan; and federal, state, and local regulations[2] to minimize the potential for releases (e.g., secondary containment, inspections, spill kits).

As stated in **Section 2.3.1.1**, before sediment is removed from the project areas, the sediment would be sampled and tested for PFAS and hazardous waste characteristics. All material would then be removed and disposed of in accordance with UFGS 02 41 00 and 01 57 19 and all federal, state, and local regulations. Appropriate measures would be taken to reduce the potential for exposure and release of the sediment or soil and contractors would wear appropriate personal protective equipment (PPE) and adhere to the installation's HWMP and all federal, state, and local regulations.

Maintenance of the project areas could include the use of pesticides and herbicides. All pesticides and herbicides used would be on the DoD Approved Pesticides List or approved by the Installation Pest Management Consultant. Application of pesticides and herbicides would be conducted by certified applicators, either contractor or Cannon AFB personnel, in accordance with the installation's IPMP and all federal, state, and local regulations. Should a pesticide spill occur, the applicator would clean up the spill in accordance with the installations SPR Plan. If applied by a contractor, DoD-certified pest management personnel would monitor all applications and chemical utilization would be reported. The contractor would dispose of excess pesticides, pesticide containers, pesticide residue, pesticide rinse water, or any pesticide contaminated article according to federal, state, and local regulations at an authorized off-installation disposal area.

Should unknown, potentially hazardous wastes be discovered or unearthed during construction, contractors would immediately cease work, contact appropriate installation personnel, and await sampling and analysis results before taking further action. Any unknown wastes determined to be hazardous would be managed and disposed of in accordance with applicable laws and regulations.

PFAS. Short-term, negligible to minor, adverse impacts could occur from the potential to encounter PFAS in AFFF Areas 7 and 8. As stated in **Section 2.3.1.1**, before sediment is removed from the project areas, the sediment would be sampled and tested for PFAS and hazardous waste characteristics. All material would then be removed and disposed of in accordance with UFGS 02 41 00 and 01 57 19 and all federal, state, and local regulations. Appropriate measures would be taken to reduce the potential for exposure and release of the sediment and contractors would wear appropriate PPE and adhere to the installation's HWMP and all applicable federal, state, and local regulations. Additionally, construction contractors would coordinate all ground-disturbing activities in the project areas with the installation's restoration personnel and implement all recommended guidelines.

3.9.3.2 No Action Alternative

Under the No Action Alternative, the significantly damaged golf course impoundment liners would not be replaced and would continue to be in violation of DP-873. Additionally, the six culverts on the South Playa would not be repaired, and the culverts would continue to deteriorate, worsening the already significant erosion. Hazardous material and waste conditions would remain as described in **Section 3.9.2**. The potentially contaminated sediment would not be disturbed. Long-

[2] Construction contractors would be subject to applicable federal, state, and local laws and regulations pertaining to hazardous materials and wastes and other contaminants, as well as installation-specific protocols and procedures. These requirements would be written into contracts in accordance with the Cannon AFB HWMP.

term, negligible to minor, adverse impacts on hazardous materials and wastes and other contaminants would be expected to occur from the continued deterioration of the pond liner under the No Action Alternative.

3.10 SAFETY

3.10.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety address workers' and public health and safety during and following construction, demolition, and training activities.

Site safety requires adherence to regulatory requirements imposed for the benefit of employees and the public. Site safety includes implementation of engineering and administrative practices that aim to reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by numerous DoD and military branch-specific requirements designed to comply with standards issued by federal OSHA, USEPA, and state occupational safety and health (OSH) agencies. These standards specify health and safety requirements, the amount and type of training required for workers, the use of PPE, administrative controls, engineering controls, and permissible exposure limits for workplace stressors.

Health and safety hazards can often be identified and reduced or eliminated before an activity begins. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself, together with the exposed (and possibly susceptible) population or public. The degree of exposure depends primarily on the proximity of the hazard to the population. Hazards include transportation, maintenance, and repair activities, and the creation of a noisy environment. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

3.10.2 Affected Environment

Contractor Safety. All contractors performing construction activities would be responsible for adhering to federal, state, and local regulations and conducting activities in a manner that does not increase health and safety risks to workers or the public. Additionally, contractors would be required to submit a Safety Plan detailing how safety requirements would be implemented prior to beginning work.

New Mexico is one of several states that administer their own OSH program according to the provision of the federal OSH Act of 1970, which permits a state to administer its own OSH program if it meets all federal requirements regarding the program's structure and operations. The New Mexico Occupational Health and Safety Bureau has the responsibility of enforcing OSH regulations within the state. Its jurisdiction includes all private and public entities such as city, county, and state government employees. Federal employees are excluded as they are covered by federal OSHA regulations.

OSH programs address the health and safety of people at work. OSH regulations cover potential exposure to a wide range of chemical, physical, and biological hazards, and ergonomic stressors. The regulations are designed to control these hazards by eliminating exposure to the hazards via administrative or engineering controls, substitution, or use of PPE. Occupational health and safety are the responsibility of each employer, as applicable. Employer responsibilities are to review potentially hazardous workplace conditions; monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous substances), physical (e.g., noise propagation, falls), and

biological (e.g., infectious waste, wildlife, poisonous plants) agents, and ergonomic stressors; recommend and evaluate controls (e.g., prevention, administrative, engineering, PPE to ensure exposure to personnel is eliminated or adequately controlled; and ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to the use of respiratory protection or engaged in hazardous waste, asbestos, lead, or other work requiring medical monitoring.

The nearest facility that offers emergency services and inpatient care for the general public, to include construction contractor personnel, is the Presbyterian Plains Regional Medical Center in Clovis, New Mexico. Plains Regional Medical Center also offers primary care, specialty care, and a same day care clinic (PHS 2023).

Military Personnel Safety. Each branch of the military has its own policies and regulations that act to protect its workers, despite their work location. AFI 91-202, *The US Air Force Mishap Prevention Program,* "establishes mishap prevention program requirements, assigns responsibilities for program elements, and contains program management information." To meet the goals of minimizing loss of USAF resources and protecting military personnel, mishap prevention programs should address groups at increased risk for mishaps, injury of illness; a process for tracking incidents; funding for safety programs; metrics for measuring performance; safety goals; and methods to identify safety BMPs.

The USAF host and tenant safety offices are responsible for implementing AFI 91-202. The Wing Safety Office implements mishap prevention programs and processes for all 27 SOW programs on Cannon AFB. Safety staff at all levels assist with implementation and integration of operational risk management in all USAF operations and missions. Detailed standard operating procedures fulfill many health and safety requirements, and personnel involved with different test equipment are instructed on the proper use of equipment and PPE. Surface danger zones are delineated for all small arms and explosives ranges to protect personnel operating inside and outside those ranges while they are active.

Cannon AFB has its own emergency services department which provides the installation with fire suppression, crash response, rescue, emergency medical response, hazardous substance protection, and emergency response planning and community health and safety education. The nearest medical facility for military personnel is the installation's Medical Clinic, which is operated by the 27 Special Operations Medical Group. The Cannon AFB Medical Clinic takes daily appointments and offers immunizations and general medical care (27 SOMDG 2023).

Public Safety. The Clovis Fire Department provides fire suppression, technical rescue, hazardous materials spill/release mitigation, emergency medical services, life safety and enforcement services and emergency preparedness for the citizens of Clovis. The fire department has 73 well-trained and highly skilled professional firefighters, fire engineers, fire officers, community risk personnel, and administrative professionals. Together, they provide emergency services to over 123,665 residents within 26 square miles (City of Clovis 2022a). The city of Clovis Police Department has approximately 105 police officers available to provide law enforcement services (City of Clovis 2022b).

3.10.3 Environmental Consequences

3.10.3.1 Proposed Action

Contractor Safety. Short-term, negligible to minor, adverse impacts on the health and safety of construction personnel could occur because of the slight increase in risk to personnel within the

project areas. The selected construction contractor would be required to develop a comprehensive health and safety plan detailing all potential hazards and site-specific guidance to ensure potential safety risks are minimized. The plan would include, at a minimum, emergency response and evacuation procedures; operating manuals; PPE recommendations; potential mitigation measures considered by Cannon AFB; procedures for handling, storing, and disposing of hazardous materials and wastes and other contaminants; information on the effects and symptoms of potential exposures; and guidance with respect to hazard identification. Contractor personnel would be responsible for compliance with applicable federal, state, and local safety regulations and would be educated though daily safety briefings to review upcoming work activities and associated hazards. If necessary, only certified contractors would perform remediation of hazardous substances. Remediation contractors would wear appropriate PPE at all times and adhere to all federal, state, and local regulations.

