Draft

Programmatic Environmental Assessment

Addressing Upgrade of the Stormwater Drainage System

Kirtland Air Force Base, New Mexico

January

2019

DRAFT
FINDING OF NO SIGNIFICANT IMPACT (FONSI)/
FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)
FOR THE
PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
ADDRESSING UPGRADE OF THE STORMWATER DRAINAGE SYSTEM
AT
KIRTLAND AIR FORCE BASE, NEW MEXICO

Pursuant to provisions of the National Environmental Policy Act, 42 United States Code §§ 4321 to 4347, as amended, implementing Council on Environmental Quality Regulations; 40 Code of Federal Regulations (CFR) §§ 1500–1508; and 32 CFR § 989, *Environmental Impact Analysis Process*, the United States Air Force (USAF) prepared a Programmatic Environmental Assessment (PEA) to assess potential environmental consequences associated with developing, upgrading, and maintaining stormwater drainage systems and conducting arroyo repair and erosion control measures at Kirtland Air Force Base (AFB), Bernalillo County, New Mexico.

The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation that occur on the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated to the point where extensive work is needed to continuously reestablish an effective stormwater drainage system. Ditches, culverts, pipes and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. Standing stormwater created by clogged ditches and flat ground surfaces poses hazards to traffic and undermines roads, parking lots, and foundations. Outdoor storage areas require berms and retention structures to control runoff. Revegetation and other measures are needed to control discharges of suspended solids. The Proposed Action would reduce the overall rate and volume of stormwater flows and detrimental effects of erosion and sedimentation into surface waters. Outlet structures are nonexistent, causing erosion of arroyos during storms. Arroyo work is required to repair erosion damage and reduce the potential for additional damage in the future.

The PEA addressing upgrade of the stormwater drainage system at Kirtland AFB, New Mexico, attached hereto and incorporated herein, analyzes the potential impacts of developing, upgrading, and maintaining stormwater drainage systems and conducting arroyo repair and erosion control measures at the installation. The PEA considers all potential impacts of the Proposed Action and the No Action Alternative. The PEA also considers cumulative environmental impacts with other projects within the Region of Influence.

PROPOSED ACTION (PEA § 2.1, pages 2-1 to 2-3)

The USAF proposes to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures at Kirtland AFB. **Figure 2-1** presents the current stormwater drainage system and arroyos on the installation. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. These activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, and other drainage infrastructure; and any required repair, maintenance, or cleaning of the stormwater pipe network. Arroyo repair activities could include

restabilizing, excavating, filling, lining arroyo banks, and constructing and repairing bridge supports, box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed.

NO ACTION ALTERNATIVE (PEA § 2.3, page 2-4)

The No Action Alternative was analyzed to provide a baseline of the existing environmental, social, and economic conditions the Proposed Action was compared against. Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repairs. Stormwater drainage problems would worsen as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs and worsening traffic hazards during heavy rains; and erosion of the arroyos on the installation, negatively affecting Waters of the United States (i.e., Rio Grande River) downstream of the installation, would continue. Severe deterioration could negatively impact the ability to execute mission and training activities.

SUMMARY OF FINDINGS

Based on the scope of the Proposed Action, the following environmental resource areas were eliminated from detailed analysis: airspace management, land use, visual resources, and environmental justice **(PEA § 3, pages 3-1 to 3-2)**. Under the Proposed Action, none of the activities would result in a change to current airspace types, flight activities, or training. The proposed activities would not result in a change in current land use designations or adversely affect the existing visual landscape. No off-installation minority, low income, or youth populations would be adversely impacted by the Proposed Action nor would they experience disproportionately high and adverse impacts. As a result, USAF anticipates no short- or long-term impacts on airspace management, land use, visual resources, or environmental justice at Kirtland AFB. Environmental analyses within the PEA focused on the following resource areas:

Noise (PEA § 3.1, pages 3-2 to 3-7). The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on the local noise environment from construction activities. Additionally, the off-installation noise environment might experience intermittent, short-term, minor, adverse impacts if construction activities occur in proximity to the installation boundary where construction noise would propagate beyond the installation's boundary. All construction-related noise impacts would be temporary and last only for the duration of each construction period. Construction activities would occur during the daytime hours of 0700 to 1700 and best management practices (BMPs) to reduce adverse noise impacts on sensitive noise receptors would be implemented.

Air Quality (PEA § 3.2, pages 3-7 to 3-11). The Proposed Action would result in intermittent, short-term, minor, adverse impacts on air quality. Kirtland AFB is within Bernalillo County, New Mexico, which is in attainment status for all criteria pollutants, except carbon monoxide. Emissions of criteria pollutants and greenhouse gases would be directly produced from activities such as operation of heavy equipment, workers commuting daily to and from the project area in their personal vehicles, heavy duty diesel vehicles hauling materials and debris to and from the project area, and ground disturbance. However, such emissions would only be temporary in nature and produced only when construction activities are occurring. Estimated air emissions from the Proposed Action can be compared to the 100 tons per year (tpy) *de minimis* level. Emissions of all criteria pollutants would be well below the 100 tpy threshold. Projected carbon monoxide emissions are 7.954 tpy; therefore, no conformity determination is required for the

Proposed Action. A fugitive dust control construction permit would be obtained for projects disturbing 0.75 acre or more. The Federal General Conformity Rule does not apply to the Proposed Action and neither an applicability determination nor a conformity analysis is required. However, for analysis purposes, it was assumed up to 10 acres of land would be disturbed annually by activities associated with the Proposed Action. Emissions of all criteria pollutants would be well below the 100 tons per year threshold. Fugitive dust emissions would be reduced with BMPs and environmental control measures specified in a fugitive dust control plan. It is not expected that emissions from construction would contribute to or affect local or regional attainment status with the National Ambient Air Quality Standards nor would the Proposed Action result in a significant impact on climate change.

Geological Resources (PEA § 3.3, pages 3-11 to 3-16). The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on local topography and soil resources. Activities would include grading, clearing, ditching or trenching, and boring of select areas on the installation. Project activities would implement techniques to minimize soil erosion and sedimentation by using appropriate BMPs and environmental protection measures. Additionally, each project activity would be reviewed to ensure proper erosion and sediment control measures are considered and incorporated into project designs.

Long-term, minor, beneficial impacts on local topography and soil resources would be anticipated to result from the Proposed Action, because these resources would likely benefit from improvements to the stormwater drainage system such as arroyo bank stabilization and landscape revegetation post-construction or -maintenance. Arroyo bank stabilization and landscape revegetation would also reduce the potential for soil erosion and loss.

The Proposed Action is not anticipated to change or result in short- or long-term impacts on regional geological features or cause an existing geologic feature to become unstable.

Water Resources (PEA § 3.4, pages 3-16 to 3-25). The Proposed Action would result in intermittent, short-term, minor, adverse impacts from ground-disturbing activities. Ground-disturbing activities would require minimal amounts of water for dust suppression. Soil disturbance from construction activities has the potential to result in a minor disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading. Appropriate BMPs and environmental protection measures would be implemented to ensure stormwater pollutants are contained to the maximum extent practical. Project-specific engineering design reviews and related studies would be conducted to determine if flood elevations or velocities would affect upstream and downstream conditions. Development of new stormwater drainage systems and upgrade of existing systems would be designed with consideration for Unified Facilities Criteria Low Impact Design requirements to maintain or restore the natural hydrologic functions of the area.

Long-term, minor, beneficial impacts on local and regional water resources would be anticipated to result from stormwater drainage improvements associated with the Proposed Action. Enhanced surface infiltration and subsurface water storage and recharge would result to surface waters on and downstream of the installation. The Proposed Action would reduce the overall rate and volume of stormwater flows and detrimental effects of erosion and sedimentation into surface waters.

Biological Resources (PEA § 3.5, pages 3-25 to 3-34). The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on biological resources. Crushing

and soil compaction would occur when vehicles and equipment access, park, and maneuver around project areas. Impacts on vegetation would be minimized through the use of BMPs. Disturbed sites would be revegetated with native vegetation reducing the establishment of invasive species, preventing/controlling soil erosion, and providing stability for slopes. Increased noise from construction activities would result in adverse impacts on state sensitive taxa. However, noise would be intermittent and short term, and it is expected that when activities cease, species sensitive to noise would resume normal activities. High-impact maintenance and repair activities that require heavy equipment should be conducted outside the nesting season to the extent possible to further reduce any adverse impact.

Stormwater drainage improvements would reduce the overall rate and volume of stormwater flows and detrimental effects of erosion and sedimentation into surface waters. Restabilizing arroyos and upgrading stormwater systems would improve the flow of floodwater resulting in improved water quality because less erosion and sedimentation would occur during a flood event. Better water quality equates to better aquatic habitat. Additionally, the arroyo repairs and stormwater improvements would promote bank stabilization, resulting in beneficial impacts on terrestrial habitat.

Cultural Resources (PEA § 3.6, pages 3-34 to 3-37). Because of the programmatic nature of the PEA, the Area of Potential Effect is defined as the entire installation. No specific project activities or locations have been determined at this time. As individual projects are developed, project-specific National Environmental Policy Act analysis would be prepared and Section 106 consultation would occur at that time. The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on cultural resources. Because of the concentration of cultural resources surrounding the natural arroyos and waterways, avoidance of known sites would be taken into consideration when planning and developing stormwater drainage and arroyo repair projects. If project activities would be conducted adjacent to or could not be adjusted to avoid impacting an archaeological site, then consultation would occur and mitigation measures would be developed in accordance with Section 106 of the National Historic Preservation Act.

Ground-disturbing activities would take into consideration the potential for discovery of previously undiscovered cultural resources. It is anticipated that proposed construction activities would occur within areas that have a high probability to encounter intact, subsurface cultural resources. It is recommended that subsurface archaeological surveys be conducted in areas where construction would impact undisturbed areas within or adjacent to arroyos. Should an inadvertent discovery of human or cultural remains occur, all project activities shall stop and procedures outlined in the Installation Cultural Resources Management Plan would be followed.

Paleontological Resources (PEA § 3.7, pages 3-37 to 3-39). The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on paleontological resources. Because most of the fossils of ancient organisms discovered on the installation have occurred in the areas surrounding the natural arroyos and waterways, avoidance of known sites would be taken into consideration when planning and developing stormwater drainage and arroyo repair projects. Because proposed construction activities would occur in areas that have a higher probability to encounter subsurface paleontological resources, any ground-disturbing would take into consideration the potential for the discovery of previously undiscovered paleontological resources. In order to minimize potential impacts to unrecorded paleontological deposits, it is recommended that subsurface surveys and monitoring be conducted in any area

where the construction would impact undisturbed areas within or adjacent to arroyos. Should an inadvertent discovery of paleontological materials occur, all project activities shall would stop and operational procedures outlined in the Installation Cultural Resources Management Plan would be followed as they would for archaeological resources.

Infrastructure (PEA § 3.8, pages 3-39 to 3-43). The Proposed Action is not anticipated to change or result in short- or long-term impacts on the electrical, natural gas and propane, liquid fuel, sanitary sewer/wastewater, and communications systems. The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on the transportation system, water supply system, stormwater handling, and solid waste management. During construction activities, the number of construction-related vehicles accessing the installation would increase, and installation roadways would be used by haul and delivery trucks; however, transportation is not expected to occur during peak travel times. Early coordination would ensure necessary safety precautions are taken and would allow ample advance notice to affected commuters and personnel.

Proposed construction and maintenance activities would require minimal amounts of water for dust suppression; however, this increase would be temporary and is not expected to exceed existing capacity on the installation. Soil disturbance would result in disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading. Implementation of BMPs would reduce these impacts. Construction debris generated would consist primarily of recyclable and reusable building materials such as concrete, metals, and removed vegetation. Should project activities be conducted within an area of known contamination, waste would be properly characterized prior to disposal. All waste disposal would be conducted in accordance with federal, state, and local laws and regulations. Nonhazardous waste that is not recyclable or reusable would be transported to the Kirtland AFB landfill for disposal.

Long-term, minor to moderate, beneficial impacts on stormwater handling would result by reducing the overall rate and volume of stormwater flows and detrimental effects of erosion and sedimentation. Development of new stormwater drainage systems and upgrade of existing systems would be designed with consideration for Unified Facilities Criteria Low Impact Design requirements to maintain or restore the natural hydrologic functions of the area.

Hazardous Materials and Wastes (PEA § 3.9, pages 3-44 to 3-50). The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on hazardous materials and wastes. Construction personnel would be made aware of the Environmental Management System program, implement standard BMPs, and comply with existing standard operating procedures and applicable federal and state laws governing the use, generation, storage, and transportation of hazardous materials. Construction equipment would be maintained according to manufacturer's specifications and drip mats would be placed under parked equipment as needed. All hazardous and petroleum wastes generated would be handled, stored, and disposed of in accordance with all federal, state, and local regulations.

It is possible that unknown, potentially hazardous wastes could be discovered or unearthed during ground-disturbing activities. In such cases, personnel would immediately cease work, contact appropriate installation personnel, and await sampling and analysis results before taking any further action. Any unknown wastes determined to be hazardous would then be managed or disposed or in accordance with applicable laws and regulations. In the event a project associated with the Proposed Action would be conducted within or adjacent to an active

restoration site, coordination with appropriate installation personnel would be conducted in order to avoid any impact on or from the site. Construction personnel would attend Unexploded Ordnance Awareness Training when project activities are conducted within or adjacent to a Military Munitions Response Program site.

Safety (PEA § 3.10, pages 3-50 to 3-53). The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on human health and safety. Construction and demolition activities would slightly increase the health and safety risk to personnel within the project area. The selected construction contractor would be required to develop a comprehensive health and safety plan for each individual project containing site-specific guidance and direction to prevent or minimize potential risks. Construction personnel would be responsible for compliance with applicable federal, state, and local safety regulations and would be educated through daily briefings to review daily activities and potential hazards. Project areas would be appropriately delineated and posted with access limited to construction and maintenance personnel.

Long-term, minor, beneficial impacts on the safety of personnel and the public downstream of the installation would be anticipated. Improved storm drainage on the installation would lessen the probability of adverse impacts from a 100-year flood event, including the resultant damage and inherent safety risks therein.

