November

2023

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

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

ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFFF	Aqueous film forming foam
AFPD	Air Force Policy Directive
AFSOC	Air Force Special Operations Command
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
DOPAA	Description of the Proposed Action and Alternatives
DP	Discharge Permit
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EO	Executive Order
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
NEPA	National Environmental Policy Act
NMED	New Mexico Environment Department
NOA	Notice of Availability
SHPO	State Historic Preservation Officer
SOCES	Special Operations Civil Engineer Squadron
SOW	Special Operations Wing
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
WWTP	Wastewater treatment plant

COVER SHEET

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

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: Final Description of the Proposed Action and Alternatives (DOPAA).

Abstract: This DOPAA 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 as this is a low-lying area. The stored reclaimed water and stormwater is 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.

PRIVACY ADVISORY

The EA will be 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 the 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 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.

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1.0 PURPOSE AND NEED FOR THE PROPOSED 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

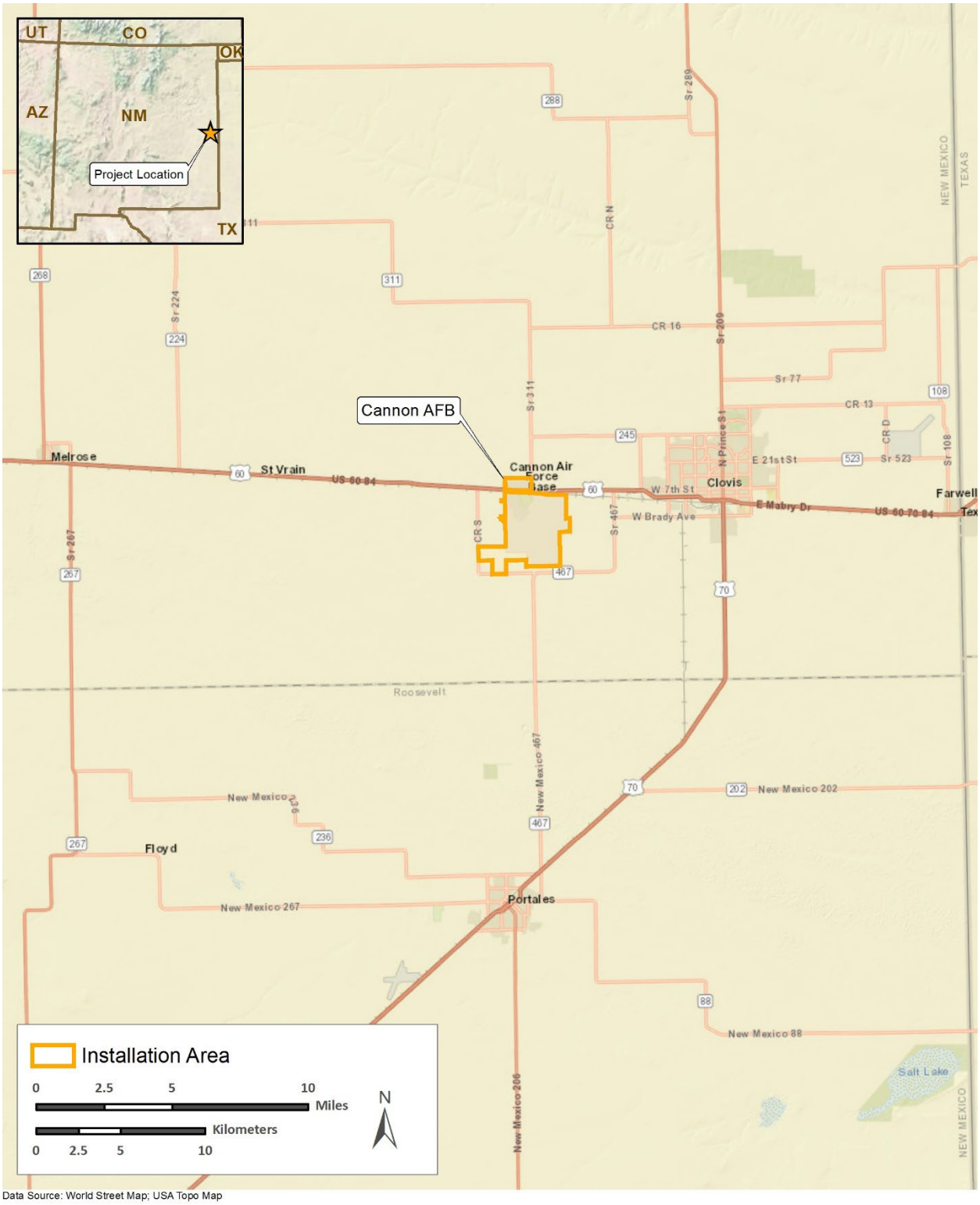
1.2.1 Cannon AFB History

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 US 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-130W Stinger 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 anytime, anywhere.