Military Personnel Safety. Short-term, negligible, adverse impacts on the health and safety of military personnel that work near the project areas could occur. Construction activities would comply with applicable safety requirements and installation-specific protocols and procedures, including appropriately marking potentially hazardous areas and posting warning signs and barriers to limit access to approved construction and oversight personnel only.

Public Safety. Short-term, negligible, adverse impacts on the health and safety of the public would occur. Replacement of the golf course impoundment liners would occur on Whispering Winds Golf Course. During repair activities, construction areas would be appropriately delineated and posted with access limited to construction and site personnel only. Therefore, the risk to public safety would be negligible. Culvert repair activities would occur on the South Playa, an area of the installation where there is no potential for members of the public. Therefore, no adverse impacts on public safety would be expected. Construction activities would comply with applicable safety requirements and installation-specific protocols and procedures, to include appropriately marking potentially hazardous areas and posting warning signs and barriers to limit access to approved construction and oversight personnel only.

3.10.3.2 No Action Alternative

Under the No Action Alternative, the proposed wastewater and stormwater infrastructure improvements would not be implemented, and the existing conditions discussed in **Section 3.10.2** would remain unchanged. No new impacts on safety would occur under the No Action Alternative.

3.11 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The relationship between short-term uses and enhancement of long-term productivity from implementation of the Proposed Action is evaluated from the standpoint of short-term effects and long-term effects. Short-term effects would be those associated with replacement of the two golf course impoundment liners and the repair of the six stormwater outfall culverts on the South Playa. The long-term effects would be those associated with the maintenance of new infrastructure and implementation of the Proposed Action.

The Proposed Action represents an enhancement of long-term productivity and enhanced capability for mission success at Cannon AFB. The negative effects of short-term impacts from replacement and repair activities would be minor compared to the long-term positive impacts by enabling the AFSOC mission at Cannon AFB to continue to grow and evolve as warfare grows more technologically advanced and specialized.

3.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the impacts that the use of these resources would have on future generations. Irreversible impacts primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). The irreversible and irretrievable commitments of resources that would result from implementation of the Proposed Action involve the consumption of material resources used for construction, energy resources, biological resources, and human labor resources. The use of these resources is considered to be permanent.

Material Resources. Material resources used for the Proposed Action would potentially include construction materials, concrete and asphalt, and various construction materials and supplies. Materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

Energy Resources. Energy resources, including petroleum-based products (e.g., gasoline and diesel), used for the Proposed Action would be irretrievably lost. During construction and maintenance activities, gasoline and diesel would be used for the operation of vehicles and construction equipment. However, consumption of these energy resources would not place a significant demand on their availability in the region. Therefore, less than significant impacts would be expected.

Human Resources. The use of human resources for construction and maintenance activities is considered an irretrievable loss only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for the Proposed Action represents employment opportunities and is considered beneficial.

Biological Resources. The Proposed Action would result in a permanent, moderate loss of vegetation and wildlife habitat. However, the loss would not be considered significant; therefore, a less than significant impact on the irretrievable loss of vegetation and wildlife habitat is expected.

4.0 REASONABLY FORESEEABLE ACTIONS AND CUMULATIVE EFFECTS

CEQ defines cumulative impacts as the "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). Cumulative impacts can result from individually minor but collectively significant past, present, and reasonably foreseeable future actions. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

This cumulative impacts analysis summarizes expected environmental impacts from the combined impacts of past, current, and reasonably foreseeable future actions in accordance with CEQ regulations implementing NEPA and CEQ guidance on cumulative effects. The geographic scope of the analysis varies by resource area. For example, the geographic scope of cumulative impacts on resources such as soils and vegetation are narrow and focused on the location of the resource. The geographic scope of air quality and wildlife and sensitive species is much broader and considers more county- or region-wide activities. Projects that were considered for this analysis were identified by Cannon AFB, news releases and published media reports, and publicly available information and reports from federal, state, and local agencies. Projects that do not occur in proximity (i.e., within several miles) of the proposed project areas would not contribute to a cumulative impact and are generally not evaluated further.

4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Past actions are those within the cumulative impacts analysis areas that have occurred prior to the development of this EA. The impacts of these past actions are generally described in **Section 3.0**. Present actions include current or funded construction projects, Cannon AFB operations near the proposed site, and current resource management programs and land use activities within the cumulative impacts analysis areas. Reasonably foreseeable future actions consist of activities that have been approved and can be evaluated with respect to their effects. The following activities are present or reasonably foreseeable future actions:

- **Repair North Apron for Mission Expansion –** Repaint and install tie downs and grounding points.
- **Install Electronic Gates, Fuels Truck Yard –** Demolish existing gates and install new electronic gates. Construct concrete pad and gate opener. Install inductive loops, switches, and lighted keypads.
- **Construct New Fence at Visitor Center –** Construct 200 linear feet of new wrought iron fence.
- **Dangerous Cargo Pad/CATM Relocation –** Design and construct a dangerous cargo pad area and new combat arms training and maintenance (CATM) facilities.
- **Special Operation Forces (SOF) Deployed Aircraft Ground Response Element (DAGRE) Facility –** Construct a pre-engineered metal building (PEMB) facility with reinforced concrete foundation and floor slab, PEMB steel structure with standing seam metal roof, environmental control (heating, air conditioning, and ventilation), fire detection and protection, mass notification system, etc.

- **Construct Internal Airlift/Helicopter Slingable-Container Unit (ISU) Storage Pad –** Work includes, but not be limited to grading, compaction, placing concrete, and finishing concrete. Construct lighting to include trenching and installing wiring and light poles.
- **Rubber Removal from Runway –** Rubber removal from runway, paint removal/painting of runway sections.
- **Repair Steel Beam and Block Wall –** Repairing the degraded block wall and the steel beam that connects to the north and south walls of the Mechanics Yard.

4.2 ASSESSMENT OF CUMULATIVE IMPACTS BY RESOURCE

A cumulative impacts analysis must be conducted within the context of the resource areas. The magnitude and context of the impact on a resource area depends on whether the cumulative effects exceed the capacity of a resource to sustain itself and remain productive. The following discusses potential cumulative impacts that could occur from the Proposed Action and other present and reasonably foreseeable future actions. No major, adverse, cumulative impacts were identified in the cumulative impacts analysis.

4.2.1 Noise

Construction and demolition for the Proposed Action and present and reasonably foreseeable future actions would result in intermittent, temporary, additive noise levels. If conducted concurrently, construction associated with the Proposed Action and the present and reasonably foreseeable future actions would produce additive noise levels a few dBA greater than what would be produced by the Proposed Action alone. The temporary increases in noise would be limited to areas in the vicinity of the proposed project areas. Sensitive noise receptors near the project areas would experience short-term, minor, adverse, cumulative impacts from increased noise. New operations facilities would be sited among existing facilities of similar use and function; therefore, the nature and levels of noise generated from new facility operations would be comparable to existing noise levels, consistent with noise levels typical at Cannon AFB. Therefore, the Proposed Action, when combined with present and reasonably foreseeable actions, would not result in significant cumulative impacts on noise.

4.2.2 Air Quality

Construction for the present and reasonably foreseeable future actions that coincide with construction for the Proposed Action, such as the Dangerous Cargo Pad/CATM Relocation, SOF DAGRE Facility, and the ISU Storage Pad projects, may contribute additional air emissions in Curry County, resulting in short-term, minor, adverse, cumulative impacts. However, such emissions would be temporary in nature and would cease upon completion of construction. The General Conformity Rule would not be applicable to such emissions, and the applicable thresholds would be applied to each individual action. Therefore, the additive emissions of criteria pollutants from construction from the present and reasonably foreseeable future actions would not be combined with the construction emissions from the Proposed Action, and it is unlikely the PSD thresholds would be exceeded for each project individually. Long-term cumulative impacts would not occur from the Proposed Action when combined with the reasonably foreseeable actions because the Proposed Action does not include sources of operational air emissions.

4.2.3 Geological Resources

Cumulative impacts would include impacts on geology, topography, and soils from general construction activities, such as grading, contouring, and trenching previously disturbed areas as

well as from an increase of impervious surfaces. Negligible to minor cumulative impacts on geological resources are expected from the additive effects of the Proposed Action in combination with other present and reasonably foreseeable future actions.

4.2.4 Water Resources

The Proposed Action, when combined with other present and reasonably foreseeable future actions occurring in the surrounding area, may result in short- and long-term, minor, cumulative impacts on water resources. Other projects would include construction of buildings and increased impervious surface areas, thus increasing potentially contaminated runoff volume into surface water bodies. Additionally, compounded projects could increase the need for water during construction. However, BMPs would be implemented that would minimize potential impacts.