Socioeconomics (PEA § 3.11, pages 3-53 to 3-55). The Proposed Action would result in intermittent, short-term, negligible, beneficial impacts on socioeconomics. Direct and indirect, beneficial impacts on the local economy of the Albuquerque Metropolitan Statistical Area would result from increased payroll tax revenue and the purchase of construction materials and goods in the area. Long-term, negligible to minor, beneficial impacts on the socioeconomic environment at Kirtland AFB would result from improved conditions of stormwater drainage systems and arroyo repair and corrosion control measures on the installation. Damage to roads, parking lots, and foundations would decrease resulting in a reduction in costly repairs.

Cumulative Impacts (PEA § 4, pages 4-1 to 4-14). The USAF has concluded that no significant adverse cumulative impacts would result from activities associated with implementation of the Proposed Action when considered with past, present, or reasonably foreseeable future projects at Kirtland AFB and the Region of Influence.

NOTICE OF POTENTIAL FLOODPLAIN INVOLVEMENT

As required by Executive Order 11988, *Floodplain Management*, and Air Force Instruction 32-7064, *Integrated Natural Resources Management*, early public notification for potential floodplain impacts was provided in the *Albuquerque Journal* on Monday, 23 July 2018.

The Tijeras Arroyo and Arroyo del Coyote are located in the 100-year floodplain. Arroyo repair activities could include restabilizing, excavating, filling, and lining arroyo banks and constructing and repairing bridge supports, box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed and banks. Gabion structures and rip-rap could be used to dissipate energy from flowing water and as grade control structures to provide the arroyo bed and banks with stabilization and protection. Box culverts, typically precast or cast in place concrete structures, could be constructed to improve the flow of floodwater resulting in improved water quality because less erosion and sediment transfer would occur during a flood event. Arroyo repair activities would be compatible with activities identified in the Tijeras Arroyo

Management Plan prepared by the Albuquerque Metropolitan Arroyo Flood Control Authority. The Proposed Action would result in improved stormwater conveyance and a reduction in erosion and sedimentation of surface waters.

CONCLUSION

Based on the description of the Proposed Action as set for in the PEA, all activities were found to comply with the criteria or standards of environmental quality and were coordinated with the appropriate federal, state, and local agencies. The attached PEA and this FONSI/FONPA were made available to the public for a 30-day review period. Agencies have been coordinated with throughout the PEA development process and their comments were incorporated into the analysis of potential environmental impacts performed as part of the PEA as appropriate.

FINDING OF NO SIGNIFICANT IMPACT

Based on my review of the facts and analyses contained in the attached PEA, conducted under the provisions of National Environmental Policy Act, Council on Environmental Quality Regulations, and 32 CFR § 989, I conclude that the Proposed Action would not have a significant environmental impact, either by itself or cumulatively, with other known projects. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact completes the environmental impact analysis process.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer, Air Force Global Strike Command

Date

Attachment: *Programmatic Environmental Assessment Addressing Upgrade of the Stormwater Drainage System, Kirtland Air Force Base, New Mexico*.

ACRONYMS AND ABBREVIATIONS

ABCWUA	Albuquerque-Bernalillo County Water Utility Authority
ABW	Air Base Wing
ACAM	Air Conformity Applicability Model
ACM	asbestos-containing material
AEHD-AQD	Albuquerque Environmental Health Department Air Quality Division
AFB	Air Force Base
AFGSC	Air Force Global Strike Command
AFI	Air Force Instruction
AFRL	Air Force Research Laboratory
AMAFCA	Albuquerque Metropolitan Arroyo Flood Control Authority
APE	Area of Potential Effect
bgs	below ground surface
BLM	Bureau of Land Management
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	construction general permit
CO	carbon monoxide
CWA	Clean Water Act
dB	decibel(s)
dBA	A-weighted decibel(s)
DNL	day/night sound level
DoD	Department of Defense
DOE	Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EO	Executive Order
ER	Environmental Restoration
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FY	fiscal year
GHG	greenhouse gas
HWMP	Hazardous Waste Management Plan
I	Interstate
ICRMP	Integrated Cultural Resources Management Plan
IDP	Installation Development Plan
INMRP	Integrated Natural Resources Management Plan
LBP	lead-based paint
LID	Low Impact Design
L_{max}	maximum sound level
mgd	million gallons per day
MMRP	Military Munitions Response Program
MS4	Municipal Separate Storm Sewer System
MSA	Metropolitan Statistical Area
MSG/CEIEC	Mission Support Group/Civil Engineering Installation Management - Environmental Management - Compliance
MSGP	Multi-Sector General Permit
NAAQS	National Ambient Air Quality Standards

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NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMAC	New Mexico Administrative Code
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NOA	Notice of Availability
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
OSH	occupational safety and health
OSHA	Occupational Safety and Health Administration
Pb	lead
PCB	polychlorinated biphenyls
PEA	Programmatic Environmental Assessment
PJ/CRO	Pararescue/Combat Rescue Officer
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PM_{10}	particulate matter equal to or less than 10 microns in diameter
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RTI	Regional Training Institute
SDWA	Safe Drinking Water Act
SFG	Security Forces Group
SHPO	State Historic Preservation Officer
SNL	Sandia National Laboratories
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TEAMS	Technical Evaluation Assessment Monitor Site
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load
tpy	tons per year
UFC	Unified Facilities Code
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
UTC	Urban Training Compound
UXO	unexploded ordnance
VOC	volatile organic compound

Cover Sheet

Draft Programmatic Environmental Assessment Addressing Upgrade of the Stormwater Drainage System at Kirtland Air Force Base, New Mexico

Responsible Agencies: United States Air Force (USAF), Air Force Global Strike Command, 377th Air Base Wing

Cooperating Agencies: USAF invited the participation of the Albuquerque-Bernalillo County Water Utility Authority, Albuquerque Metropolitan Arroyo Flood Control Authority, Department of Energy, Federal Emergency Management Agency, and United States Army Corps of Engineers in the preparation of this Programmatic Environmental Assessment. The Albuquerque-Bernalillo County Water Utility Authority and Federal Emergency Management Agency have accepted to be Cooperating Agencies. The United States Army Corps of Engineers has agreed to review the draft documents during the scoping and public review periods.

Affected Location: Kirtland Air Force Base (AFB), New Mexico

Report Designation: Draft Programmatic Environmental Assessment

Abstract: USAF proposes to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland AFB. Various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or the Albuquerque Metropolitan Arroyo Flood Control Authority; therefore, either organization could be conducting activities covered under the Proposed Action. The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation transfer that occurs across the installation. The Proposed Action is needed because existing stormwater drainage facilities have deteriorated and clogged to the point where extensive work is needed to reestablish and maintain an effective stormwater drainage system. Ditches, culverts, pipes, and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. Standing stormwater created by clogged ditches and flat ground surfaces poses hazards to traffic and undermines roads, parking lots, and foundations. Outdoor storage areas require berms and retention structures to control runoff. Revegetation and other measures are needed to control discharges of suspended solids. Outlet structures are nonexistent, causing erosion to arroyos during storms. Arroyo work is required to repair erosion damage and reduce the potential for additional damage in the future. The Proposed Action would reduce the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation into surface waters.

Under the No Action Alternative, Kirtland AFB would take no action. Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures. Stormwater drainage problems would worsen as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs and worsening traffic hazards during heavy rains; and erosion of the

arroyos on the installation would continue, negatively affecting Waters of the United States (i.e., Rio Grande River) downstream of the installation.

This Programmatic Environmental Assessment analyzes the potential environmental impacts associated with the Proposed Action and alternatives, including the No Action Alternative, and aids in determining whether a Finding of No Significant Impact can be prepared or an Environmental Impact Statement is required.

Written comments and inquiries regarding this document should be directed by mail to the Kirtland AFB NEPA Program Manager, 377 MSG/CEIEC, 2050 Wyoming Boulevard SE, Suite 116, Kirtland AFB, New Mexico 87117-5270, or by email to *KirtlandNEPA@us.af.mil*.

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PROGRAMMATIC ENVIRONMENTAL ASSESSMENT ADDRESSING UPGRADE OF THE STORMWATER DRAINAGE SYSTEM AT KIRTLAND AIR FORCE BASE, NEW MEXICO

UNITED STATES AIR FORCE

Kirtland Air Force Base, New Mexico

JANUARY 2019

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Appendices

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1. Purpose of and Need for the Proposed Action

1.1 Introduction

The United States Air Force (USAF) proposes to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland Air Force Base (AFB), New Mexico. Various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA); therefore, either organization could be conducting activities covered under the Proposed Action. This Programmatic Environmental Assessment (PEA) evaluates the potential environmental impacts resulting from the Proposed Action and No Action Alternative.

This PEA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] § 4321 et seq.) and the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 Code of Federal Regulations [CFR] §§ 1500–1508). The USAF is also required to consider USAF NEPA-implementing regulations, 32 CFR § 989, as amended.

1.2 Project Location and Kirtland AFB Background

Kirtland AFB is in Bernalillo County, southeast of the city of Albuquerque, New Mexico (see **Figure 1-1**). The installation encompasses 51,585 acres with elevations that range from 5,200 to almost 8,000 feet above mean sea level. The Manzanita Mountains on its eastern boundary rise to over 10,000 feet (KAFB 2018a). The land within the installation is owned by a variety of entities (see **Table 1-1**). USAF controls 44,052 acres of the land within Kirtland AFB. The northwest portion of Kirtland AFB is developed. The remaining portion of the installation is relatively undeveloped and is used for training and testing missions.

Table 1-1. Kirtland AFB Land Ownership

Kirtland AFB Lands	Acres
USAF Fee Owned	25,612
United States Forest Service (USFS) withdrawn to the Department of Defense (DoD)	15,891
Bureau of Land Management (BLM) withdrawn to DoD	2,549
USAF Total (USAF Controlled Lands)	**44,052**
Department of Energy (DOE) Fee Owned	2,938
USFS withdrawn to DOE	4,595
DOE Total	**7,533**
GRAND TOTAL	**51,585**

Source: KAFB 2012

Surrounding land uses adjacent to Kirtland AFB include the USFS Cibola National Forest to the northeast and east; the Isleta Pueblo Reservation to the south; Bernalillo County developments to the southwest; residential and business areas of the city of Albuquerque to the west and north; and the Albuquerque International Sunport, hereafter referred to as the Sunport, directly to the northwest.

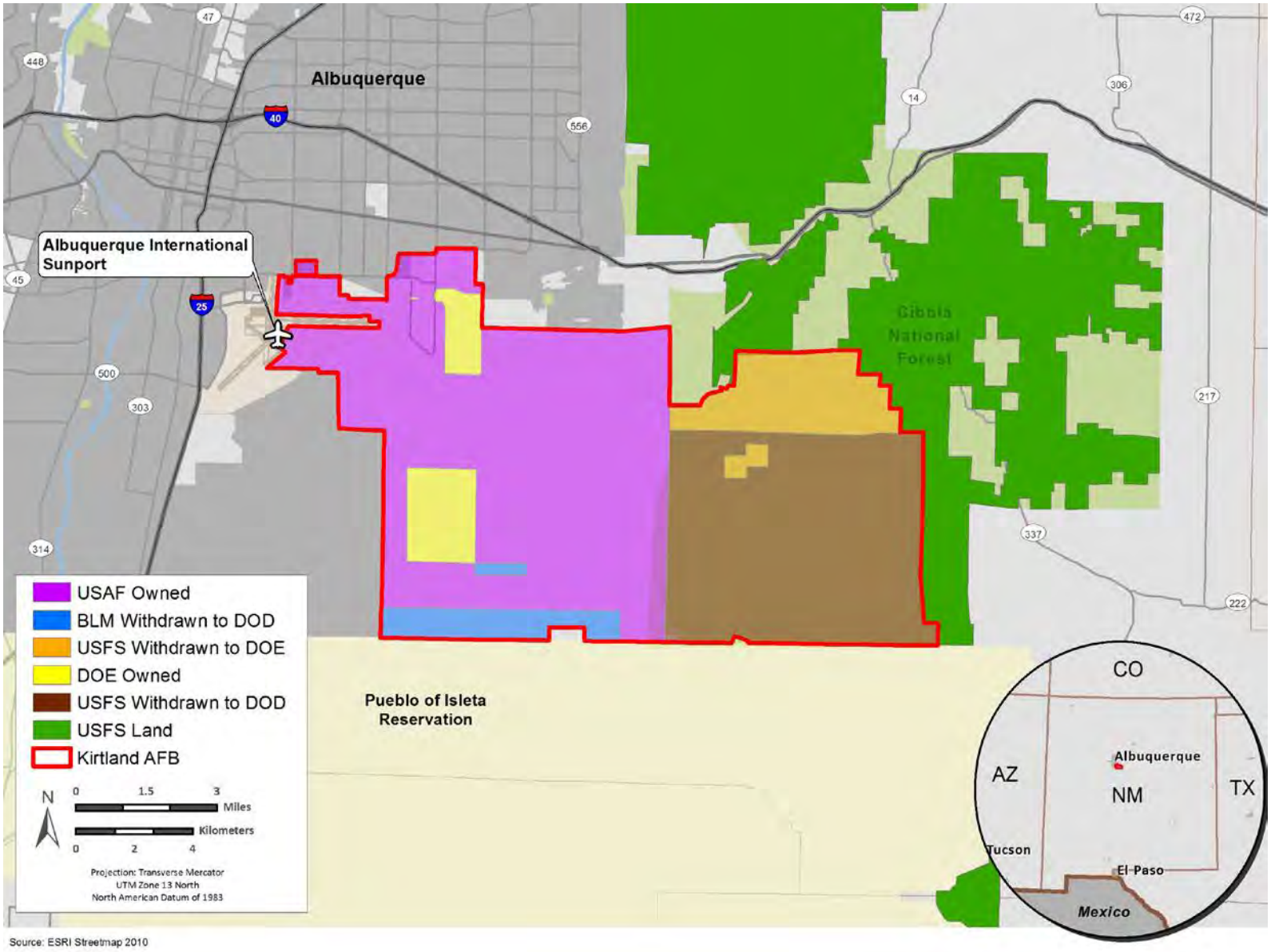

Figure 1-1. Kirtland AFB Vicinity Map with Land Ownership and Withdrawn Areas

Kirtland AFB was established in the late 1930s as a training installation for the United States (US) Army Air Corps. At that time, the installation was known as the Albuquerque Army Air Base. The installation grew rapidly with the involvement of the United States in World War II as a training site for aircrews for many of the country's bomber aircraft. In February 1942, Albuquerque Army Air Base was renamed Kirtland Army Air Field in honor of Colonel Roy C. Kirtland, one of the Army's earliest aviation pioneers. During this same year, the US Army Air Corps established a training base, later to be known as Sandia Base, just east of Kirtland Army Air Field. In 1947, the US Army Air Corps became the USAF, and Kirtland Army Air Field was renamed Kirtland AFB.