1.2.2 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 to the impoundments and is then used to irrigate the golf course turf with the reclaimed water.. 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, Term and Condition 57, as issued by the New Mexico Environment Department (NMED) for Cannon AFB.



Data Source: World Street Map; USA Topo Map

Figure 1-1. Cannon AFB Vicinity Map

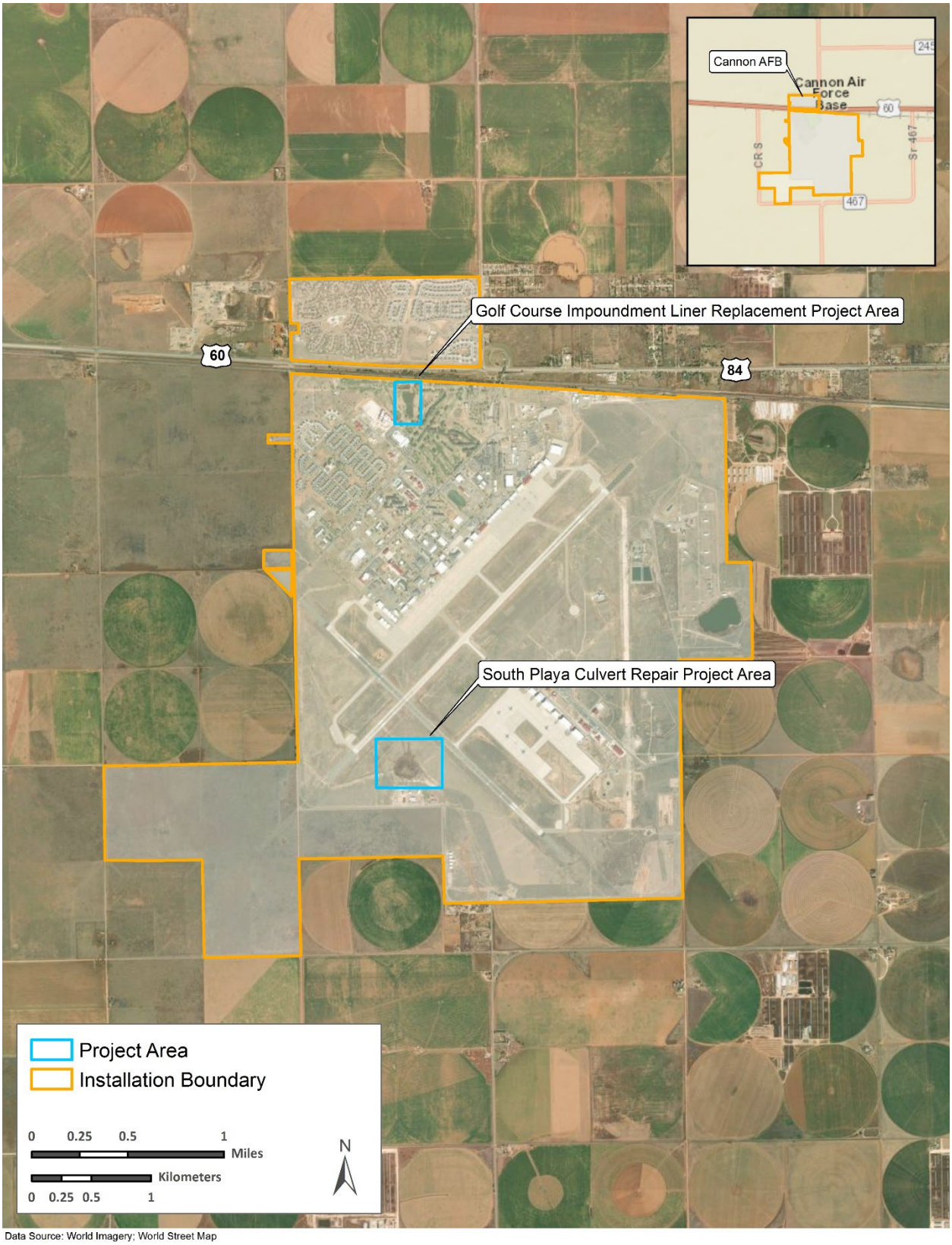


Figure 1-2. Project Areas Overview

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.

This Description of the Proposed Action and Alternatives (DOPAA) lays the framework for the Environmental Assessment (EA), detailing the proposed activities under the Proposed Action. The EA is a planning and decision-making tool that will be used to guide Cannon AFB in implementing the Proposed Action in a manner that complies with all applicable federal, state, and local environmental laws and is consistent with United State Air Force (USAF) standards for environmental stewardship. This DOPAA supports a proposal by the USAF and Cannon AFB to conduct repair and replacement activities for wastewater and stormwater infrastructure on the installation.