4.2.5 Biological Resources

Repair activities under the Proposed Action, as well as present and reasonably foreseeable future actions on the installation and within the city of Clovis, would result in impacts on vegetation crushing and soil compaction during ground-disturbing activities, which could result in establishment of invasive species. Adverse impacts on vegetation would be minimized through the use of BMPs, such as cleaning construction equipment prior to entering the project area. BMPs would be implemented to help prevent and control dissemination of invasive plant species during ground-disturbing activities. Revegetation of disturbed areas with native vegetation would further reduce the establishment of invasive species and support the native plant community on the installation.

Project activities that require heavy equipment could cause mobile mammals, reptiles, and birds, including breeding migratory birds, to temporarily relocate to nearby similar habitat. This disturbance is expected to be minor, and it is assumed that displaced wildlife would return to areas that had not been improved soon after activities conclude or would move to adjacent areas of similar habitat. Adverse impacts on wildlife would be minimized through the use of BMPs, such as conducting surveys prior to any construction activities and scheduling project activities to occur outside of the nesting season of 1 March to 30 September in order to reduce impacts on migratory birds. Although growth and development can be expected to continue outside of Cannon AFB and within the surrounding natural areas, significant adverse impacts on these resources would not be expected. Therefore, the Proposed Action, when combined with other present and reasonably foreseeable future actions both on and off the installation, would not result in a significant cumulative impact on biological resources.

4.2.6 Cultural Resources

The Proposed Action, as well as present and reasonably foreseeable future actions at Cannon AFB would not result in significant cumulative impacts on cultural resources. Resurvey of project areas and evaluation of identified resources may be necessary to ensure compliance with current standards.

4.2.7 Infrastructure

Construction activities under the Proposed Action, as well as present and reasonably foreseeable future actions on the installation and within the surrounding areas, would result in impacts on all aspects of infrastructure at Cannon AFB. The addition and renovation of new facilities on the installation would result in long-term, minor, adverse impacts on the infrastructure at Cannon AFB due to the increase in the consumption of electricity, natural gas, and water, and in the generation of wastewater and solid waste. The Proposed Action, when combined with other present and reasonably foreseeable future actions occurring in the surrounding area, may result in long-term, negligible to minor, cumulative impacts on infrastructure.

4.2.8 Hazardous Materials and Wastes and Other Contaminants

The Proposed Action, as well as present and reasonably foreseeable future actions at Cannon AFB would incorporate appropriate BMPs and environmental protection measures to limit and control hazardous materials and wastes and other contaminants into their design and operations plans. Therefore, the Proposed Action, when combined with other present and reasonably foreseeable future actions, would not result in a significant cumulative impact on hazardous materials and wastes management.

4.2.9 Safety

No adverse cumulative impacts on health and safety would be expected from the Proposed Action and present and reasonably foreseeable future actions on the installation or in the surrounding area. Adherence to established procedures, including the use of PPE, fencing project areas and posting signs, and compliance with OSH, DoD, and OSHA standards would reduce or eliminate health and safety impacts on contractors, military personnel, and the general public. These procedures are typical for construction projects on the installation and in the surrounding areas. Therefore, the Proposed Action, when combined with other present and reasonably foreseeable future actions, would not result in a significant cumulative impact on health and safety.

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APPENDIX A

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING AND PUBLIC INVOLVEMENT MATERIALS

1

1

Appendix A

Interagency and Intergovernmental Coordination for Environmental Planning and Public Involvement Materials

Federal, State, and Local Agencies – Scoping Letter Distribution List

The Honorable Martin Heinrich
Senator
United States Senate
303 Hart Senate Office Building
Washington DC 20510-0001

The Honorable Ben Ray Luján
Senator
United States Senate
498 Russell Senate Office Building
Washington DC 20510-0001

The Honorable Gabe Velasquez
Representative
United States House of Representatives
1517 Longworth House Office Building
Washington DC 20515-0004

The Honorable Melanie Stansbury
Representative
United States House of Representatives
1421 Longworth House Office Building
Washington DC 20515-0004

The Honorable Teresa Leger Fernandez
Representative
United States House of Representatives
1432 Longworth House Office Building
Washington DC 20515-0004

Ms. Earthea Nance, PhD
Regional Administrator
US Environmental Protection Agency
Region 6
1201 Elm Street, Suite 500
Dallas TX 75270-2102

Ms. Cheryl Prewitt
Regional Environmental Coordinator
US Forest Service, Southwestern Region
333 Broadway Boulevard SE
Albuquerque NM 87102-3426

Mr. Rob Lowe, Regional Administrator
Federal Aviation Administration
Southwest Region
10101 Hillwood Parkway
Fort Worth TX 76177-1524

Ms. Patricia Mattingly
Acting Regional Director and Regional
Environmental Specialist
Bureau of Indian Affairs
Southwest Region Regional Office
1001 Indian School Road NW
Albuquerque NM 87104-2303

Ms. Sabrina Flores, District Manager
Bureau of Land Management
Albuquerque District Office
100 Sun Avenue NE, Pan American
Building, Suite 330
Albuquerque NM 87109-4676

Ms. Rebecca Collins
Regional Environmental Officer
Office of Environmental Policy and
Compliance, Albuquerque Region
US Department of Interior
1001 Indian School Road NW, Suite 348
Albuquerque NM 87104-2303

Ms. D'Llaynn Bruce, District Conservationist
Natural Resources Conservation Service
Clovis Service Center
918 Parkland Drive
Clovis NM 88101-4432

Mr. Matt Wunder, Chief
Conservation Services
New Mexico Department of Game and Fish
PO Box 25112
Santa Fe NM 87504-5112

Ms. Danielle Galloway, Chief
Environmental Resources Section
USACE - Albuquerque District
4101 Jefferson Plaza NE
Albuquerque NM 87109-3435

Board of Directors
Mid-Region Council of Governments
809 Copper Avenue NW
Albuquerque NM 87102-3009

Mr. Jeff M. Witte, Director/Secretary
New Mexico Department of Agriculture
MSC 3189, Box 30005
Las Cruces NM 88003-4222

Mr. James C. Kenney, Cabinet Secretary
Office of General Counsel & Environmental Policy
New Mexico Environment Department
PO Box 5469
Santa Fe NM 87502-5469

Ms. Stephanie Garcia Richard
Commissioner of Public Lands
New Mexico State Land Office
310 Old Santa Fe Trail
Santa Fe NM 87501-2708

Ms. Sarah Cottrell Propst
Cabinet Secretary
New Mexico Energy, Minerals and Natural Resources Department
Wendell Chino Building
1220 South St. Francis Drive
Santa Fe NM 87505-4225

Mr. Lance A. Pyle
Curry County Manager
Curry County Manager's Office
417 Gidding Street, Suite #100
Clovis NM 88101-7500

Mayor Mike Morris
City of Clovis
PO Box 760
Clovis NM 88101-0760

Ms. Avery Young
Groundwater Quality Bureau
New Mexico Environment Department
PO Box 5469
Santa Fe NM 87502-5469

1

Federal, State, and Local Agencies – Example Scoping Letter

DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS WING (AFSOC)
CANNON AIR FORCE BASE, NEW MEXICO

November 10, 2023

Colonel Brent A. Greer
27 SOW Deputy Commander
511 North Chindit Boulevard, Suite 200
Cannon AFB NM 88103-5109

Mr. Jeff M. Witte, Director/Secretary
New Mexico Department of Agriculture
2604 Aztec Road NE
Albuquerque NM 87107-4222

Dear Mr. Witte

In accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations, and United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with the Wastewater and Stormwater Infrastructure Improvement Project at Cannon Air Force Base (AFB), New Mexico.

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. The need for the Proposed Action is to restore the integrity of the installation's wastewater and stormwater infrastructure to support current and future Air Force Special Operations Command missions and comply with the terms and conditions of New Mexico Environmental Department (NMED) Groundwater Discharge Permit 873 for the installation. These areas pose a potential concern to the natural environment through both erosion and runoff. The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, thus requiring repair. The current condition of the impoundment liners poses a concern due to possible seepage of reclaimed water into the ground, which could potentially threaten area water quality and wildlife. Cannon AFB submitted a Corrective Action Plan, which was approved by NMED, for the replacement which must be completed by April 2025.

The culverts on the South Playa have undergone extensive erosion for many years. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70, *Environmental Quality*, which provide guidelines for managing water and wastewater systems at USAF installations. Additionally, if the culverts are not repaired, the area will continue to erode and the footprint of the South Playa will continue to expand, causing further detriment to the surrounding environment.