In 1949, the USAF established its own Special Weapons Center and testing laboratory at Kirtland Field near Sandia Base, which eventually became Phillips Laboratory and subsequently the Air Force Weapons Laboratory (now the Air Force Research Laboratory [AFRL]). A majority of the test and evaluation activities were conducted on a 46,000-acre tract in the Manzanita Mountains, referred to as the New Mexico Proving Ground, on the southern portion of the installation, which includes USFS lands withdrawn for DoD and DOE research, testing, and development activities. The establishment of these activities at Kirtland AFB was considered ideal due to its proximity to Los Alamos Laboratory and Sandia Base. The late 1940s and 1950s were expansion years as both Kirtland AFB and the adjacent Sandia Army Base played increasing roles in the nation's defense efforts. New buildings, hangars, and the east-west runway, which is now owned by the city of Albuquerque, were constructed. During this period, air defense, weather, and atomic test squadrons operated from Kirtland AFB. In 1971, Kirtland AFB and its adjoining military neighbors to the east, Sandia and Manzano Army Bases, were merged to form what is known as Kirtland AFB.

Kirtland AFB is the sixth largest installation in the USAF. It is operated by 377th Air Base Wing (ABW), a unit of Air Force Global Strike Command's 20th Air Force and the host unit at Kirtland AFB. Missions at Kirtland AFB fall into four major categories: research, development, and testing; readiness and training; munitions maintenance; and support to installation operations for more than 100 mission partners. The primary mission of 377 ABW is to execute nuclear, readiness, and support operations for American airpower. Kirtland AFB is a center for research, development, and testing of nonconventional weapons, space and missile technology, laser warfare and much more. Organizations involved in these activities include the Air Force Nuclear Weapons Center, Air Force Operational Test and Evaluation Center, Space and Missile Systems Center, Air Force Inspection Agency, Air Force Safety Center, AFRL, DOE, and Sandia National Laboratories (SNL). In addition, 377 ABW ensures readiness and training of airmen for worldwide duty and operates the airfield for present and future USAF operations, prepares personnel to deploy worldwide on a moment's notice, and keeps the installation secure. Mission partners involved in these activities include the 58th Special Operations Wing, 150th Special Operations Wing (New Mexico Air National Guard), and USAF Pararescue School.

1.3 Purpose and Need

The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation transfer that occurs across the installation.

The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated and clogged to the point where extensive work is needed to reestablish and maintain an effective stormwater drainage system. Ditches, culverts, pipes, and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. Standing stormwater created by clogged ditches and flat ground surfaces poses hazards to traffic and undermines roads, parking lots, and foundations. Outdoor storage areas require berms and retention structures to control runoff. Revegetation and other measures are needed to control discharges of suspended solids. Energy dissipation and grade control structures are nonexistent, which allows substantial erosion of arroyos during storm events. Arroyo work is required to repair erosion damage and reduce the potential for additional damage in the future. The Proposed Action would reduce the velocity and energy of stormwater flows, which in turn would reduce the detrimental effects of erosion and sedimentation into surface waters.

1.4 Scope of the Programmatic Environmental Assessment

The scope of this PEA includes the actions proposed; alternatives considered; a description of the existing environment; and direct, indirect, and cumulative impacts. The scope of the Proposed Action and the range of alternatives to be considered are presented in **Section 2**. The USAF NEPA-implementing regulations, 32 CFR § 989 (as amended), require consideration of the No Action Alternative, which is analyzed to provide the baseline against which the environmental impacts of implementing the range of alternatives addressed can be compared. The PEA identifies appropriate measures that are not already included in the Proposed Action or alternatives in order to avoid, minimize, or reduce adverse environmental impacts, if necessary.

A programmatic environmental document, such as this PEA, is prepared when an agency is proposing to carry out a broad action, program, or policy. USAF has determined that stormwater drainage system upgrades and arroyo repair activities are broad actions that could occur intermittently across the installation. This PEA reduces duplication of effort by analyzing general aspects of stormwater drainage system upgrade and arroyo repair activities and establishing a framework for environmental impact analysis of future site-specific actions. The impacts of future site-specific actions would be addressed in subsequent NEPA evaluations, per CEQ regulations (40 CFR § 1502.20). The use of tiering allows future documents to be specific in their analysis of individual stormwater drainage system upgrade or arroyo repair projects when they are more fully developed and designed while referencing previous environmental analyses.

This PEA identifies the environmental impacts of the Proposed Action and No Action Alternative on affected resource areas. Per CEQ regulations (40 CFR § 1501.7[a][3]), only those resource areas that apply to the Proposed Action and alternatives are analyzed. The following resource areas are analyzed and discussed for potential impacts: Noise, Air Quality, Geological Resources, Water Resources, Biological Resources, Cultural Resources, Paleontological

Resources, Infrastructure, Hazardous Materials and Wastes, Safety, and Socioeconomics and Environmental Justice.

1.4.1 NEPA Compliance Requirements

NEPA is a federal law requiring the analysis of potential environmental impacts associated with proposed federal actions before the actions are taken. The intent of NEPA is to make decisions informed by potential environmental consequences and take actions to protect, restore, or enhance the environment. NEPA established the CEQ, which is responsible for ensuring federal agency compliance with NEPA. CEQ regulations mandate all federal agencies use a prescribed approach to environmental impact analysis. The approach includes an evaluation of the potential environmental consequences associated with a proposed action and considers alternative courses of action.

The process for implementing NEPA is outlined in 40 CFR §§ 1500–1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. These CEQ regulations specify that an Environmental Assessment (EA) be prepared to determine whether a Finding of No Significant Impact (FONSI) is appropriate or if preparation of an Environmental Impact Statement (EIS) is necessary. An EA considers the effects (direct, indirect, and cumulative) of a proposed action on the natural and human environment. It uses a systematic, interdisciplinary approach to evaluate a proposed action and possible alternatives and must disclose all considerations to the public. An EA can aid in an agency's compliance with NEPA when an EIS is unnecessary and facilitate preparation of an EIS when one is required.

Because this PEA includes the evaluation of actions proposed to occur within a 100-year floodplain, if it is determined that a FONSI is appropriate, a Finding of No Practicable Alternative (FONPA) and approval from Headquarters AFGSC would be required. In accordance with 32 CFR § 989 and Executive Order (EO) 11988, *Floodplain Management*, because the proposed arroyo repair and erosion control measures would occur within a 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. In addition, appropriate permits would be obtained from applicable regulatory agencies to address impacts and determine potential mitigation, if required. As required by EO 11988 and Air Force Instruction 32-7064, *Integrated Natural Resources Management*, early public notification for potential floodplain impacts was provided in the *Albuquerque Journal* on Monday, 23 July 2018.

USAF regulations under 32 CFR § 989 provide procedures for environmental impact analysis for the USAF to comply with NEPA and CEQ NEPA regulations. Air Force Policy Directive 32-70, *Environmental Quality*, states the USAF will comply with applicable federal, state, and local environmental laws and regulations, including NEPA. If significant impacts are predicted under NEPA, the USAF would decide whether to conduct mitigation to reduce impacts below the level of significance, prepare an EIS, or abandon the Proposed Action. This PEA would also be used to guide the USAF in implementing the Proposed Action in a manner consistent with USAF standards for environmental stewardship should the Proposed Action be approved for implementation.

1.4.2 Intergovernmental and Stakeholder Coordination

NEPA requirements help ensure environmental information is made available to the public during the decision-making process and prior to an action's implementation. A premise of NEPA is that the quality of federal decisions will be enhanced if the public is involved in the planning process. 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, Kirtland AFB notified relevant stakeholders about the Proposed Action and alternatives (see **Appendix A** for stakeholder coordination materials). The notification process provided these stakeholders the opportunity to cooperate with Kirtland 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 § 800), and Section 7 of the Endangered Species Act (ESA) and implementing regulations (50 CFR § 17), including the Migratory Bird Treaty Act, findings of effect and a request for concurrence were transmitted to the New Mexico State Historic Preservation Officer (SHPO) and the United States Fish and Wildlife Service (USFWS). New Mexico SHPO responded that once the Areas of Potential Effect (APEs) for specific projects are defined, it may be necessary to complete National Register of Historic Places (NRHP) consultation. SHPO recommended that the Section 106 consultation be substantially complete before preparing a FONSI for the PEA, and further recommended the development of a programmatic agreement per 36 CFR 800.4.b.2 and 800.14 (HPD Log 107738). However, because specific projects have not yet been determined, the development of a programmatic agreement is not feasible at this time. Concurrence indicating a primary finding of no effect was received from the USFWS under Consultation Code 02ENNM00-2018-SLI-1108. Correspondence with the SHPO and USFWS is included in **Appendix A**.

The NHPA requires federal agencies to consult with federally recognized Native American tribes on proposed undertakings that have the potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal consultation process is distinct from NEPA consultation or the intergovernmental coordination process, and it requires separate consultation with all relevant tribes. The timelines for tribal consultation are also distinct from those of other consultations. The Kirtland AFB point-of-contact for Native American tribes is the Installation Commander. Consultation with the tribes was conducted concurrently with the scoping and Draft PEA review periods. The Native American tribal governments coordinated or consulted with regarding the Proposed Action are listed in **Appendix A** along with all USAF correspondence. Comments received from the various stakeholders and Native American tribes are discussed below and were considered during preparation of this PEA (see **Appendix A**).

Scoping letters were provided to relevant federal, state, and local agencies and Native American tribes notifying them that the USAF is preparing a PEA to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures at Kirtland AFB. The agencies and tribes were requested to provide information regarding impacts of the Proposed Action on the natural environment or other environmental aspects that they feel should be included and considered in the preparation of the PEA. During the scoping period, USAF received responses from two federal agencies

(USFS and BLM), three state agencies (New Mexico Environment Department [NMED], New Mexico Department of Game and Fish [NMDGF], and New Mexico SHPO) and one Native American Tribe (Santa Clara Pueblo). The USFS, BLM, and NMED had no concerns with the Proposed Action. NMDGF provided recommendations to minimize impacts on wildlife that have been included in the environmental consequences discussion in **Section 3.5** of this PEA. SHPO advised once APEs for specific projects are defined, it may be necessary to complete NRHP consultation (HPD Log 107738). This comment has been included in the environmental consequences discussion in **Section 3.6** of this PEA. Santa Clara Pueblo requested to be a consulting party in the preparation of this PEA. The federal, state, and local agencies and Native American tribal governments coordinated or consulted with regarding the Proposed Action are listed in **Appendix A** along with all correspondence.

1.4.3 Public and Agency Review of Draft PEA

A Notice of Availability (NOA) for the Draft PEA will be published in the *Albuquerque Journal* announcing the availability of the Draft PEA. Letters will be provided to relevant federal, state, and local agencies and Native American tribal governments informing them that the Draft PEA is available for review. The publication of the NOA will initiate a 30-day comment period. A copy of the Draft PEA will be made available for review at the San Pedro Public Library at 5600 Trumbull Avenue SE, Albuquerque, New Mexico 87108. A copy of the Draft PEA will also be made available for review online at *http://www.kirtland.af.mil* under the Environment Information tab. At the closing of the public review period, applicable comments from the general public and interagency and intergovernmental coordination/consultation will be incorporated into the analysis of potential environmental impacts performed as part of the PEA, where applicable, and included in **Appendix A** of the Final PEA.

1.5 Cooperating Agencies

In accordance with CEQ regulations (40 CFR § 1508.5), a cooperating agency may be any federal agency that has jurisdiction by law or special expertise with respect to environmental impacts expected from a proposal. An agency's jurisdiction by law (40 CFR § 1508.15) refers to an agency's authority to approve, veto, or finance all or part of a proposal. An agency's special expertise (40 CFR § 1508.26) refers to its statutory responsibility, agency mission, or program experience. Responsibilities of a cooperating agency (40 CFR § 1501.6b) include early participation in the NEPA process; developing information and preparing portions of the PEA for which the cooperating agency has special expertise, at the request of the lead agency; and providing staff support to enhance the lead agency's interdisciplinary capability. USAF invited the participation of the Albuquerque-Bernalillo County Water Utility Authority (ABCWUA), AMAFCA, DOE, Federal Emergency Management Agency (FEMA), and United States Army Corps of Engineers (USACE) in the preparation of this PEA. ABCWUA and FEMA have accepted to be Cooperating Agencies. USACE has agreed to review the draft documents during the scoping and public review periods.

During preparation of this PEA, Cooperating Agencies were provided an opportunity to review and comment on the Preliminary Draft PEA. ABCWUA and FEMA provided comments during their review and were provided a Check Draft version of the PEA to confirm their comments were addressed sufficiently. FEMA concurred with how their comments were addressed and

ABCWUA stated they had no additional comments. ABCWUA further stated that although their comments were not specifically addressed, they realize that no specific projects have been developed at this time and they will continue to work with the installation during project development. Correspondence between Kirtland AFB and the Cooperating Agencies is included in **Appendix A**.

2. Proposed Action and Alternatives

As discussed in **Section 1.4.1**, the NEPA process provides for an evaluation of potential environmental consequences associated with a proposed action and considers alternative courses of action. Reasonable alternatives must satisfy the purpose of and need for the Proposed Action, as defined in **Section 1.3**. In addition, CEQ guidance recommends the inclusion of a No Action Alternative against which potential impacts would be compared. While the No Action Alternative would not satisfy the purpose of or need for the Proposed Action, it is analyzed in detail in accordance with USAF NEPA-implementing regulations (32 CFR § 989, as amended).