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 repair. 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

The EA will evaluate 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. The EA will be prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code 4331 et seq.), the regulations of the President's Council on Environmental Quality that implement NEPA procedures (40 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 will include the evaluation of actions proposed to occur within three separate wetlands, 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*, because replacement of the golf course impoundment liners and repair of the six culverts on the South Playa would occur within three separate wetlands, a FONPA would need to accompany the FONSI to discuss why no other practicable alternatives exist to avoid impacts. Impacts would be reduced by 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 will be published in *The Eastern New Mexico News*.

1.5 INTERGOVERNMENTAL COORDINATION AND CONSULTATIONS

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 will notify relevant stakeholders about the Proposed Action and alternatives (see **Appendix A** for all stakeholder coordination materials). The notification process will provide 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 and implementing regulations (36 CFR Part 800), Section 7 of the Endangered Species Act and implementing regulations (50 CFR Part 17) including the Migratory Bird Treaty Act, findings of effect and a request for concurrence will be 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 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 National Historic Preservation Act and implementing regulations 36 CFR Part 800 require federal agencies to consult with federally recognized tribes historically affiliated with the area of potential effects 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 will be 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 will be 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 will be published in *The Eastern New Mexico News* announcing the availability of the Draft EA. Letters will be 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 will initiate a 30-day comment period. Copies of the Draft EA will be 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 will also be 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 1.5 million gallons per day. The WWTP then discharges up to 165,000 gallons of reclaimed wastewater per day to its various impoundments on the installation. From the golf course impoundments, the reclaimed wastewater 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 wastewater 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 impoundment would need to be drained, which would require the installation's WWTP to stop sending reclaimed wastewater 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 wastewater. 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 wastewater 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 the fall of 2023 as a 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 5.56 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.

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 2023). 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*, as well as 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 wastewater, 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. 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**).