If you have additional information regarding impacts of the Proposed Action on the natural environment or other environmental aspects of which we are unaware, we would appreciate receiving such information for inclusion and consideration during the NEPA compliance process. A copy of the *Final Description of the Proposed Action and Alternatives for the Environmental Assessment Addressing Wastewater and Stormwater Infrastructure Improvements at Cannon Air Force Base, New Mexico* is available at https://www.cannon.af.mil/Environmental/. A hardcopy can also be provided upon request. We look forward to and welcome your participation in this process. Please respond by 10 December 2023 to ensure your concerns are adequately addressed in the EA.

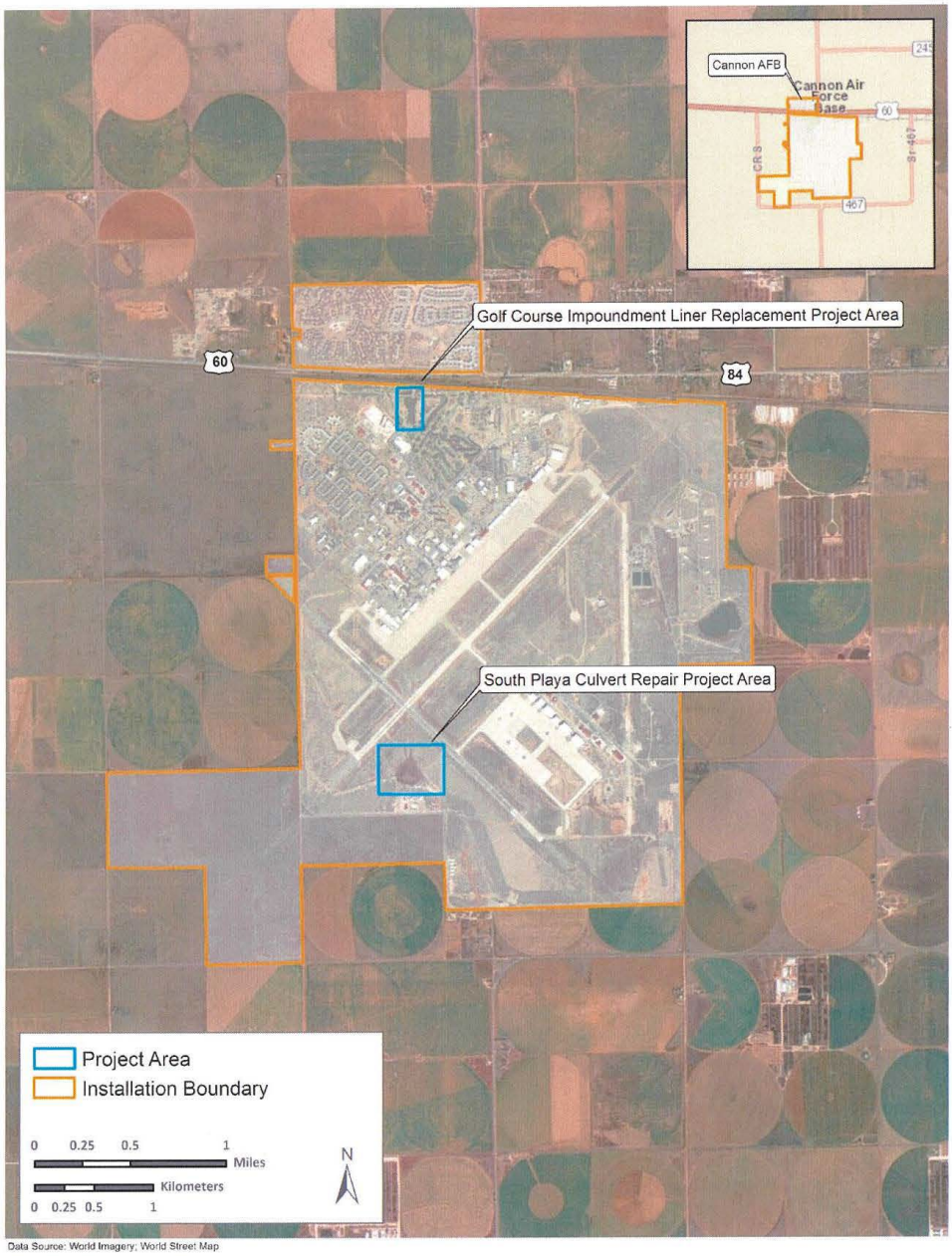
Please send your written responses to Mrs. Lylya Granfield, 27th Special Operations Civil Engineer Squadron, 506 North Air Commando Way, Cannon AFB, NM 88103-5108, or by email to 27SOCES.CEIE.Environmental@us.af.mil. Thank you in advance for your assistance in this effort.

Sincerely

BRENT A. GREER, Colonel, USAF
Deputy Commander

Attachment:
Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

1



Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

1

State Historical Preservation Office – Scoping Letter Distribution List

Mr. Jeff Pappas, PhD
State Historic Preservation Officer and Director
New Mexico Historic Preservation Division
Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street Suite 236
Santa Fe NM 87501-2834

State Historical Preservation Office – Example Scoping Letter

DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS WING (AFSOC)
CANNON AIR FORCE BASE, NEW MEXICO

November 10, 2023

Colonel Brent A. Greer
27 SOW Deputy Commander
511 North Chindit Boulevard, Suite 200
Cannon AFB NM 88103-5109

Mr. Jeff Pappas, PhD
State Historic Preservation Officer and Director
New Mexico Historic Preservation Division, Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe NM 87501-2834

Dear Mr. Pappas

In accordance with the National Historic Preservation Act (NHPA) of 1966, and 36 Code of Federal Regulations (CFR) Part 800, the United States Air Force (USAF) would like to consult with your office on the Area of Potential Effect (APE) for the Wastewater and Stormwater Infrastructure Improvement Project at Cannon Air Force Base (AFB), New Mexico.

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. The need for the Proposed Action is to restore the integrity of the installation's wastewater and stormwater infrastructure to support current and future Air Force Special Operations Command missions and comply with the terms and conditions of New Mexico Environmental Department (NMED) Groundwater Discharge Permit 873 for the installation. These areas pose a potential concern to the natural environment through both erosion and runoff. The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, thus requiring repair. The current condition of the impoundment liners poses a concern due to possible seepage of reclaimed water into the ground, which could potentially threaten area water quality and wildlife. Cannon AFB submitted a Corrective Action Plan, which was approved by NMED, for the replacement which must be completed by April 2025.

The culverts on the South Playa have undergone extensive erosion for many years. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70, *Environmental Quality*, which provide guidelines for managing water and wastewater systems at USAF installations. Additionally, if the culverts are not repaired, the area will continue to erode

and the footprint of the South Playa will continue to expand, causing further detriment to the surrounding environment.

Pursuant to Section 106 of the NHPA and 36 CFR 800, as amended, the USAF would like to initiate consultation concerning the APE for the Proposed Action and to discuss inventory efforts to identify any historic properties within the APE. A copy of the *Final Description of the Proposed Action and Alternatives for the Environmental Assessment Addressing Wastewater and Stormwater Infrastructure Improvements at Cannon Air Force Base, New Mexico* is available at https://www.cannon.af.mil/Environmental/. As we move forward through this process, we welcome your participation and input.

Please send your written responses to Mrs. Lylya Granfield, 27th Special Operations Civil Engineer Squadron, 506 North Air Commando Way, Cannon AFB, NM 88103-5108, or by email to 27SOCES.CEIE.Environmental@us.af.mil. Thank you in advance for your assistance in this effort.