2.1 Proposed Action

USAF proposes to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland AFB. **Figure 2-1** presents the current stormwater drainage system and arroyos on the installation. Various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or AMAFCA; therefore, either organization could be conducting activities covered under the Proposed Action. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Project activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, and other drainage infrastructure; and any required repair, maintenance, or cleaning of the stormwater pipe network. Arroyo repair and erosion control activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing and repairing bridge supports, box culverts, bank protection, grade control and energy dissipation structures, stilling basins, and other structures to assist in stabilizing the arroyo integrity and grades.

Stormwater Drainage Systems. Development of new stormwater drainage systems and upgrade of existing systems would include ditching/trenching; installation of reinforced concrete pipe, vegetation, environmentally-friendly soil stabilizers, rip-rap, and gabion structures; and construction of drop inlets, flow control structures, and retention structures. Ditching/trenching would require use of a backhoe or trencher to excavate a linear trench to install a pipe or other infrastructure. Trench lining, using reinforcement technologies such as trench boxes, would stabilize the trench during excavation and installation of pipes and other infrastructure. Pipes would be settled in the trench and surrounded with bedding material. Reinforced concrete pipe would be installed to assist in channelizing and diverting water flow where necessary.

Culverts, fully enclosed structures that run underneath a road to allow water to flow from one side of the road to another, would be installed, which would require excavation of the road. In order to prevent erosion, vegetation would be planted, environmentally-friendly soil stabilizers would be applied, or rip-rap, consisting of loose stone, would be used to form a foundation for breakwater or other structures. Gabion structures, consisting of a wire mesh cage filled with cobble or small boulder material, could be used to dissipate energy from flowing water and provide bed protection or bank stabilization.

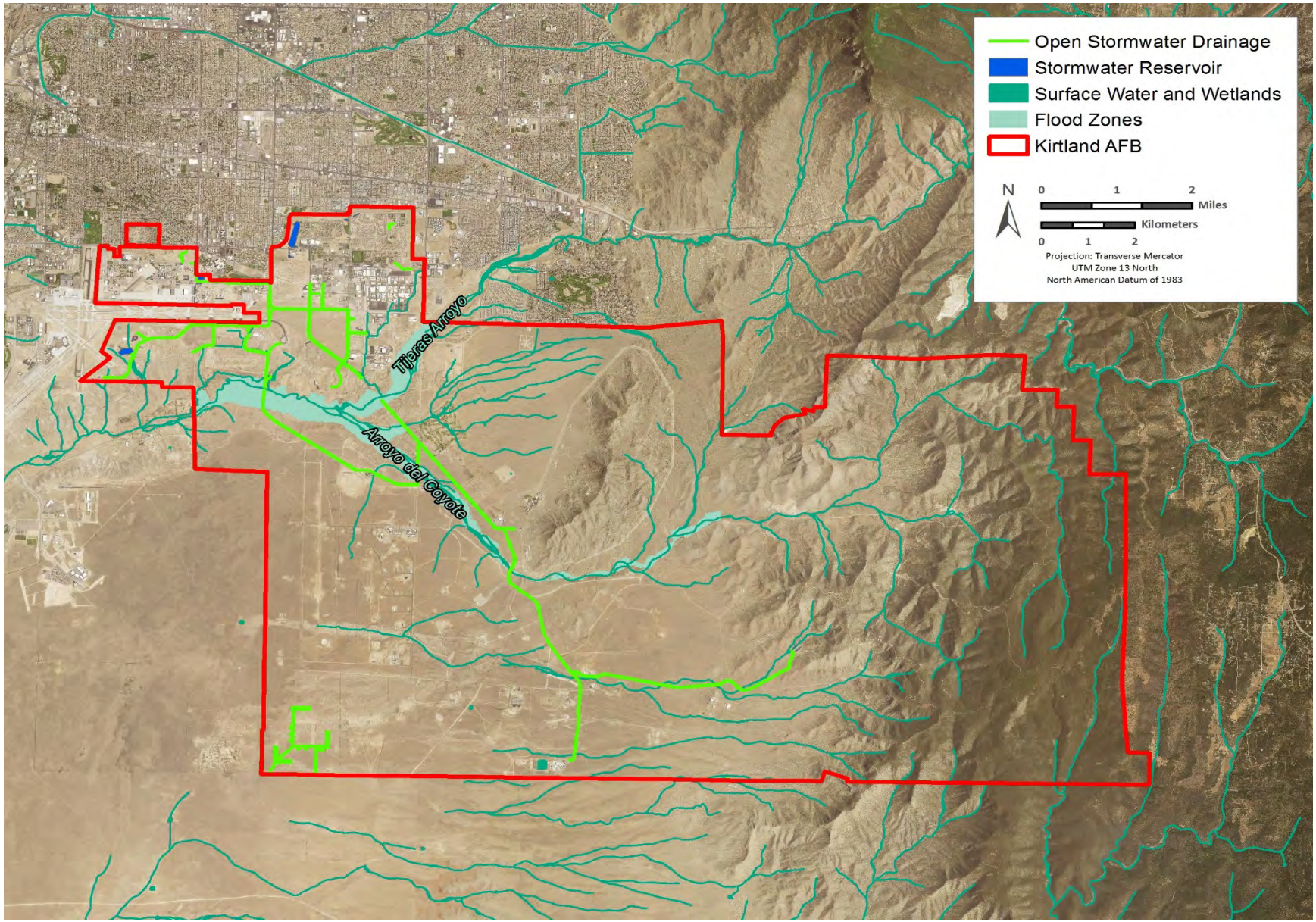

Figure 2-1. Stormwater Drainage Systems, Arroyos, Flood Zones, and Surface Waters on Kirtland AFB

A drop inlet is an access point to underground storm drains. It is usually precast concrete with a grate between the gutter and the inlet to keep debris out of the storm sewer lines. Installation of drop inlets would accompany construction of gutters and require excavation and storm drains to be present. Flow control structures are designed to control stormwater runoff. These structures trap sediment, dissipate energy, and can be used to redirect water around problem areas. Retention structures are lined, excavated areas for water to collect when it rains. Outlet structures are usually constructed of concrete with metal grates that lead from detention and retention basins into the storm sewer or other destination. Together, these structures reduce the amount of sediment going to the storm sewer and help manage stormwater flow.

Stormwater drainage system maintenance activities would include cleaning, excavating, regrading, filling, and backfilling. Debris would be cleaned from existing stormwater drains and drainage infrastructure by snaking, water blasting, or using hand tools or other equipment. Excessive soil would be removed by excavating, and regrading would be conducted to change the elevation of an area to direct water flow and allow for better drainage away from structures. Filling consists of filling an area that has been impacted by erosion and backfilling consists of refilling an excavated area with the material that was taken out during excavation or with other material if specified. Excavating, regrading, filling, and backfilling would require the use of a backhoe and other heavy equipment.

Arroyo Repair. Arroyo repair and erosion control activities could include restabilizing, excavating, filling, and lining arroyo banks and constructing and repairing bridge supports, box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed and banks. Gabion structures and rip-rap could be used to dissipate energy from flowing water and as grade control structures to provide the arroyo bed and banks with stabilization and protection. Box culverts, typically precast or cast in place concrete structures, could be constructed to protect the arroyo bed and banks.

As previously stated, various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or AMAFCA; therefore, either organization could be conducting activities covered under the Proposed Action. ABCWUA owns and maintains sanitary sewer lines on the installation, several of which traverse tributaries or are adjacent to the Tijeras Arroyo. The three organizations would continue to coordinate their activities in order to ensure no negative impacts would result to the other's activities or systems. It is assumed that an average of 3 acres of land would typically be disturbed annually by activities associated with the Proposed Action; however, it is conservatively assumed that the Proposed Action could disturb up to 10 acres of land annually.

2.2 Selection Standards

In accordance with 32 CFR § 989.8(c), the development of selection standards is an effective mechanism for the identification, comparison, and evaluation of reasonable alternatives. The following selection standards were developed to be consistent with the purpose of and need for the Proposed Action and to address pertinent mission, environmental, safety, and health factors. The following selection standards were used to identify reasonable alternatives for analysis in the PEA:

- Enable Kirtland AFB to reduce flooding and standing water issues, reestablish an effective stormwater drainage system, and reduce damaging erosion to arroyos.
- Be compatible with the mission and training at the installation. Stormwater drainage system development may not adversely impact installation testing and training activities.
- Be compatible with future development needs identified in the 2016 Installation Development Plan (IDP).
- Result in no adverse impacts on adjacent communities and properties.
- Meet current criteria/scope specified in:
    - Air Force Manual 32-1084, *Facilities Requirements*
    - EO 13693, *Planning for Federal Sustainability in the Next Decade*
    - EO 11988, *Floodplain Management*
    - EO 13807, *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure*
    - Section 438 of the Energy Independence and Security Act (EISA) of 2007.
- Meet current standards and optimize stormwater flow on the installation.
- Meet or exceed erosion and sediment control requirements of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) Regulation (40 CFR § 122).
- Be compatible with the activities identified in the Tijeras Arroyo Management Plan prepared by AMAFCA (AMAFCA 2017).
- Avoid environmental resources such as protected plant or animal species habitat or known cultural resources.
- Consider Bird/Wildlife Aircraft Strike Hazard concerns by reducing the potential for standing water adjacent to the runways.

2.3 No Action Alternative

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repairs and erosion control measures. Stormwater drainage problems would worsen as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs and worsening traffic hazards during heavy rains; and erosion of the arroyos on the installation, negatively affecting Waters of the United States (i.e., Rio Grande River) downstream of the installation, would continue. Severe deterioration could negatively impact the ability to execute mission and training activities.

The No Action Alternative would not meet the purpose of and need for the Proposed Action as described in **Section 1.3**; however, the USAF Environmental Impact Analysis Process (32 CFR § 989.8[d]) requires consideration of the No Action Alternative. In addition, CEQ

guidance recommends inclusion of the No Action Alternative in an EA to assess any environmental consequences that may occur if the Proposed Action is not implemented. Therefore, this alternative will be carried forward for detailed analysis in this PEA. The No Action Alternative also serves as a baseline against which the Proposed Action can be compared.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

No practical alternatives to the Proposed Action were identified because of the programmatic nature of the PEA. Alternatives, such as performing the proposed activities on only a portion of the installation, performing only the stormwater drainage system activities, or performing only the proposed arroyo repair activities, were not considered viable alternatives because they would not fully meet the purpose and need of the Proposed Action or satisfy the selection standards.

2.5 Comparative Summary of Impacts

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

1 **Table 2-1. Summary of Potential Impacts**

Affected Resource	Proposed Action	No Action Alternative
Noise	The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on the local noise environment. Activities associated with the Proposed Action would require the use of heavy construction equipment, which can cause an increase in sound above the ambient level. The off-installation noise environment might experience intermittent, short-term, minor, adverse impacts if construction associated with the Proposed Action occurred in proximity to the installation boundary; however, the Sunport lies between these locations and any noise from construction activities would be overshadowed by the noise created by commercial and military aircraft overflights.	The No Action Alternative would not result in any new or additional impacts.
Air Quality	The Proposed Action would result in intermittent, short-term, minor, adverse impacts on air quality. Emissions would be directly produced from activities such as operation of heavy equipment, workers commuting daily to and from job sites in their personal vehicles, heavy duty diesel vehicles hauling materials and debris to and from the job sites, and ground disturbance. However, such emissions would only be produced when construction associated with the Proposed Action is occurring, which is anticipated to be sporadic. Construction activities would incorporate best management practices (BMPs) and environmental control measures (e.g., wetting the ground surface) to minimize fugitive particulate matter air emissions. Additionally, work vehicles are assumed to be well maintained and to use diesel particulate filters to reduce particulate matter air emissions.	The No Action Alternative would not result in any new or additional impacts.
Geological Resources	The Proposed Action would result in short- and long-term impacts. Ground-disturbing activities would result in intermittent, short-term, negligible to minor, adverse impacts on local topography and soil resources. Activities would include grading, clearing, ditching or trenching, and boring of select areas on the installation. Project activities would implement techniques to minimize soil erosion and sedimentation by using appropriate BMPs and environmental protection measures. Additionally, each project activity would be reviewed to ensure proper erosion and sediment control measures are considered and incorporated into project designs. Long-term, minor, beneficial impacts on local topography and soil resources would be anticipated. These resources would likely benefit from improvements to the stormwater drainage system such as arroyo bank stabilization and landscape revegetation. Arroyo bank stabilization and landscape revegetation would also be expected to reduce the potential for soil erosion and loss. No short- or long-term impacts on regional geology or geological hazards are anticipated to occur.	The No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and erosion of arroyos on the installation continues.

Table 2-1. Summary of Potential Impacts (continued)

Affected Resource	Proposed Action	No Action Alternative
Water Resources	The Proposed Action would result in short- and long-term impacts. Intermittent, short-term, minor, adverse impacts would result from ground-disturbing activities associated with the Proposed Action; however, these impacts would be reduced by incorporating measures to promote stormwater retention and re-use and implementation of BMPs and environmental protection measures. Long-term, minor, beneficial impacts on local and regional water resources would be anticipated to result from the Proposed Action. Enhanced surface infiltration and subsurface water storage and recharge would occur on and downstream of the installation. The Proposed Action would reduce the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation into surface waters.	The No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs; and erosion of arroyos on and downstream of the installation would continue.
Biological Resources	The Proposed Action would result in short- and long-term impacts. Ground-disturbing activities would result in intermittent, short-term, negligible to minor, adverse impacts on grassland and juniper grassland vegetation. Direct effects on vegetation from crushing and indirect effects from soil compaction and potential for establishment of invasive species would occur. However, revegetation of disturbed sites with native species would support a native plant community. Temporary, minor degradation of wildlife habitat and a small amount of permanent habitat loss would result; however, stormwater drainage system upgrades would improve stream flow and result in beneficial impacts on aquatic habitat and species in the long-term. Additionally, arroyo repairs and stormwater improvements would promote bank stabilization and reduce erosion, resulting in beneficial impacts on terrestrial habitat. No impacts on federally and state listed species would occur due to physical improvements. Increased noise from construction activities would result in short-term, negligible to minor, adverse impacts on wildlife. However, noise would be intermittent and short-term and it is expected that when activities cease, species sensitive to noise would resume normal activities. High-impact maintenance and repair activities that require heavy equipment should be conducted outside the nesting season to the extent possible to further reduce any adverse impact.	The No Action Alternative would allow stormwater drainage problems to worsen and erosion of arroyos to continue resulting in adverse impacts on vegetation and wildlife habitat through increased erosion and sedimentation.