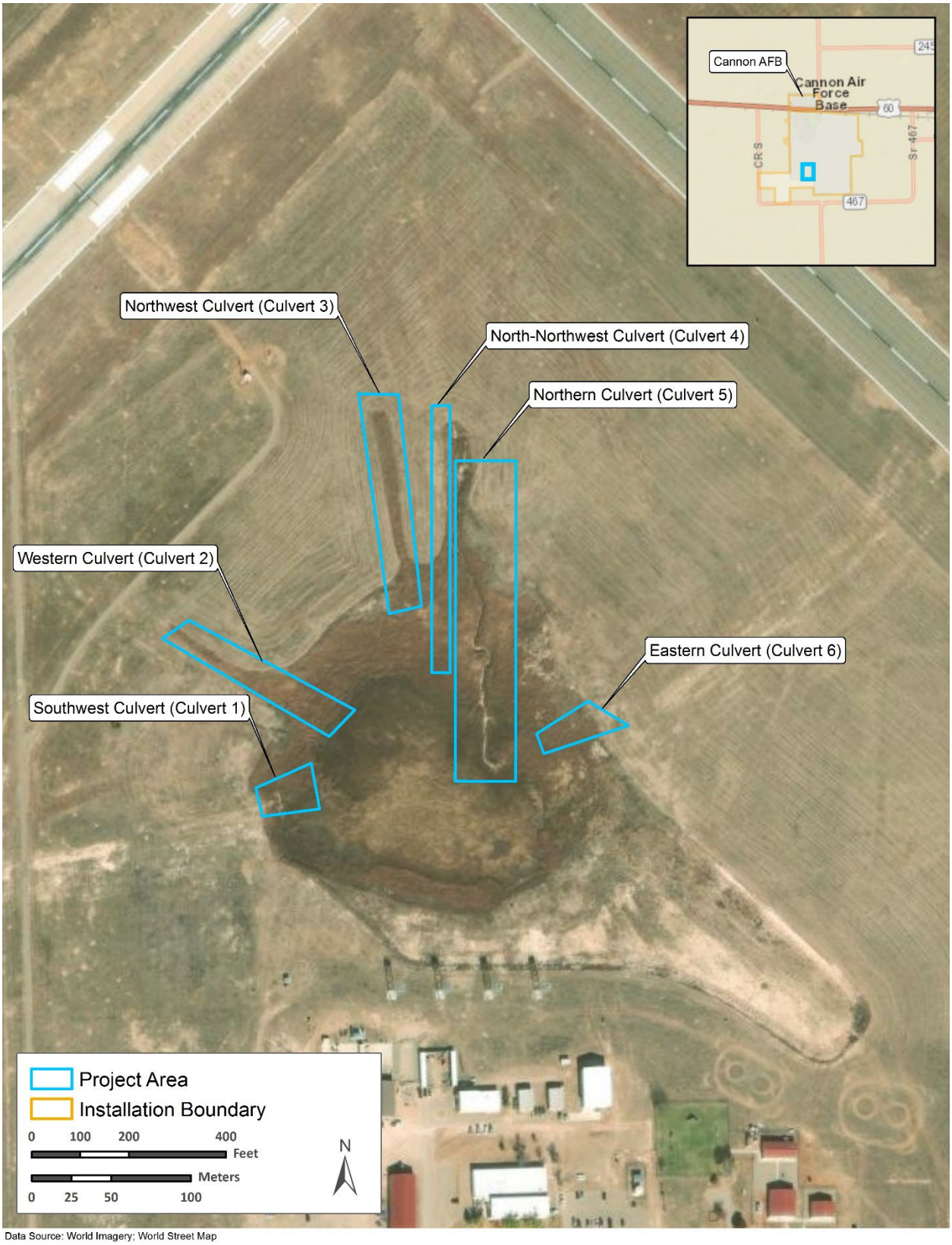


Figure 2-4. Culverts 1-6 in the South Playa

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

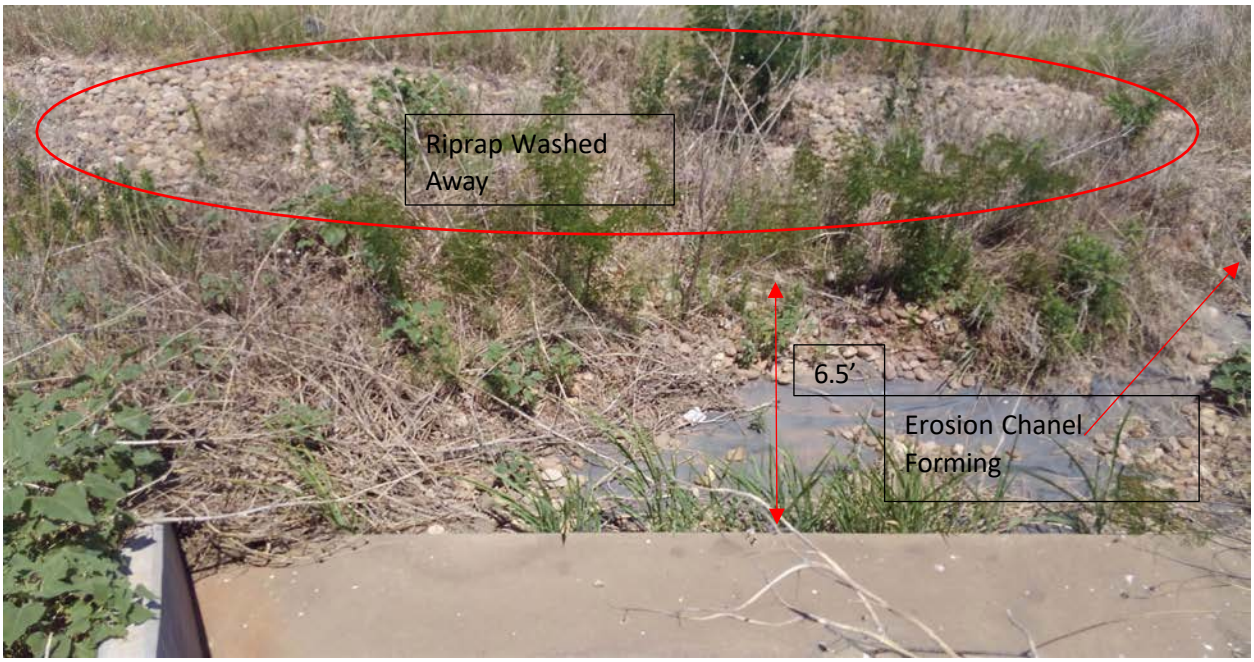


Photo 2-6. Riprap Washed Away from the Apron/Base of Culvert 1

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. 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 in 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. Therefore, this alternative was eliminated from further consideration as it does not meet Selection Standards 1 or 3.

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 also 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 would have adversely impacted the storage capacity for effluent on Cannon AFB, resulting in the need to find or create additional effluent storage space elsewhere on the installation. Due to the greater potential for adverse environmental impacts as well as not meeting Selection Standards 1, 2, 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 would have adversely impacted the storage capacity for effluent on Cannon AFB, resulting in the need to find or create additional effluent storage space elsewhere on the installation. Therefore, this alternative was eliminated from further consideration as it does not meet Selection Standards 1, 2, or 3.

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 in 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.

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3.0 REFERENCES

Cannon AFB 2023 — Cannon Air Force Base (AFB). 2023. *Final Preliminary Charrette Report, Repair by Replacement, Golf Course Liner, B5077, CZQZ22-0008, FY2022 for 27 SOCES/CEN, Cannon Air Force Base, NM 88103*. 14 September 2023.

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APPENDIX A

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING AND PUBLIC INVOLVEMENT MATERIALS

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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

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

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

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

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