Sincerely

BRENT A. GREER, Colonel, USAF
Deputy Commander

Attachment:
Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

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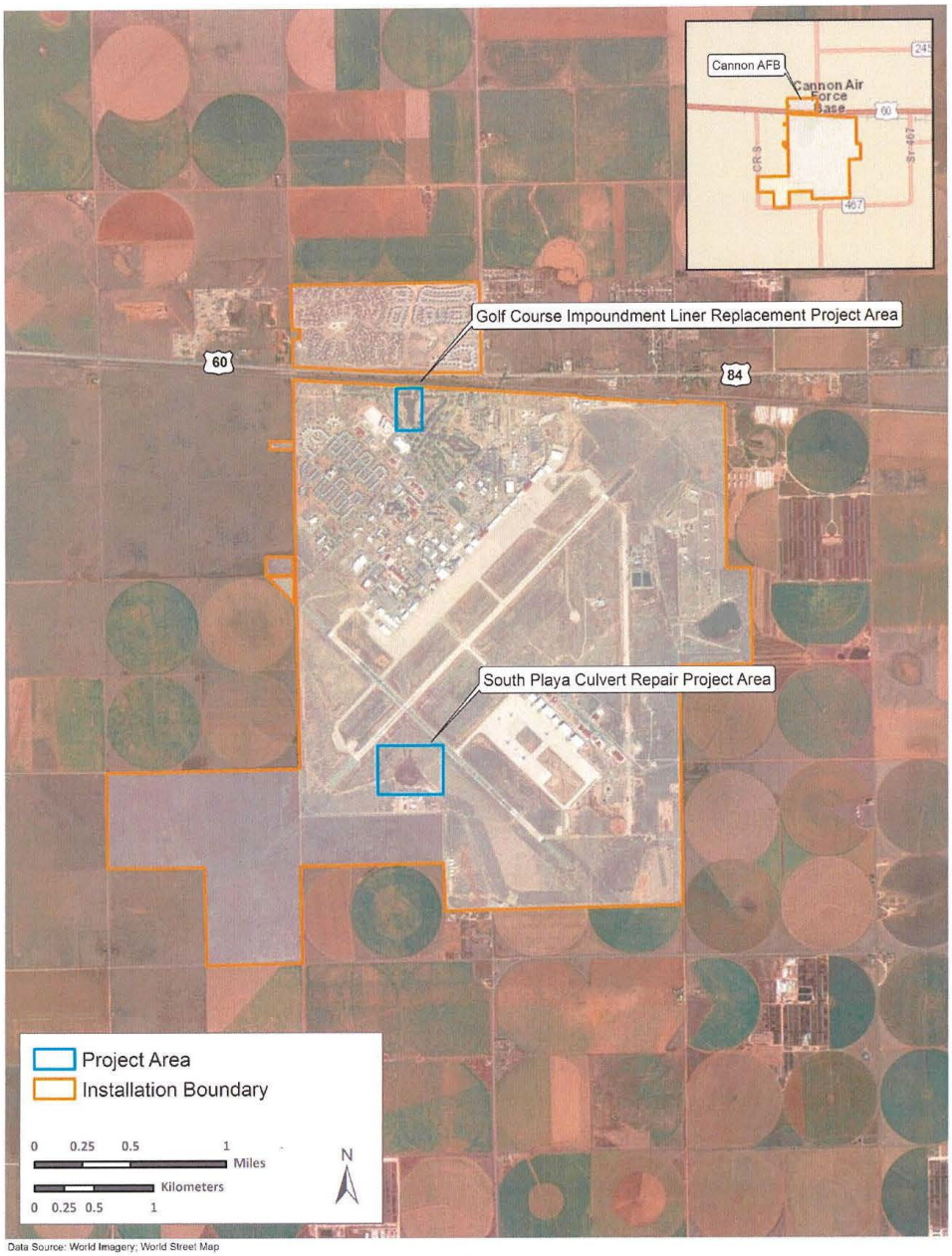
3



Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

1

US Fish and Wildlife Service - Scoping Letter Distribution List

Ms. Amy Leuders
Regional Director
US Fish & Wildlife Service
Southwest Regional Office
500 Gold Ave. SW
Albuquerque NM 87102-3190

US Fish and Wildlife Service – Example Scoping Letter

DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS WING (AFSOC)
CANNON AIR FORCE BASE, NEW MEXICO

November 10, 2023

Colonel Brent A. Greer
27 SOW Deputy Commander
511 North Chindit Boulevard, Suite 200
Cannon AFB NM 88103-5109

Ms. Amy Leuders, Regional Director
U.S. Fish & Wildlife Service
Southwest Regional Office
500 Gold Ave. SW
Albuquerque NM 87102-3190

Dear Ms. Leuders

In accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations, and United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with the Wastewater and Stormwater Infrastructure Improvement Project at Cannon Air Force Base (AFB), New Mexico.

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. The need for the Proposed Action is to restore the integrity of the installation's wastewater and stormwater infrastructure to support current and future Air Force Special Operations Command missions and comply with the terms and conditions of New Mexico Environmental Department (NMED) Groundwater Discharge Permit 873 for the installation. These areas pose a potential concern to the natural environment through both erosion and runoff. The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, thus requiring repair. The current condition of the impoundment liners poses a concern due to possible seepage of reclaimed water into the ground, which could potentially threaten area water quality and wildlife. Cannon AFB submitted a Corrective Action Plan, which was approved by NMED, for the replacement which must be completed by April 2025.

The culverts on the South Playa have undergone extensive erosion for many years. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70, *Environmental Quality*, which provide guidelines for managing water and wastewater systems at USAF installations. Additionally, if the culverts are not repaired, the area will continue to erode and the footprint of the South Playa will continue to expand, causing further detriment to the surrounding environment.

Pursuant to Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 United States Code 1531, et seq.), Cannon AFB conducted an effect determination for the Proposed Action. All interrelated and interdependent actions were analyzed during that review. The United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) Official Species and Habitat List was received on 19 September 2023 under Consultation Code 2023-0130822. The USFWS IPaC tool listed a total of three federally listed threatened or endangered species with the potential to occur within the project area, including the tricolored bat (Perimyotis subflavus), lesser prairie-chicken (Tympanuchus pallidicinctus), and monarch butterfly (Danaus plexippus). There is a potential for the monarch butterfly to be impacted within the South Playa area; however, best management practices would be implemented to minimize any potential impacts. An updated species list from USFWS is required to be obtained within 90 days of starting construction activities.

If you have additional information regarding impacts of the Proposed Action on the natural environment or other environmental aspects of which we are unaware, we would appreciate receiving such information for inclusion and consideration during the NEPA compliance process. A copy of the *Final Description of the Proposed Action and Alternatives for the Environmental Assessment Addressing Wastewater and Stormwater Infrastructure Improvements at Cannon Air Force Base, New Mexico* is available at https://www.cannon.af.mil/Environmental/. A hardcopy can also be provided upon request. We look forward to and welcome your participation in this process. Please respond within 30 days of the date of this letter to ensure your concerns are adequately addressed in the EA.

Please send your written responses to Mrs. Lylya Granfield, 27th Special Operations Civil Engineer Squadron, 506 North Air Commando Way, Cannon AFB, NM 88103-5108, or by email to 27SOCES.CEIE.Environmental@us.af.mil. Thank you in advance for your assistance in this effort.

Sincerely

BRENT A. GRERR, Colonel, USAF
Deputy Commander

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Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

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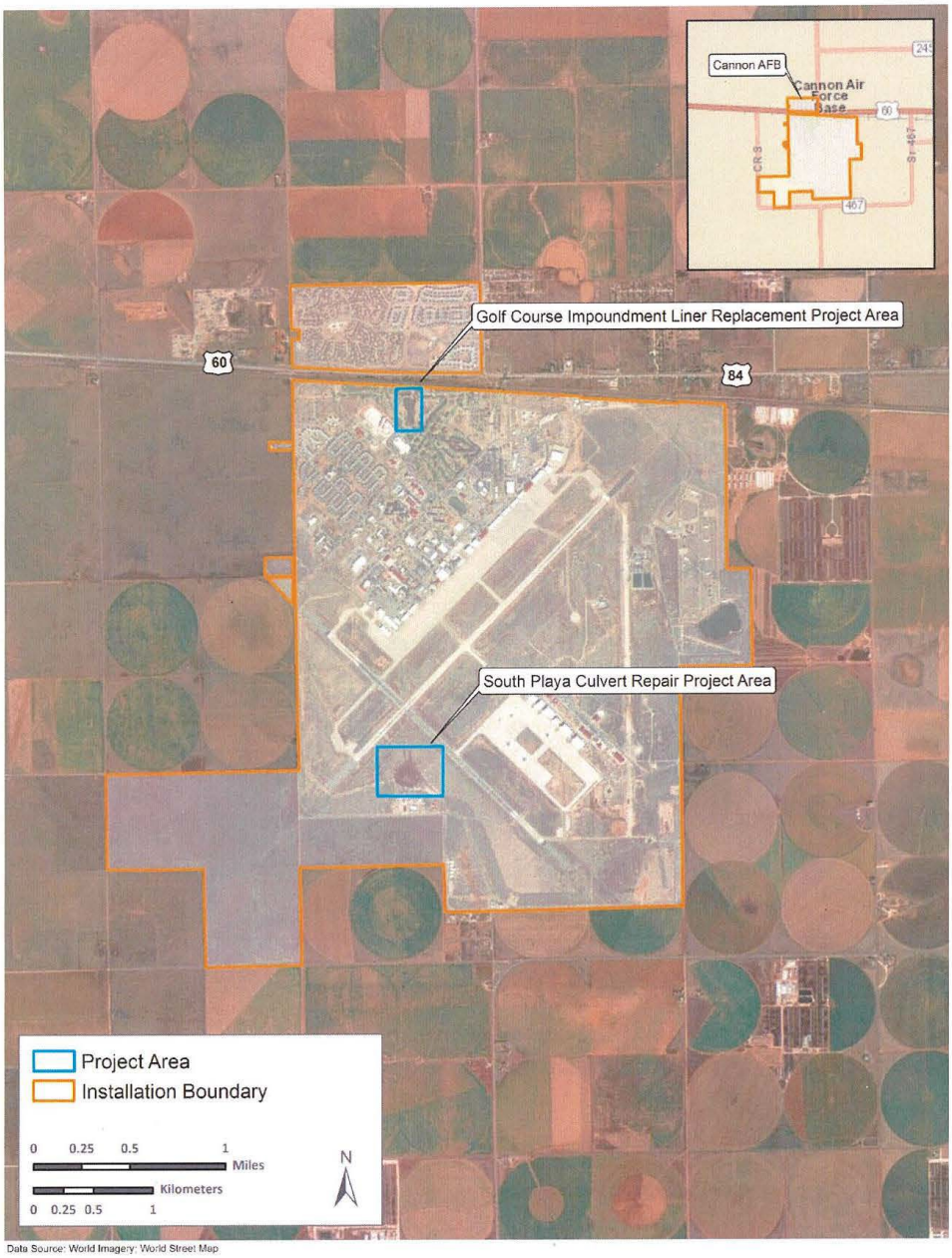


Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

1

Native American Tribes – Scoping Letter Distribution List

Chairman Timothy L. Nuvangyaoma
The Hopi Tribe
PO Box 123
Kykotsmovi AZ 86039-0123

President Edward Velarde
Jicarilla Apache Nation
PO Box 507
Dulce NM 87528-0507

President Eddy Martinez
Mescalero Apache Tribe
PO Box 227
Mescalero NM 88340-0227

Governor E. Michael Silvas
Ysleta del Sur Pueblo
P119 S. Old Pueblo Road
Ysleta del Sur TX 79917-6644

Chairman Durell Cooper
Apache Tribe of Oklahoma
PO Box 1330
Anadarko OK 73005-1330

Chairman Lawrence SpottedBird
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie OK 73015-0369

Chairman Mark Woommavovah
Comanche Nation of Oklahoma
PO Box 908
Lawton OK 73502-0908

Native American Tribes – Example Scoping Letter

DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS WING (AFSOC)
CANNON AIR FORCE BASE, NEW MEXICO

November 10, 2023

Colonel Brent A. Greer
27 SOW Deputy Commander
511 North Chindit Boulevard, Suite 200
Cannon AFB NM 88103-5109

Chairman Timothy L. Nuvangyaoma
The Hopi Tribe
PO Box 123
Kykotsmovi AZ 86039-0123

Dear Chairman Nuvangyaoma

In accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations, and United States Air Force (USAF) NEPA regulations, as well as the National Historic Preservation Act of 1966 (NHPA), and 36 Code of Federal Regulations (CFR) 800, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with the Wastewater and Stormwater Infrastructure Improvement Project at Cannon Air Force Base (AFB), New Mexico. We would like to consult with you on the environmental impacts associated with these actions, as well as consult on the Area of Potential Effects (APE) for historic properties that have the potential to be affected by this action.

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. The need for the Proposed Action is to restore the integrity of the installation's wastewater and stormwater infrastructure to support current and future Air Force Special Operations Command missions and comply with the terms and conditions of New Mexico Environmental Department (NMED) Groundwater Discharge Permit 873 for the installation. These areas pose a potential concern to the natural environment through both erosion and runoff. The impoundment liners have reached the end of their life cycle and their structural integrity has been compromised, thus requiring repair. The current condition of the impoundment liners poses a concern due to possible seepage of reclaimed water into the ground, which could potentially threaten area water quality and wildlife. Cannon AFB submitted a Corrective Action Plan, which was approved by NMED, for the replacement which must be completed by April 2025.

The culverts on the South Playa have undergone extensive erosion for many years. Stormwater drainage has significantly eroded the area, undermining the soil and causing the pipes to separate and break in several places. Repair of the six culverts is necessary to comply with Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*, and AFPD 32-70,

Environmental Quality, which provide guidelines for managing water and wastewater systems at USAF installations. Additionally, if the culverts are not repaired, the area will continue to erode and the footprint of the South Playa will continue to expand, causing further detriment to the surrounding environment.

The APE for this undertaking is therefore defined as two geographically separated areas. The proposed wastewater infrastructure project area is on the golf course in the northwestern portion of Cannon AFB. This area consists of approximately 5 acres and is approximately 350 feet south of US Highway 60 and the adjacent railroad tracks. The proposed stormwater infrastructure project area is in an area known as the South Playa. The South Playa is approximately 1,300 feet south of the intersection of Runway 04/22 and 13/31 in the southwestern portion of Cannon AFB. This area consists of approximately 20 acres.

Pursuant to Section 106 of the NHPA, as well as 36 CFR 800, as amended, the USAF would like to initiate government-to-government consultation to allow you and your designee the opportunity to consult on the APE for this undertaking, and the identification efforts that we will pursue to identify historic properties within this APE. We would also like to work with you to identify any comments, concerns, and suggestions relevant to the NEPA compliance process concerning the Proposed Action. Cannon AFB does not know of any historic properties of religious and/or cultural significance with tribal association on the installation. Nevertheless, we ask for your assistance in identifying any historic properties of which we may be unaware, particularly those which may be affected by the proposed undertaking described above. A copy of the *Final Description of the Proposed Action and Alternatives for the Environmental Assessment Addressing Wastewater and Stormwater Infrastructure Improvements at Cannon Air Force Base, New Mexico* is available at https://www.cannon.af.mil/Environmental/. As we move forward through this process, we welcome your participation and input.

For technical information, please contact Mrs. Lylya Granfield, 27th Special Operations Civil Engineer Squadron, 506 North Air Commando Way, Cannon AFB, NM 88103-5108, or by email at 27SOCES.CEIE.Environmental@us.af.mil. Thank you in advance for your assistance in this effort.

Sincerely

BRENT A. GREER, Colonel, USAF
Deputy Commander

Attachment:
Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

1

3

The Hopi Tribe has determined that:

Historic properties of religious and/or cultural significance to the Hopi Tribe are not present on Cannon AFB or within the project's APE, and therefore consultation is not required at this time.

Historic properties of religious and/or cultural significance to the Hopi Tribe are present on Cannon AFB, but consultation is not required at this time because the properties will not be affected by the Wastewater and Stormwater Infrastructure Improvement Project.

Historic properties of religious and/or cultural significance to the Hopi Tribe are present on Cannon AFB or within the project's APE, and the tribe desires to consult on these and future projects.