Table 2-1. Summary of Potential Impacts (continued)

Affected Resource	Proposed Action	No Action Alternative
Cultural Resources	The Proposed Action could result in intermittent, short-term, negligible to minor, adverse impacts on cultural resources. As individual projects are developed, project-specific NEPA analysis would be prepared and Section 106 consultation would occur at that time. Ground-disturbing activities have the potential to result in an adverse effect on known cultural resources because of the concentration of cultural resources surrounding the natural arroyos and waterways. Avoidance of known cultural resources sites would be taken into consideration when planning and developing stormwater drainage and arroyo repair projects. However, if project activities would be conducted adjacent to or cannot be adjusted to avoid impacting an archaeological site, then consultation with the SHPO/Tribal Historic Preservation Officer (THPO) would occur, and mitigation measures would be developed in accordance with Section 106 of the NHPA. It is recommended that any ground-disturbing activities take into consideration the potential for the discovery of previously undiscovered cultural resources. It is anticipated that proposed construction activities would occur within areas that have a high probability to encounter intact, subsurface cultural resources. Areas within or adjacent to the arroyos have the highest incidence of inadvertent discoveries of cultural resources. In order to minimize the potential impacts to unrecorded cultural deposits, it is recommended that subsurface archaeological surveys be conducted in any area where the construction would impact undisturbed areas within or adjacent to arroyos. Should an inadvertent discovery of human or cultural remains occur, all project activities shall stop, the Cultural Resources Program Manager would be notified, and procedures outlined in the current Integrated Cultural Resources Management Plan (ICRMP) would be followed. This would ensure no adverse impacts would occur on the newly discovered cultural resources,	The No Action Alternative would not result in any new or additional impacts. Continued erosion could unearth and damage or remove cultural resources.
Paleontological Resources	The Proposed Action could result in intermittent, short-term, negligible to minor, adverse impacts on paleontological resources. Most of the fossils of ancient organisms discovered on the installation have occurred in areas surrounding natural arroyos and waterways. Considering the project aims to construct, repair, and maintain the stormwater drainage systems within Kirtland AFB, the proposed construction activities would occur within areas that have a higher probability to encounter subsurface paleontological resources. Avoidance of known paleontological resources sites would be taken into consideration when planning projects. Additionally, it is recommended that any ground-disturbing activities take into consideration the potential for the discovery of previously undiscovered paleontological resources. To minimize potential impacts on unrecorded paleontological deposits, subsurface surveys and monitoring should be conducted in any area where the construction would impact undisturbed areas within or adjacent to arroyos.	The No Action Alternative would not result in any new or additional impacts. Continued erosion could unearth and damage or remove paleontological materials.

Table 2-1. Summary of Potential Impacts (continued)

Affected Resource	Proposed Action	No Action Alternative
Paleontological Resources (continued)	Should an inadvertent discovery of paleontological materials occur, all project activities shall stop, the Kirtland AFB Cultural Resources Program Manager would be notified, and operational procedures outlined in the ICRMP would be followed as they would for archaeological resources. This would ensure no adverse impacts would occur on the newly discovered paleontological resources.	
Infrastructure	The Proposed Action would result in short- and long-term impacts on the transportation system. Intermittent, short-term, negligible to minor, adverse impacts on area roadways would occur because of an increase in the number of construction-related vehicles accessing the installation; however, haul and delivery truck transportation is not expected to occur during peak travel times. Long-term, minor, beneficial impacts would result from project activities such as constructing and repairing gutters, curbs, and bridge supports. These activities would reduce costly repairs to roadways and improve transportation on the installation. The Proposed Action is not anticipated to change or result in short- or long-term impacts on the electrical, natural gas and propane, liquid fuel, sanitary sewer/wastewater, and communications utility systems. Intermittent, short-term, negligible to minor, adverse impacts are expected on the water supply system, stormwater handling, and solid waste management. Ground-disturbing activities would require minimal amounts of water, primarily for dust suppression; however, this increase would be temporary and would not be expected to exceed existing capacity. Soil disturbance has the potential to result in a minor disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading; however, implementation of BMPs would reduce these impacts. Minimal amounts of solid waste would be generated; however, construction debris would consist primarily of recyclable and reusable building materials and removed vegetation. Should project activities be conducted within an area of known contamination, waste would be properly characterized prior to disposal. Waste disposal would be conducted in accordance with all federal, state, and local laws and regulations. Materials that could be recycled or reused would be diverted from landfills to the greatest extent possible. Long-term, minor to moderate, beneficial impacts would result by reducing the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation.	The No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs and worsening traffic hazards during heavy rains; and erosion of the arroyos on the installation would continue.

Table 2-1. Summary of Potential Impacts (continued)

Affected Resource	Proposed Action	No Action Alternative
Hazardous Materials and Wastes	The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on hazardous materials and wastes. Activities would require the use of small quantities of hazardous materials and petroleum products. Kirtland AFB, AMAFCA, and construction contractors would ensure the handling and storage of any hazardous materials and petroleum products is carried out in compliance with applicable laws and regulations. No short- or long-term impacts are expected on the installation Environmental Management System (EMS) or special hazards. Intermittent, short-term, negligible, adverse impacts on the generation of hazardous and petroleum wastes would result. However, implementation of BMPs and environmental protection measures would reduce the potential for accidental release or unintentional disturbance of hazardous and petroleum wastes. All materials would be handled, stored, and disposed of in accordance with federal, state, and local regulations	The No Action Alternative would not result in any new or additional impacts.
Safety	The Proposed Action would result in short-term, negligible, adverse and long-term, negligible to minor, beneficial impacts on the safety of contractors, military personnel, and the public. Activities associated with the Proposed Action would slightly increase the health and safety risk to personnel within the project area. Contractor personnel would be responsible for compliance with applicable federal, state, and local safety regulations and would be educated through daily briefings to review daily activities and potential hazards. Project areas would be fenced and signs would be posted to notify visitors and personnel of planned and ongoing construction or maintenance activities. Long-term, minor, beneficial impacts on the safety of personnel and the public would be anticipated. Improved storm drainage on the installation would lessen the probability of a 100-year flood event, including the resultant damage and inherent safety risks therein.	The No Action Alternative would not result in any new or additional impacts.
Socioeconomics	The Proposed Action would result in short- and long-term, negligible to minor, beneficial impacts on the socioeconomic environment. Direct and indirect, beneficial impacts would result from increased payroll tax revenue and the purchase of construction materials and goods in the area. Damage to roads, parking lots, and foundations would decrease resulting in a reduction in costly repairs. The temporary increase of construction workers on the installation would represent a small increase in the total number of persons working on the installation and no additional facilities would be necessary to accommodate the workforce.	The No Action Alternative would not result in new or additional impacts; however, repairs and renovations to the stormwater drainage system would become more costly to execute the longer they are delayed.

3. Affected Environment and Environmental Consequences

This section of the PEA describes the natural and human environments that exist within Kirtland AFB and the consequences of the Proposed Action and No Action Alternative on affected resources within those environments. Only those resources that have the potential to be affected by any of the alternatives considered are described, as per CEQ guidance (40 CFR § 1501.7[3]).

Specific criteria for evaluating the potential environmental impacts of the Proposed Action and No Action Alternative are discussed by resource area. The significance of an action is measured in terms of its context and intensity. The context and intensity of potential environmental impacts are described in terms of duration, the magnitude of the impact, and whether they are adverse or beneficial, as summarized below:

- ***Short-term or long-term*.** 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.
- ***Significant, moderate, minor, negligible, or no impact*.** These relative terms are used to characterize the magnitude or intensity of an impact. Significant impacts are those effects that would result in substantial changes to the environment (as defined by 40 CFR § 1508.27) and should receive the greatest attention in the decision-making process. Less than significant impacts are those that would be slight but detectable.
- ***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.

Based upon the scope of the Proposed Action, resource areas with no impacts were identified through a preliminary screening process. The following describes those resource areas not being carried forward for detailed analysis, along with the rationale for their elimination:

- ***Airspace Management.*** Airspace management is not addressed in this PEA because none of the proposed activities would result in a change to current airspace types, flight activities, or training and no changes to current aircraft operations would occur. As a result, USAF anticipates no short- or long-term impacts on airspace management at Kirtland AFB. Therefore, airspace management will not be carried forward for detailed analysis.
- ***Land Use.*** Land use is not addressed in this PEA because none of the proposed activities would result in a change in the current land use designations identified in the 2016 IDP. As a result, USAF anticipates no short- or long-term impacts on land use at Kirtland AFB. Therefore, land use will not be carried forward for detailed analysis.

- ***Visual Resources.*** Visual resources are not addressed in this PEA because none of the proposed activities would result in a change to the visual environment on or off the installation. As a result, USAF anticipates no short- or long-term impacts on visual resources at Kirtland AFB. Therefore, visual resources will not be carried forward for detailed analysis.

- ***Environmental Justice.*** EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, require that all federal agencies address the potential effects of policies on minorities, low-income populations, and children. Environmental justice is not addressed in this PEA because the Proposed Action is not anticipated to cause disproportionately high and adverse health or environmental effects on minority or low-income populations or children. Because of the distance of the project area from off-installation populated areas, no off-installation minority, low income, or youth populations would be adversely impacted by the Proposed Action, nor would they experience disproportionately high and adverse impacts. As a result, USAF anticipates no short- or long-term impacts on any minority or low-income populations or children. Therefore, environmental justice will not be carried forward for detailed analysis.

3.1 Noise

Sound is a particular auditory impact produced by a given source, for example, the sound of rain on a rooftop. Noise is any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory impact. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. Noise can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between the source and receptor, receptor sensitivity, and time of day. Affected receptors are specific (e.g., residential areas, schools, places of worship, hospitals) or broad (e.g., nature preserves, designated districts) areas in which occasional or persistent sensitivity or noise above ambient levels exists. These receptors are generally referred to as sensitive noise receptors.

Sound levels vary with time. For example, the sound increases as an aircraft approaches, then falls and blends into the ambient sound environment, or background, as the aircraft recedes into the distance. Because of this variation, it is often convenient to describe a particular noise "event" by its highest or maximum sound level (L_{max}). However, L_{max} describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical L_{max} levels may produce different total noise exposures. One may be of short duration, while the other may last much longer.

Human response to noise varies, as do the metrics used to quantify it. Generally, sound levels can be measured with instruments that record instantaneous sound levels in decibels (dB). A-weighted decibel (dBA) is the unit used to characterize sound levels that can be sensed by the human ear. "A-weighted" denotes the adjustment of the frequency range to what the average human ear can sense when experiencing an audible event. The lower threshold of

audibility is generally within the range of 10 to 25 dBA for normal hearing. The threshold of pain occurs at the upper boundary of audibility, which is normally in the region of 135 dBA (USEPA 1981a).

Table 3-1 compares common sounds and shows how they rank in terms of auditory impacts. As shown, a whisper is normally 30 dBA and considered to be very quiet while an air conditioning unit 20 feet away is considered an intrusive noise at 60 dBA. Noise levels can become annoying at 80 dBA and very annoying at 90 dBA. To the human ear, each 10 dBA increase seems twice as loud (USEPA 1981b).

Table 3-1. Sound Levels and Human Response

Noise Level (dBA)	Common Sounds	Effect
10	Just audible	Negligible
30	Soft whisper (15 feet)	Very quiet
50	Light auto traffic (100 feet)	Quiet
60	Air conditioning unit (20 feet)	Intrusive
70	Noisy restaurant or freeway traffic	Telephone use difficult
80	Alarm clock (2 feet)	Annoying
90	Heavy truck (50 feet) or city traffic	Very annoying Hearing damage (8 hours)
100	Garbage truck	Very annoying
110	Pile drivers	Strained vocal effort
120	Jet takeoff (200 feet) or auto horn (3 feet)	Maximum vocal effort
140	Carrier deck jet operation	Painfully loud

Source: USEPA 1981a

Under the Noise Control Act of 1972, the Occupational Safety and Health Administration (OSHA) established workplace standards for noise. The minimum requirement states that constant noise exposure must not exceed 90 dBA over an 8-hour period. The highest allowable sound level to which workers can be constantly exposed is 115 dBA, and exposure to this level must not exceed 15 minutes within an 8-hour period. These standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise levels exceed these standards, employers are required to provide hearing protection equipment that reduces sound levels to acceptable limits.

The average day/night sound level (DNL) metric is a measure of the total community noise environment. DNL is the average A-weighted sound level over a 24-hour period, with a 10 dBA adjustment added to the nighttime levels (between 2200 and 0700 hours). This adjustment is an effort to account for increased human sensitivity to nighttime noise events. DNL was endorsed by the United States Environmental Protection Agency (USEPA) for use by federal agencies and was adopted by the US Department of Housing and Urban Development. DNL is an accepted unit for quantifying annoyance to humans from general environmental noise, including construction noise. Land use compatibility and incompatibility are determined by comparing the

predicted DNL at a site with the recommended land uses. Noise levels occurring at night generally produce a greater annoyance than those of the same levels occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 dBA louder than those occurring during the day, at least in terms of its potential for causing community annoyance.

The federal government established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. According to the US Army, Federal Aviation Administration, and US Department of Housing and Urban Development criteria, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where noise exposure exceeds 75 dBA, "normally unacceptable" in regions exposed to noise between 65 and 75 dBA, and "normally acceptable" in areas exposed to noise of 65 dBA or less. For outdoor activities, USEPA recommends 55 dBA as the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA 1974).