❑ Other: _____

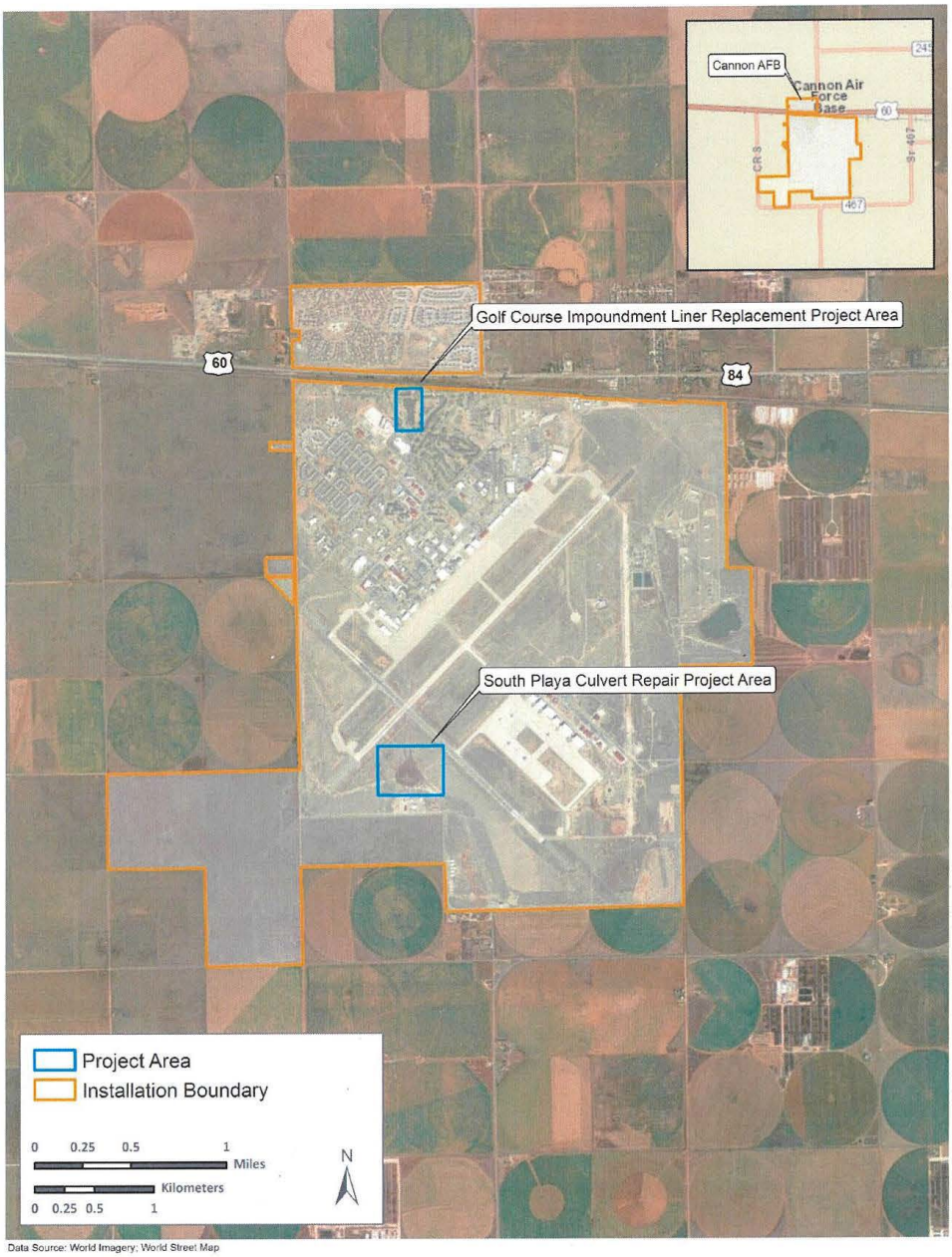
_____

_____

_____
Signature

_____
Position

1



Map of Wastewater and Stormwater Infrastructure Proposed Action Sites

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APPENDIX B

AIR QUALITY SUPPORT DOCUMENTATION

1

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

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

a. Action Location:

Base: CANNON AFB
State: New Mexico
County(s): Curry
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Wastewater and Stormwater Infrastructure Improvements at Cannon Air Force Base (AFB)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2024

e. Action Description:

The Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. Replacement of the golf course liner would occur in three phases: impoundment drainage, vegetation removal and regrowth prevention measures, sedimentation removal, liner replacement, and refilling of the impoundment. The Proposed Action includes repair of the six South Playa culverts to include the Southwest Culvert (Culvert 1), Western Culvert (Culvert 2), Northwest Culvert (Culvert 3), North-Northwest Culvert (Culvert 4), Northern Culvert (Culvert 5), and Eastern Culvert (Culvert 6).

For the purposes of this analysis, a 9-month construction period was assumed for the golf course impoundment liner replacements, and a 1-year construction period was assumed for the culvert repairs. A surrogate year of 2024 was used.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

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

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 tons/year Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR *de minimis* values (25 tons/year for lead and 100 tons/year for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

Analysis Summary:

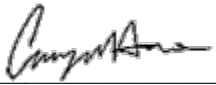
2024

VOC	0.529	250	
NO_x	3.110	250	
CO	3.878	250	
SO_x	0.010	250	
PM_{10}	33.187	250	
$PM_{2.5}$	0.113	250	
Pb	0.000	25	No
NH_3	0.005	250	
CO_2e	1093.8		

2025 - (Steady State)

VOC	0.000	250	
NO_x	0.000	250	
CO	0.000	250	
SO_x	0.000	250	
PM_{10}	0.000	250	
$PM_{2.5}$	0.000	250	
Pb	0.000	25	No
NH_3	0.000	250	
CO_2e	0.0		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.



Carolyn Hein, Contractor

10/26/2023
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: CANNON AFB
State: New Mexico
County(s): Curry
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Wastewater and Stormwater Infrastructure Improvements at Cannon Air Force Base (AFB)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:

The purpose of the Proposed Action is to replace two golf course impoundment liners and repair six culverts on the South Playa. The need for the Proposed Action is to retore the integrity of the installation's wastewater and stormwater infrastructure to support current and future Air Force Special Operations Command missions and comply with the terms and conditions of DP-873.

- Action Description:

The Proposed Action is to replace two golf course impoundment liners and repair the six culverts on the South Playa. Replacement of the golf course liner would occur in five phases: impoundment drainage, vegetation removal and regrowth prevention measures, sedimentation removal, liner replacement, and refilling of the impoundment. The Proposed Action includes repair of the six South Playa culverts to include the Southwest Culvert (Culvert 1), Western Culvert (Culvert 2), Northwest Culvert (Culvert 3), North-Northwest Culvert (Culvert 4), Northern Culvert (Culvert 5), and Eastern Culvert (Culvert 6).

For the purposes of this analysis, a 9-month construction period was assumed for the golf course impoundment liner replacements, and a 1-year construction period was assumed for the culvert repairs. A surrogate year of 2024 was used.

- Point of Contact

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:
Phone Number:

- Activity List:

1.	Construction / Demolition	Replacement of Liners: Phase 1 – Impoundment Drainage
2.	Construction / Demolition	Replacement of Liners: Phase 2 – Vegetation Removal and Regrowth Prevention Measures
3.	Construction / Demolition	Replacement of Liners: Phase 3 – Sedimentation Removal
4.	Construction / Demolition	Replacement of Liners: Phase 4 – Liner Replacement
5.	Construction / Demolition	Replacement of Liners: Phase 5 – Refill Impoundments
6.	Construction / Demolition	Repair Six Culverts on the South Playa

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. Construction / Demolition

2.1 General Information & Timeline Assumptions

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

- Activity Title: Replacement of Liners: Phase 1 – Impoundment Drainage

- Activity Description:
Following draining of the impoundments, components associated with the existing aerators would be removed. These included buried air compressor lines, distribution boxes, and wiring. A trench length of 500 feet and a trench width of 3 feet (1,500 square feet total) was assumed for removal of buried components at both impoundments. Trenching would begin in January 2024 and last approximately 1 month.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

VOC	0.020468
SO_x	0.000431
NO_x	0.099116
CO	0.166357
PM_{10}	0.018566

$PM_{2.5}$	0.003642
Pb	0.000000
NH_3	0.000060
CO_2e	40.6

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (square feet): 1,500
Amount of Material to be Hauled On-Site (cubic yards): 0
Amount of Material to be Hauled Off-Site (cubic yards): 0

- Trenching Default Settings
Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Excavators Composite	2	8
Other General Industrial Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (cubic yards): 20 (default)

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

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

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

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

LDGV	000.604	000.007	000.679	005.119	000.013	000.012		000.033	00365.157
LDGT	000.784	000.010	001.171	008.128	000.015	000.013		000.034	00488.008
HDGV	001.315	000.015	003.118	025.189	000.035	000.031		000.045	00760.452
LDDV	000.249	000.003	000.329	003.517	000.007	000.006		000.008	00371.991
LDDT	000.550	000.005	000.880	007.137	000.008	000.008		000.008	00579.910
HDDV	000.934	000.014	009.704	002.987	000.373	000.344		000.031	01586.560
MC	002.847	000.008	000.870	014.993	000.028	000.025		000.051	00396.071

2.1.4 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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: Replacement of Liners: Phase 2 – Vegetation Removal and Regrowth Prevention Measures
- Activity Description:
Site grading would include clearing of vegetation and removal of stumps on 5.56 acres (2,421,94 square feet). It was assumed 500 cubic yards of removed vegetation would be hauled off-site. Grading would occur in February 2024 and last approximately 1 month.

- Activity Start Date
Start Month: 2
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2024

- Activity Emissions:

VOC	0.031333
SO_x	0.000549
NO_x	0.184921
CO	0.204720
PM_{10}	2.416478

$PM_{2.5}$	0.007136
Pb	0.000000
NH_3	0.000092
CO_2e	54.8

3.1 Site Grading Phase

3.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2024

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

3.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (square feet): 242,194
Amount of Material to be Hauled On-Site (cubic yards): 0
Amount of Material to be Hauled Off-Site (cubic yards): 500

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

- Construction Exhaust (default)

Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (cubic yards): 20 (default)
Average Hauling Truck Round Trip Commute (miles): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

3.1.3 Site Grading Phase Emission Factor(s)

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

	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

3.1.4 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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)

EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

- Activity Title: Replacement of Liners: Phase 3 – Sedimentation Removal
- Activity Description:
Excavation would include removal of sediments that have accumulated in the impoundments on a total of 5 acres (217,800 square feet). Excavation depth was conservatively assumed to be uniform throughout the impoundments at 21 feet. It was assumed 100,000 cubic yards of sediment would be hauled away from the impoundments. Removal of sediment would occur in March 2024 and last approximately 2 months.