3.1.1 Affected Environment

The ambient sound environment at Kirtland AFB is affected mainly by USAF and civilian aircraft operations, automotive vehicles, and live-fire weapons. In the heavily developed northwestern portion of the installation, the commercial and military aircraft operations at the Sunport are the primary source of noise. **Figure 3-1** presents the existing DNL noise contours for the Sunport plotted in 5-dB increments, ranging from 65 to 75 dBA DNL. Secondary sources of noise, such as vehicle travel, industrial activities, and military training, also contribute to the louder ambient sound environment of the northwestern portion of the installation compared to other portions of Kirtland AFB. The ambient sound environment of the remaining portions of the installation is quieter because development is less concentrated. Intermittent noises from military training, mainly military vehicles, live-fire weapons, and explosives training, dominate the ambient sound environment of these portions of Kirtland AFB.

Most sensitive noise receptors that could potentially be exposed to noise from installation activities are on or proximate to the northwestern and northern portions of Kirtland AFB. For example, several schools for the city of Albuquerque are on or proximate to the northwestern portion of the installation. There are also several medical centers and hospitals in this region. All Kirtland AFB housing and community functions are within the northwestern portion of the installation, and several residential neighborhoods in the city of Albuquerque are proximate to the northwest and northern boundaries of the installation. No other portions of Kirtland AFB contain or are proximate to sensitive noise receptors (KAFB 2016).

3.1.2 Environmental Consequences

3.1.2.1 PROPOSED ACTION

The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on the local Kirtland AFB noise environment. The activities associated with the Proposed Action would require the use of heavy construction equipment, which can cause an increase in sound that is well above the ambient level. These activities are described in detail in

Section 2.1.1. Such activities would occur annually as needs are identified. The off-installation noise environment might experience intermittent, short-term, minor, adverse impacts if construction associated with the Proposed Action occurred in proximity to the Kirtland AFB boundary where construction noise would propagate beyond the installation's boundary; however, the Sunport lies between these locations and any noise from construction activities would be overshadowed by the noise created by commercial and military aircraft overflights (see **Figure 3-1**).

Noise decreases with distance; therefore, adverse impacts from construction noise are typically confined to within 0.5 mile of a project area. **Table 3-2** presents noise levels associated with common types of construction equipment that can exceed the ambient sound levels by 20 to 25 dBA in an urban environment and up to 30 to 35 dBA in a remote area. All construction-related noise impacts would last only for the duration of each construction period and would occur during the daytime hours of 0700 to 1700.

Table 3-2. Predicted Noise Levels for Construction Equipment

Construction Equipment	L_{max} at 50 feet	L_{max} at 500 feet	L_{max} at 1,500 feet
Backhoe	78	58	48
Chain Saw	84	64	54
Compactor (Ground)	83	63	53
Concrete Mixer Truck	79	59	49
Concrete Pump Truck	81	61	51
Concrete Saw	90	70	60
Crane	81	61	51
Dozer	82	62	52
Excavator	81	61	51
Front End Loader	79	59	49
Grapple (Backhoe)	87	67	57
Impact Pile Drive	101	81	71
Jack Hammer	89	69	59
Pavement Scarifier	90	70	60
Pneumatic Tools	85	65	55
Vacuum Excavator	85	65	55

Source: FHWA 2006

When project activities are proposed, Kirtland AFB personnel would identify the sensitive noise receptors, such as schools, hospitals, housing, and places of worship proximal to the work site. Project activities occurring on the northwestern and northern portions of the installation would have the greatest potential to impact sensitive noise receptors. Construction workers would implement BMPs to reduce adverse noise impacts on these receptors, as needed. Noise from construction equipment could be managed using mufflers and temporarily placing noise dampening barriers (e.g., sound screens) around construction sites. Noise levels from construction sites would vary depending on the types of equipment being used on a given day, the topography of the area where the project would occur, the distance between the receptor and the generating source, and the presence of trees or buildings.

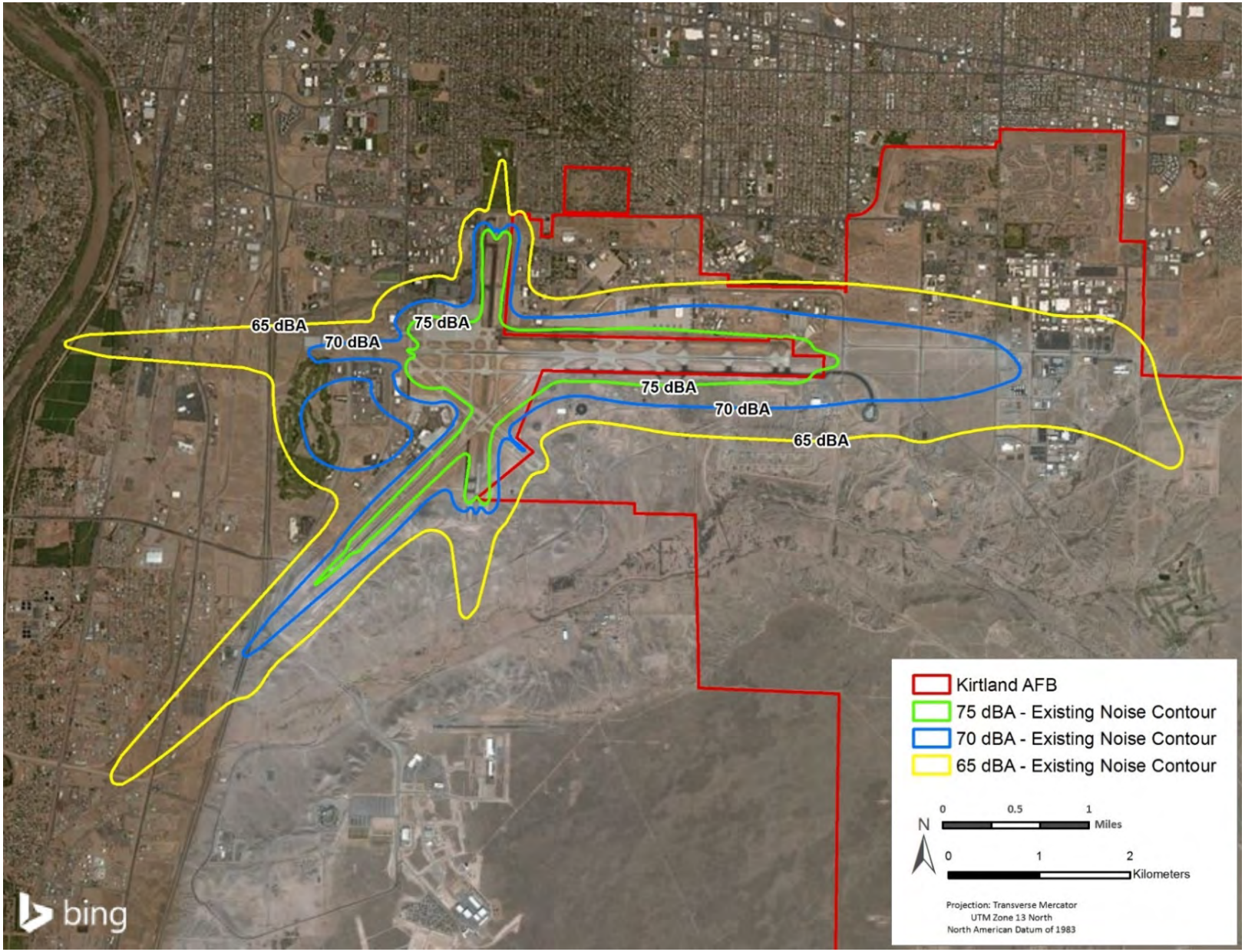

Figure 3-1. DNL Noise Contours for the Albuquerque International Sunport

Because Kirtland AFB is adjacent to the Sunport and is an active military installation that supports aircraft and live-fire weapons training, the intermittent increases in construction noise would be a fraction of the noise generated routinely on the installation. Additionally, construction noise occurring within the heavily developed northwestern portion of Kirtland AFB would be less noticeable than construction noise occurring elsewhere on the installation because of the louder ambient noise environment of this portion of the installation. While construction noise might be more noticeable on the portions of Kirtland AFB that are less developed, there are no sensitive noise receptors that would be exposed to these increased levels of noise. Therefore, the Proposed Action would not be expected to result in a significant impact on sensitive noise receptors or the noise environment.

3.1.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures, and the existing conditions discussed in **Section 3.1.1** would remain unchanged. No new noises would be introduced to the on- and off-installation noise environments; therefore, no new noise impacts would occur. Noise associated with emergency repairs because of stormwater damage from deteriorated and non-existent stormwater infrastructure would continue.

3.2 Air Quality

Air quality is defined by the concentration of various pollutants in the atmosphere at a given location. Under the Clean Air Act, the six pollutants defining air quality, called "criteria pollutants," include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide, ozone (O_3), suspended particulate matter (measured less than or equal to 10 microns in diameter [PM_{10}] and less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), and lead (Pb). CO, SO_2, Pb, and some particulates are emitted directly into the atmosphere from emissions sources. Nitrogen dioxide, O_3, and some particulates are formed through atmospheric chemical reactions that are influenced by weather, ultraviolet light, and other atmospheric processes. Volatile organic compounds (VOCs) and nitrogen oxides (NO_x) emissions are used to represent O_3 generation because they are precursors of O_3.

USEPA has established National Ambient Air Quality Standards (NAAQS) (40 CFR § 50) for criteria pollutants. NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards protect against welfare effects, such as damage to farm crops and vegetation and damage to buildings. Some pollutants have short-term and long-term standards. Short-term standards are designed to protect against acute, or short-term, health effects, while long-term standards were established to protect against chronic health effects. The state of New Mexico has established its own ambient air quality standards for the criteria pollutants, which in some cases are more stringent than the NAAQS.

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 a federal 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 maintenance designation can

be removed from an area if the area demonstrates to the USEPA it can consistently remain below NAAQS for more than 20 years.

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 conformity analysis are called *de minimis* levels. *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.

NMED Air Quality Bureau oversees programs for permitting the construction and operation of new or modified stationary source air emissions in the state of New Mexico. The NMED Air Quality Bureau has delegated authority over air quality in Bernalillo County to the Albuquerque Environmental Health Department Air Quality Division (AEHD-AQD).

Fugitive Dust Control Regulation. AEHD-AQD has fugitive dust control requirements in 20.11.20 New Mexico Administrative Code (NMAC), *Fugitive Dust Control*. A fugitive dust control construction permit is required for projects disturbing 0.75 acre or more and the demolition of buildings containing more than 75,000 cubic feet of space. As stated in 20.11.20.12 NMAC, *General Provisions*, each person shall use reasonably available control measures or any other effective control measure during active operations or on inactive disturbed surface areas, as necessary, to prevent the release of fugitive dust, whether or not the person is required by 20.11.20 NMAC to obtain a fugitive dust control permit.

Climate Change and Greenhouse Gases. Global climate change refers to long term fluctuations in temperature, precipitation, wind, sea level, and other elements of Earth's climate system. Ways in which the Earth's climate system may be influenced by changes in the concentration of various gases in the atmosphere have been discussed worldwide. Of particular interest, greenhouse gases (GHGs) are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. 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 produce negative economic and social consequences across the globe.

3.2.1 Affected Environment

Kirtland AFB is in Bernalillo County, New Mexico, which is within the Albuquerque-Mid Rio Grande Intrastate Air Quality Control Region. The Albuquerque-Mid Rio Grande Intrastate Air Quality Control Region also includes portions of Sandoval and Valencia counties, New Mexico (NMED 2017). Bernalillo County is designated by USEPA as unclassified/attainment for all criteria pollutants, except CO. The county was designated as nonattainment for CO until 1996 when it was redesignated as maintenance because CO concentrations decreased and no longer exceeded NAAQS (USEPA 2017a). CO concentrations continued to steadily decrease in the region over the next 20 years, so the AEHD-AQD submitted a CO Limited Maintenance Plan to USEPA. The CO Limited Maintenance Plan is an option provided by USEPA for areas that demonstrated CO levels will remain below 85 percent of the CO NAAQS. Bernalillo County is still under a CO maintenance plan and a CO conformity applicability analysis is required.

Kirtland AFB manages multiple air quality permits, including 20.11.41 NMAC, *Construction Permits*; 20.11.21 NMAC, *Open Burning*; 20.11.20 NMAC, *Fugitive Dust Control*; and 20.11.40 NMAC, *Source Registrations.* All of these permits include operating or emissions limits to ensure compliance with the Clean Air Act. Kirtland AFB must also comply with all 20.11 NMAC requirements to include 20.11.42 NMAC Title V Operating Permit #527-RN1, which covers most of the permitted stationary emission sources on the installation. These sources include emergency generators, fire pump engines, boilers, water heaters, fuel storage tanks and fuel dispensing systems, gasoline service stations, surface coating operations, aircraft engine testing, fire training, remediation activities, mulching activities, miscellaneous chemical usage, and open detonation of munitions for military training and research and development. **Table 3-3** presents the 2017 stationary air emissions inventory for Kirtland AFB.

Table 3-3. Calendar Year 2017 Stationary Air Emissions Inventory for Kirtland AFB

Actual Emissions	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)
	6.03	41.15	5.60	0.34	0.68

Kirtland AFB also holds a Fugitive Dust Control Programmatic Permit, Permit No. 8091-P, with the AEHD-AQD that covers routine heavy equipment activities. The permit includes BMPs such as watering during ground-disturbing activities, using soil stabilization agents for dust suppression, and decreasing speed limits on unpaved roads.

Climate Change and Greenhouse Gases. Ongoing global climate change has the potential to increase average temperatures and cause more frequent, intense, and prolonged droughts in the southwest United States including New Mexico (Garfin et al. 2014). These changes to regional climate patterns could result in regional changes to flooding frequency, vegetation types, vegetation growth rates, wildfire potential, groundwater depth, and potable water availability.

3.2.2 Environmental Consequences

3.2.2.1 PROPOSED ACTION

The Proposed Action would result in intermittent, short-term, minor, adverse impacts on air quality. Such activities would occur annually as maintenance, upgrade, and repair needs are identified. Emissions of criteria pollutants and GHGs would be directly produced from activities such as operation of heavy equipment, workers commuting daily to and from job sites in their personal vehicles, heavy duty diesel vehicles hauling materials and debris to and from the job sites, and ground disturbance. However, such emissions would only be produced when the construction associated with the Proposed Action is occurring, which is anticipated to be sporadic during any given year.