- Activity Start Date
Start Month: 3
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 4
End Month: 2024

- Activity Emissions:

VOC	0.053395
SO_x	0.001302
NO_x	0.484883
CO	0.501508
PM_{10}	4.345914

$PM_{2.5}$	0.012135
Pb	0.000000
NH_3	0.003647
CO_2e	223.1

4.1 Trenching/Excavating Phase

4.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 2
Number of Days: 0

4.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (square feet): 217,800
Amount of Material to be Hauled On-Site (cubic yards): 0
Amount of Material to be Hauled Off-Site (cubic yards): 100,000

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

- Construction Exhaust (default)

Excavators Composite	2	8
Other General Industrial Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (cubic yards): 20 (default)
Average Hauling Truck Round Trip Commute (miles): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

4.1.3 Trenching / Excavating Phase Emission Factor(s)

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

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

LDGV	000.604	000.007	000.679	005.119	000.013	000.012		000.033	00365.157
LDGT	000.784	000.010	001.171	008.128	000.015	000.013		000.034	00488.008
HDGV	001.315	000.015	003.118	025.189	000.035	000.031		000.045	00760.452
LDDV	000.249	000.003	000.329	003.517	000.007	000.006		000.008	00371.991
LDDT	000.550	000.005	000.880	007.137	000.008	000.008		000.008	00579.910
HDDV	000.934	000.014	009.704	002.987	000.373	000.344		000.031	01586.560
MC	002.847	000.008	000.870	014.993	000.028	000.025		000.051	00396.071

4.1.4 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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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. Construction / Demolition

5.1 General Information & Timeline Assumptions

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

- Activity Title: Replacement of Liners: Phase 4 – Liner Replacement

- Activity Description:
Grading and earthwork for both impoundments would occur on 5 acres (217,800 square feet). It was assumed 500 cubic yards of material, including any loose earth, graded soils, and the removed liners, would be hauled off-site. It was assumed 500 cubic yards of materials including sand and soils needed for grading and the new liner would be hauled on-site. Grading would occur in May 2024 and last approximately 2 months.

Trenching would be required for the liner anchor on top of the berm. The trenched area was assumed to be 3,000 square feet. Trenching would occur in July 2024 and last approximately 1 month.

Construction would include a concrete slab or larger rock slabs along the berm, which is approximately 3,000 feet in length. Construction was estimated to be 6,000 square feet with a slab height of 1 foot. Construction would occur in August 2024 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 8

End Month: 2024

- Activity Emissions:

VOC	0.113177
SO_x	0.002025
NO_x	0.630120
CO	0.775170
PM_{10}	4.388212

$PM_{2.5}$	0.025018
Pb	0.000000
NH_3	0.000352
CO_2e	199.4

5.1 Site Grading Phase

5.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 2
Number of Days: 0

5.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (square feet): 217,800
Amount of Material to be Hauled On-Site (cubic yards): 500
Amount of Material to be Hauled Off-Site (cubic yards): 500

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

- Construction Exhaust (default)

Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

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

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

5.1.3 Site Grading Phase Emission Factor(s)

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

	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
	VOC	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
	VOC	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
	VOC	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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: 7
Start Quarter: 1
Start Year: 2024

- 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 (square feet): 3,000
Amount of Material to be Hauled On-Site (cubic yards): 0
Amount of Material to be Hauled Off-Site (cubic yards): 0

- Trenching Default Settings
Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Excavators Composite	2	8
Other General Industrial Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (cubic yards): 20 (default)

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

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

5.2.3 Trenching / Excavating Phase Emission Factor(s)

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

	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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: 8
Start Quarter: 1
Start Year: 2024

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

5.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (square feet): 6,000
Height of Building (feet): 1
Number of Units: N/A

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

- Construction Exhaust

Cement and Mortar Mixers Composite	2	8
Generator Sets Composite	1	8
Off-Highway Trucks Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (miles): 20

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (miles): 20

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (miles): 40

- Vendor Trips Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

5.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (pounds/hour)

	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0534	0.0413	0.0020	0.0020	0.0007	7.2673
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.1188	0.0026	0.5286	0.5400	0.0163	0.0163	0.0107	260.33
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0764	0.0008	0.4135	0.4773	0.0243	0.0243	0.0068	78.105
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0584	0.0007	0.3546	0.4007	0.0212	0.0212	0.0052	69.068
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

5.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (square feet)
BH: Height of Building (feet)
(0.42 / 1000): Conversion Factor cubic feet to trips (0.42 trip / 1000 cubic feet)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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

- Vendor Trips Emissions per Phase

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

VMT_{VT}: Vendor Trips Vehicle Miles Travel (miles)
BA: Area of Building (square feet)
BH: Height of Building (feet)
(0.38 / 1000): Conversion Factor cubic feet to trips (0.38 trip / 1,000 cubic feet)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

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

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

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location

County: Curry
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Replacement of Liners: Phase 5 – Refill Impoundments

- Activity Description:

It was assumed the impoundments would be filled in part by trucking in water. It was assumed that approximately 2,000,000 gallons of water would be trucked into the impoundments. Each truck was assumed to hold 5,000

gallons, resulting in a total of 400 roundtrips. Refilling of the impoundments would begin in September 2024 and last approximately 1 month.

- Activity Start Date
Start Month: 9
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 9
End Month: 2024

- Activity Emissions:

VOC	0.000002
SO_x	0.000000
NO_x	0.000057
CO	0.000034
PM_{10}	0.000001

$PM_{2.5}$	0.000001
Pb	0.000000
NH_3	0.000001
CO_2e	0.0

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 9
Start Quarter: 1
Start Year: 2024

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

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (square feet): 0
Amount of Material to be Hauled On-Site (cubic yards): 20
Amount of Material to be Hauled Off-Site (cubic yards): 0

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

- Construction Exhaust (default)

Off-Highway Trucks Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (cubic yards): 20 (default)
Average Hauling Truck Round Trip Commute (miles): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

6.1.3 Site Grading Phase Emission Factor(s)

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

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

6.1.4 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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

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

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

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

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

- Activity Title: Repair Six Culverts on the South Playa

- Activity Description:
It was assumed the entire area containing the culverts, approximately 5 acres (217,800 square feet) would be graded. It was assumed 5,000 cubic yards of material would be hauled on-site for backfilling the areas around the culverts. Site grading would begin in January 2024 and last approximately 6 months.

Trenching would be required to access the buried portions of the and was estimated to occur on 150,000 square feet. It was assumed portions of some of the culverts would need to be replaced. As such, it was assumed approximately 500 cubic yards of material would be hauled on-site to support the culvert repairs. Trenching would begin in July 2024 and last approximately 6 months.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

VOC	0.311121
SO_x	0.005890
NO_x	1.711389
CO	2.230682
PM_{10}	22.018012

$PM_{2.5}$	0.064788
Pb	0.000000
NH_3	0.001000
CO_2e	575.8

7.1 Site Grading Phase

7.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

7.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (square feet): 217,800
Amount of Material to be Hauled On-Site (cubic yards): 5,000
Amount of Material to be Hauled Off-Site (cubic yards): 0

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

- Construction Exhaust (default)

Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (cubic yards): 20 (default)
Average Hauling Truck Round Trip Commute (miles): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

7.1.3 Site Grading Phase Emission Factor(s)

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

	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

7.1.4 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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)

HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

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

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

7.2 Trenching/Excavating Phase

7.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2024

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

7.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (square feet): 150,000
Amount of Material to be Hauled On-Site (cubic yards): 500
Amount of Material to be Hauled Off-Site (cubic yards): 0

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

- Construction Exhaust (default)

Excavators Composite	2	8
Other General Industrial Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (cubic yards): 20 (default)

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

- Vehicle Exhaust Vehicle Mixture (%)

POVs	0	0	0	0	0	100.00	0

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

POVs	50.00	50.00	0	0	0	0	0

7.2.3 Trenching / Excavating Phase Emission Factor(s)

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

	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
	VOC	SO_x	NO_x	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

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

LDGV	000.225	000.002	000.129	003.365	000.005	000.004		000.024	00304.482
LDGT	000.223	000.003	000.223	003.754	000.006	000.005		000.026	00393.433
HDGV	000.830	000.006	000.943	013.718	000.025	000.022		000.051	00889.720
LDDV	000.073	000.001	000.089	003.143	000.002	000.002		000.008	00311.620
LDDT	000.074	000.001	000.132	002.161	000.003	000.003		000.009	00354.627
HDDV	000.113	000.004	002.600	001.531	000.048	000.044		000.032	01287.120
MC	002.651	000.003	000.757	013.180	000.024	000.021		000.055	00389.752

7.2.4 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 pounds / 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

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
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 (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/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 (miles)
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