The air pollutant of greatest concern is particulate matter, such as fugitive dust. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of activity. Minor fugitive dust emissions would be produced from the amount of land disturbance associated with the Proposed Action. Fugitive dust air emissions would be greatest during the initial site grading and excavation and would vary day to day

depending on the work phase, level of activity, and prevailing weather conditions. Particulate matter emissions would also be produced from the combustion of fuels in vehicles and equipment needed for construction.

Construction would incorporate BMPs and environmental control measures (e.g., wetting the ground surface) to minimize fugitive particulate matter air emissions. Additionally, work vehicles are assumed to be well maintained and to use diesel particulate filters to reduce particulate matter air emissions. All projects must comply with 20.11.20 NMAC, *Fugitive Dust Control*, to prevent the release of fugitive dust. USAF would obtain a fugitive dust control construction permit from AEHD-AQD each time a stormwater drainage system and arroyo repair and erosion control project is proposed if the action is subject to the 20.11.20 NMAC permitting threshold. Application for the fugitive dust control construction permit would require USAF to develop a fugitive dust control plan, which would outline specific dust control measures that would be implemented during construction. These BMPs and environmental control measures could reduce uncontrolled particulate matter emissions from a construction site by approximately 50 percent depending upon the number of BMPs and environmental control measures required and the potential for particulate matter air emissions. Kirtland AFB's existing fugitive dust control programmatic permit for routine heavy equipment activities, Permit No. 8091-P, would provide coverage for future maintenance activities associated with the Proposed Action. Per 20.11.20.12 NMAC, the USAF would also use reasonably available fugitive dust control measures during any construction activity associated with the Proposed Action, whether or not a fugitive dust control permit was required.

USAF's Air Conformity Applicability Model (ACAM) was used to estimate the annual air emissions from the construction associated with representative stormwater drainage system and arroyo repair and erosion control projects. For the purposes of this air quality analysis, it was assumed up to 10 acres of land would be disturbed annually by the activities associated with the Proposed Action. **Table 3-4** summarizes the anticipated air emissions, and **Appendix B** contains the detailed ACAM report.

Table 3-4. Estimated Annual Air Emissions from Construction Associated with the Proposed Action

Estimated Annual Air Emissions	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	GHG (tpy)
	8.522	1.353	7.954	0.018	28.101	0.210	1,750.0

Notes: Pb emissions are not included because they are negligible for the types of emission sources under this Proposed Action.
All air emissions have been estimated using the USAF ACAM. Actual construction equipment and operating periods are expected to produce lesser emissions than those estimated in this table. A 50 percent control factor to PM_{10} and $PM_{2.5}$ emissions has been applied because fugitive dust emissions would be reduced with BMPs and environmental control measures specified in a project's fugitive dust control plan.

As noted in **Section 3.2.1**, Bernalillo County is designated by USEPA as unclassified/attainment for all criteria pollutants, except CO. With the exception of CO, the general conformity rule does not apply to the Proposed Action. As demonstrated in **Table 3-4**, estimated CO emissions are well below the 100 tpy threshold for a conformity determination. Projected CO emissions would be 7.954 tpy; therefore, a conformity determination is not required for the Proposed Action. Fugitive dust emissions would be reduced with BMPs and environmental control measures

specified in a fugitive dust control plan. As such, a 50 percent control factor to PM_{10} and $PM_{2.5}$ emissions has been applied in **Table 3-4**. Therefore, the Proposed Action would not be expected to result in a significant impact on air quality.

Climate Change and Greenhouse Gases. Construction associated with the Proposed Action would emit approximately 1,705 tons of carbon dioxide equivalent during a given year. By comparison, this amount of carbon dioxide equivalent is approximately the GHG footprints of 83 single family houses with two cars per home (USEPA 2018). As such, this annual emission of GHGs would not meaningfully contribute to the potential effects of global climate change. Therefore, the Proposed Action would not be expected to result in a significant impact on climate change.

Ongoing changes to climate patterns in the southwestern United States are described in **Section 3.2.1**. These climate changes are unlikely to affect USAF's ability to implement the Proposed Action. Because global climate change could increase the severity of flooding on Kirtland AFB, the Proposed Action would serve as a climate change resiliency action to lessen potential damage to infrastructure and the severity of flooding impacts in vulnerable areas.

3.2.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures; therefore, the existing conditions discussed in **Section 3.2.1** would remain unchanged and no new air emissions would be produced. The No Action Alternative would not result in any new or additional impacts on air quality.

3.3 Geological Resources

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography and physiography, geology, soils, and, where applicable, geologic hazards. Topography and physiography pertain to the general shape and arrangement of the land surface, including its height and the position of its natural and human-made features. Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types, in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential, affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

Farmland is protected under the Farmland Protection Policy Act (FPPA) of 1981. The intent of the FPPA is to minimize the extent that federal programs contribute to the unnecessary conversion of high-quality farmland to non-agricultural uses. The FPPA also ensures that federal programs are administered in a manner that, to the extent practicable, is compatible with private, state, and local government programs and policies to protect farmland. The

implementing procedures of the FPPA (7 CFR § 658) require federal agencies to evaluate the adverse effects (direct and indirect) of their activities on farmland, which includes prime farmland, unique farmland, and farmland of statewide or local importance, and to consider alternative actions that could avoid adverse effects.

3.3.1 Affected Environment

Regional Geology. The Rio Grande Rift is a zone of faults and sediment-filled basins extending from south-central Colorado across New Mexico and into northern Mexico. The rift is a defining physiographic feature of central New Mexico and the approximately 3,000-square-mile Albuquerque Basin (also referred to as the Middle Rio Grande Basin). This basin is comprised of three discrete sub-basins each containing more than 14,000 feet of rift-filled valley deposition accrued over millions of years. Along the margins of the basin, sediment deposits thin out to depths as low as 3,000 feet in areas where tectonic activity formed and uplifted mountains (USGS 2003).

Kirtland AFB is situated near the east-central edge of the Albuquerque Basin, along the margins of the Sandia and Manzanita Mountains. The geology of Kirtland AFB is defined by the vertical displacement between the rock units exposed at the top of these mountains and areas west and southwest towards the Rio Grande River (hereafter, referred to as Rio Grande) and its tributaries. The subsurface environment underlying Kirtland AFB is complex because of the gradual filling of the basin with sediments deposited by river and stream (fluvial), slopes and mountain fronts (alluvial-colluvial), wind (eolian), and volcanic activity in the form of lava or ash. Sediment deposition was further complicated by the large-scale faulting of the Albuquerque Basin that occurred approximately 5 to 11 million years ago (SNL 2017a).

The portion of the Albuquerque Basin underlying Kirtland AFB is primarily composed of poorly consolidated alluvial-colluvial sediments. The exposed bedrock in the eastern part of the installation generally consists of igneous (i.e., granite) and metamorphic rock, overlain by non-corresponding deposits of marine carbonate rock (i.e., limestone, sandstone, and shale) (KAFB 2018a).

Topography and Soils. The east-central portion of the Albuquerque Basin (locally referred to as East Mesa) extends west and southwest from the steep foothills and slopes of the Sandia and Manzanita Mountains to the gently sloping areas near the Rio Grande. Similarly, the topography of Kirtland AFB ranges from the mountainous terrain of the Cibola National Forest Withdrawn Area in the east to the relatively flat mesa in the west. Elevations range from nearly 8,000 feet above mean sea level in the Manzanita Mountains to approximately 5,200 feet above mean sea level on the mesa. The greatest change in elevation occurs in the centrally located Coyote Canyon and along the far eastern boundary of Kirtland AFB. The ground surface slope across the installation generally occurs in a west to southwest direction.

Regionally, the soils of the Albuquerque Basin vary from fine-grained clays and silts near river channels to well-drained sands and sandy loams on plateaus and highlands. Soils associated with Kirtland AFB predominately consist of sand and loam with varying amounts of gravel, cobble, or stone. Nearly all soils on the installation are well drained, and some are susceptible to erosion, particularly in areas with topographic relief (KAFB 2018a).

Table 3-5 describes the soil characteristics for areas of Kirtland AFB that directly support the USAF mission. **Figure 3-2** displays the location of these soils on the installation.

Table 3-5. Soil Characteristics of USAF Controlled Lands at Kirtland AFB

Soil Series	Slope	Runoff
Bluepoint loamy fine sand	1 to 9%	low
Embudo gravelly fine sandy loam	0 to 5%	very low
Embudo-Tijeras complex	0 to 9%	very low to medium
Gila fine sandy loam	0 to 2%	low
Ildefonso gravelly sandy loam	1 to 9%	low
Laporte-Rock Outcrop-Escabosa complex	5 to 20%	medium
Latine sandy loam	1 to 5%	low
Madurez loamy fine sand	1 to 5%	low
Madurez-Wink Association	1 to 7%	very low to low
Nickel-Latene Association	1 to 30%	low to medium
Pino-Rock outcrop Association	3 to 15%	very high
Rock outcrop (various)	15 to 80%	high to very high
Salas complex	20 to 80%	high
Seis-Silver complex	10 to 40%	very high
Seis very cobbly loam	0 to 15%	medium
Silver and Witt soils	5 to 9%	high to very high
Tesajo-Millet stony sandy loam	3 to 20%	low to medium
Tijeras gravelly fine sandy loam	1 to 5%	low
Tome very fine sandy loam	0 to 2%	medium
Wink fine sandy loam	0 to 5%	very low

Source: USDA-NRCS 2017

None of the soils listed in **Table 3-5** are classified as prime farmland, unique farmland, or farmland of statewide or local importance pursuant to the FPPA (USDA-NRCS 2018). Additionally, Kirtland AFB is not currently utilized for agriculture, nor is any agricultural use planned in the future.

Geological Hazards. Earthquake activity or seismicity is generally caused by displacement across active faults. Earthquakes are more prevalent in areas with a high-level of tectonic activity such as volcanic regions and fault zones. Landslides or mudslides are also commonly associated with tectonically active zones. Landslides include a wide range of ground movements and are typically caused by multiple, overlapping environmental factors (e.g., rockfalls, deep failure of slopes, land modifications, earthquakes, and storms).

More commonly known as the Tijeras fault zone, the Tijeras-Cañoncito fault system consists of several northeast-oriented, sub-vertical faults that form the eastern edge of the Albuquerque Basin. The Tijeras fault zone is part of this regionally extensive group of faults. The southern end of the Tijeras fault zone converges with the southern Sandia and Hubbell Spring fault zones beneath Kirtland AFB near Tijeras Arroyo (USGS 2002). Frequent, low magnitude and intensity earthquakes are common occurrences for the Albuquerque region, including Kirtland AFB.

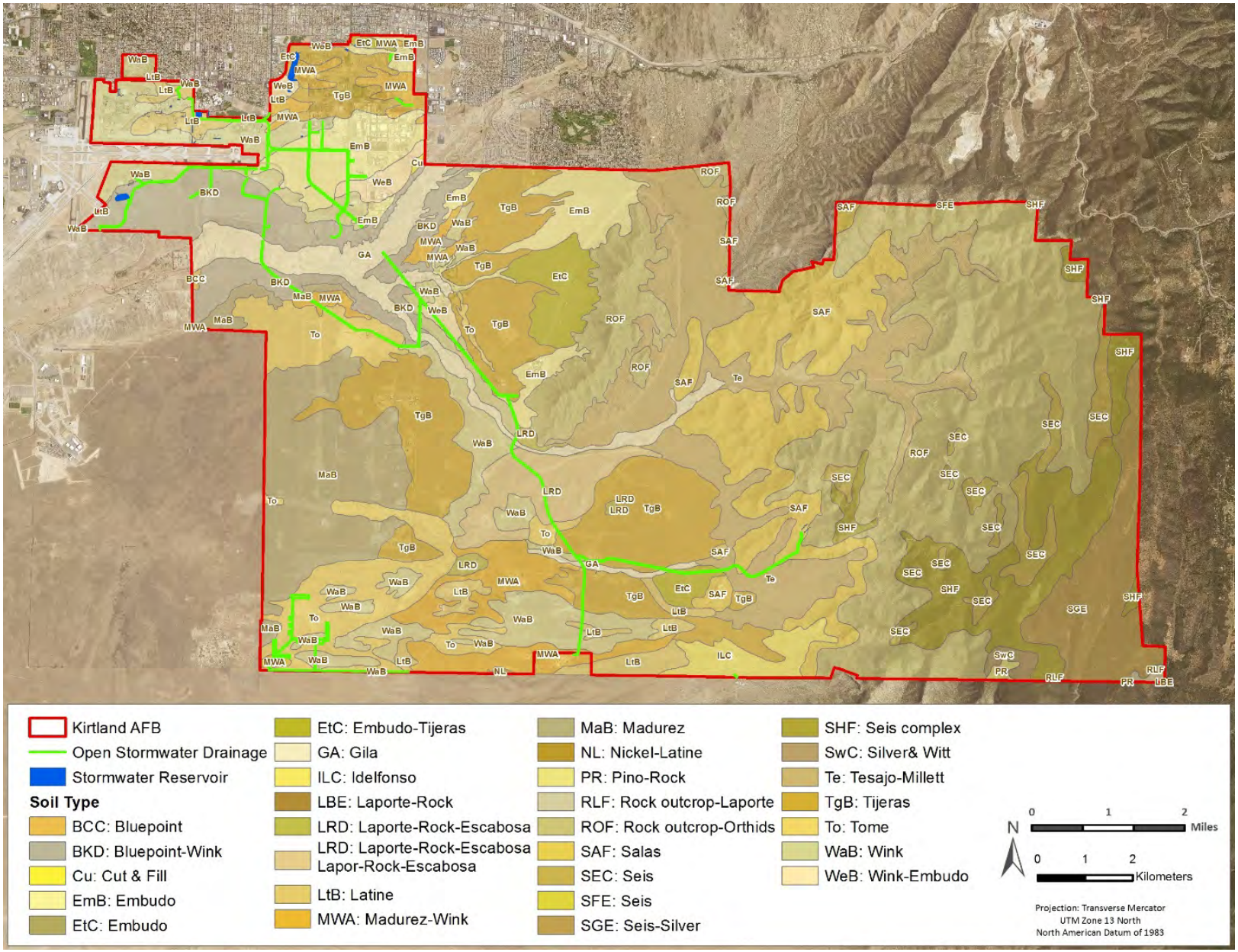

Figure 3-2. Soils on Kirtland AFB

Accordingly, the United States Geological Survey rates the seismic hazard of this area as "moderate" based upon a measurement of expected building damage in an earthquake scenario. Similarly, the International Conference of Building Officials Uniform Building Code classifies the region as having a moderate potential for damage to structures from seismic activity (USGS 2008).

3.3.2 Environmental Consequences

3.3.2.1 PROPOSED ACTION

The Proposed Action would result in short- and long-term impacts on topography and soil resources. No short- or long-term impacts on regional geology or geological hazards are anticipated to occur. The Proposed Action is not anticipated to change or result in short- or long-term impacts on regional geological features or cause an existing geologic feature to become unstable. Therefore, regional geology and geological hazards are not discussed further.

Topography and Soils. The Proposed Action is expected to result in intermittent, short-term, negligible to minor, adverse impacts on local topography and soil resources. Construction and maintenance activities associated with the Proposed Action would include ground disturbance or excavation to remove or expand existing storm drainage infrastructure and install new infrastructure; grading to route, redirect, or retain surface water runoff during storm events; the installation of grade control structures such as box culverts for arroyo bank stabilization; or earthwork to direct or control surface water runoff. These activities would include grading, clearing, ditching or trenching, and boring of select areas on the installation. Ground-disturbing activities would expose soils and increase their susceptibility to water and wind erosion.

Over time, the Proposed Action could also result in the gradual alteration of topography downstream of select project locations because of minor changes in the direction, rate, and volume of surface water flows. To a lesser extent, maintenance activities under the Proposed Action would similarly change the topography in select areas of the installation. These impacts would be reduced by the implementation of appropriate BMPs and environmental protection measures. Additionally, the use of heavy equipment or vehicles could result in soil compaction, altering their normal function relative to water storage, infiltration, or filtration; however, construction activities associated with the Proposed Action would take the attributes of the topography and underlying soil types within a project area into consideration in the design of each potential project.

Project activities would implement techniques to minimize soil erosion and sedimentation by using appropriate BMPs and environmental protection measures. As applicable, Kirtland AFB would obtain coverage under the 2017 NPDES CGP for projects that individually or cumulatively disturb 1 acre or more of land. The CGP requires the preparation, approval, and implementation of site-specific Stormwater Pollution Prevention Plans (SWPPPs) prior to construction, including appropriate structural and non-structural erosion, sediment, and waste control BMPs (USEPA 2017b). In accordance with the current CGP, the Kirtland AFB Municipal Separate Storm Sewer System (MS4) Stormwater Management Plan, and the Kirtland AFB Multi-Sector General Permit (MSGP) SWPPP, each project activity would be reviewed to ensure proper erosion and sediment control measures are considered and incorporated into project designs. Under the Proposed Action, these measures would be specific to individual projects, but may include:

- compost blankets, mulching, rip-rap, watering, seeding and sodding, geotextiles, and slope drains for erosion control
- compost filter berms and socks; fiber rolls or berms; temporary sediment basins, rock dams, filters, chambers, or traps; silt fences; and storm drain inlet protection for sediment control.

Under the Proposed Action, all project activities would comply with EISA Section 438 (refer to **Section 3.4**) and employ Low Impact Design (LID) practices to maintain or restore a site's pre-development hydrology. Site-specific LID features would further enhance stormwater retention and infiltration onsite thereby reducing the potential for soil loss via erosion (USEPA 2009). Similarly, soil compaction would be minimized via implementation of standard BMPs. For example, staging areas for equipment and construction materials would utilize existing gravel, paved, or mowed areas to the extent practicable. All project activities that disturb 0.75-acre or more would also obtain a fugitive dust control construction permit from Bernalillo County (see **Section 3.2**). Each permit would include site-specific BMPs for dust control and suppression such as watering, the use of soil stabilization agents, and vehicle speed limits on unpaved roads. Therefore, the Proposed Action would not be expected to result in a significant impact on the local topography or soil resources.

Long-term, minor, beneficial impacts on local topography and soil resources would be anticipated to result from the Proposed Action. Upon completion of the Proposed Action, these resources would likely benefit from improvements to the stormwater drainage system such as arroyo bank stabilization and landscape revegetation post-construction or post-maintenance. Arroyo bank stabilization and landscape revegetation would also be expected to reduce the potential for soil erosion and loss.

3.3.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures, and the existing conditions discussed in **Section 3.3.1** would remain unchanged. Additionally, implementation of the No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and erosion of the arroyos on the installation continues.

3.4 Water Resources

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 Kirtland AFB's location in New Mexico include groundwater, surface water, floodplains, and wetlands. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes and ensures compliance with the Clean Water Act (CWA), 33 USC § 1251 et seq. (1972).

Groundwater. Groundwater is water that exists in the saturated zone beneath the Earth's surface that collects and flows through aquifers. Groundwater is an essential resource that functions to recharge surface water 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, recharge rate, and surrounding geologic formations. The state of New Mexico passed ground and surface water protection objectives subject to the Water Quality Act, New Mexico Statutes Annotated (NMSA) 74-6, under 20.6.2 NMAC.

Groundwater quality and quantity are regulated under several federal and state programs. The federal Underground Injection Control regulations, authorized under the Safe Drinking Water Act (SDWA), require a permit for the discharge or disposal of fluids into a well. The federal Sole Source Aquifer regulations, also authorized under the SDWA, protect aquifers that are critical to water supply. The state of New Mexico passed state drinking water rules, which incorporate the federal SDWA regulations, under 20.7.10 NMAC and regulates water rights under NMSA 72-1.

Surface Water. 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. These features are generally classified as streams, springs, wetlands, natural and artificial impoundments (e.g., ponds, lakes), and constructed drainage canals and ditches. Stormwater is surface water generated by precipitation events that may percolate into permeable surficial sediments or flow across the top of impervious or saturated surficial areas, a condition known as runoff. 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. Proper management of stormwater flows, which can be intensified by high proportions of impervious surfaces associated with buildings, roads, and parking lots, is important to the management of surface water quality and natural flow characteristics.

The CWA establishes federal limits, through the NPDES permit process, for regulating point (end of pipe) and non-point (stormwater) discharges of pollutants into the Waters of the United States and quality standards for surface waters. The term “Waters of the United States” has a broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats (including wetlands). Sections 401 and 404 of the CWA regulate the discharge of dredged or fill materials into the Waters of the United States, including wetlands.

USEPA’s MS4 program addresses pollution from stormwater runoff conveyed by an MS4 and discharged into rivers and streams. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and trash and other inappropriately disposed of waste materials. In compliance with provisions of the CWA, operators of stormwater discharges associated with industrial activities are authorized to discharge to Waters of the United States in accordance with the eligibility and Notice of Intent requirements, effluent limitations, inspection requirements, and other conditions set forth in the 2015 MSGP. The USEPA currently regulates large (equal to or greater than 1 acre) construction activity through the 2017 CGP, which provides coverage for a period of 5 years.

EISA 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. EISA Section 438 requirements are independent of stormwater requirements under the CWA. The project footprint consists of all horizontal hard surface and disturbed areas associated with project development. 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. Pre-development hydrology would be modeled or calculated using recognized tools and must include site-specific factors, such as soil type, ground cover, and ground slope.

Additionally, LID features need to be incorporated into new construction activities to comply with the restrictions on stormwater management promulgated by EISA Section 438. LID is a stormwater management strategy designed to maintain site hydrology and mitigate the adverse impacts of stormwater runoff and non-point source pollution. LIDs can manage the increase in runoff between pre- and post-development conditions on the project site through interception, infiltration, storage, and evapotranspiration processes before the runoff is conveyed to receiving waters. Examples of LID methods include bio-retention, permeable pavements, cisterns/recycling, and green roofs (DoD 2010).

Floodplains. Floodplains are areas of low, level ground present along rivers, stream channels, or coastal waters that are subject to periodic or infrequent inundation because of rain or melting snow. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, nutrient cycling, water quality maintenance, and provision of habitat for a diversity of plants and animals. Flood potential is evaluated by 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. The risk of flooding is influenced by local topography, the frequencies of precipitation events, the size of the watershed above the floodplain, and upstream development. Federal, state, and local regulations often limit floodplain development to passive uses, such as recreation and conservation activities, to reduce the risks to human health and safety. EO 11988, *Floodplain Management*, requires federal agencies to determine whether a proposed action would occur within a floodplain and directs them to avoid floodplains to the maximum extent possible wherever there is a practicable alternative.

3.4.1 Affected Environment

Groundwater. Kirtland AFB is within the limits of the Rio Grande Underground Water Basin, which is defined as a natural resources area and designated as a “declared underground water basin” by the state of New Mexico. The average depth to groundwater beneath Kirtland AFB is 450 to 550 feet below ground surface (bgs). The Rio Grande Basin’s source of groundwater is the Santa Fe Aquifer, which has an estimated 2.3 billion acre-feet of recoverable water. This aquifer is most likely recharged east of the installation in the Manzanita Mountains where the sediment soil materials favor rapid infiltration (KAFB 2018a). The regional aquifer is used for the installation’s water supply. Kirtland AFB has a water right that allows it to divert approximately 6,400 acre-feet of water, or approximately 2 billion gallons, per year from the underground aquifer (KAFB 2016). In 2017, Kirtland AFB pumped 2,283 acre-feet (744 million gallons) of water from the regional aquifer (KAFB 2018b).

Surface Water. Kirtland AFB is within the Rio Grande watershed. The Rio Grande is the major surface hydrologic feature in central New Mexico, flowing north to south through Albuquerque, approximately 5 miles west of the installation. Surface water resources on Kirtland AFB reflect its dry climate. The average annual rainfall in Albuquerque is 9 inches, with half of the average

annual rainfall occurring from July to October during heavy thunderstorms. Surface water generally occurs in the form of stormwater sheet flow that drains into small gullies during heavy rainfall events (KAFB 2018a). Surface water generally flows across the installation in a westerly direction toward the Rio Grande.

The two main surface water drainage channels on Kirtland AFB are the Tijeras Arroyo and the smaller Arroyo del Coyote, which joins the Tijeras Arroyo approximately 1 mile west of the Tijeras Arroyo Golf Course (see **Figure 2-1**). The Tijeras Arroyo and Arroyo del Coyote are tributaries to the Rio Grande. They flow intermittently during heavy thunderstorms and the spring snowmelt, but most of the water percolates into alluvial deposits or is lost to the atmosphere via evapotranspiration. The Tijeras Arroyo, which is dry for most of the year, is the primary surface channel that drains surface water from Kirtland AFB to the Rio Grande. Precipitation reaches the Tijeras Arroyo through a series of storm drains, flood canals, and small, mostly unnamed arroyos. Nearly 95 percent of the precipitation that flows through the Tijeras Arroyo evaporates before it reaches the Rio Grande. The remaining 5 percent is equally divided between groundwater recharge and runoff (KAFB 2018a, USAF 1991).

The topography of Kirtland AFB causes stormwater runoff to either percolate into the ground or flow towards the Rio Grande. During heavy precipitation, stormwater on the installation is collected via a series of storm drains, flood canals and small, mostly unnamed, arroyos that eventually drain to Tijeras Arroyo or Arroyo del Coyote. Stormwater in the developed area drains into small culverts towards Gibson Boulevard along the installation boundary. There are also four detention ponds in the area. Stormwater in the industrial/laboratory areas discharges through surface runoff or three large culverts that drain toward the Tijeras Arroyo on the south (KAFB 2018a).

There are 10 wetlands supplied by at least 15 naturally occurring springs on Kirtland AFB; however, no Jurisdictional Determinations have been made concerning these water features. There are no natural lakes or rivers on Kirtland AFB; however, six man-made ponds have been created on the Tijeras Arroyo Golf Course.

Kirtland AFB operates under three NPDES Permits: the MSGP for industrial activities, the MS4 permit for stormwater conveyances from installation development, and the CGP for construction projects. Stormwater runoff on the installation predominantly flows through the drainage patterns created by natural terrain and paved surfaces. In some areas, runoff is directed through ditches and piping, with direct discharges into a receiving stream or surface water body.

Issued in December 2015, the MSGP, Permit No. NMR050001, focuses on facilities and industry sector-specific BMP requirements. It requires the installation to have a SWPPP and includes specific requirements for implementing control measures (e.g., minimize exposure, good housekeeping, maintenance, spill prevention and response), conducting self-inspections and visual assessments of discharges, taking corrective actions, and conducting training, as appropriate. Kirtland AFB has 10 outfalls (i.e., five MS4 and five MSGP) on the installation. Because of the semi-arid climate in Albuquerque, wet weather samples are typically collected in July, August, September, and October when flow is present and storm event criteria are met. These months are categorized as the installation's four quarterly sample events; however,

collection and monitoring of data for all four quarters is not always possible due to the semi-arid climate.

According to the 2017 MSGP Annual Report being prepared by Kirtland AFB, Outfalls D and E are subject to wet weather monitoring. For the 2017 reporting period, only one sample was collected from Outfall E and no samples were collected from Outfall D. Although average benchmark values could not be calculated, the Outfall E results indicated that the sample contained elevated levels of magnesium. Other Sector K (hazardous waste treatment storage or disposal) parameters were below the benchmark concentrations. Magnesium has been elevated in past sampling years at that outfall; however, the concentrations were consistent with naturally occurring background levels. Past results for Outfall D indicated concentrations of iron and total suspended solids that exceed the applicable Sector L (landfills and land application sites) benchmark values in past reporting years; however, the concentrations appear consistent with naturally occurring background levels. Kirtland AFB is working with an environmental consultant to identify improvements to Outfall D that would increase the number of wet weather samples collected in this outfall. A thorough site inspection was conducted for Sectors K and L to verify that structural control measures and BMPs were implemented to the maximum extent practicable (Branson 2018).

Kirtland AFB is a co-permittee to the city of Albuquerque, Bernalillo County, for compliance with the Middle Rio Grande Watershed Based MS4 General Permit No. NMR04A000. The MS4 permit, issued in September 2015, regulates stormwater sediment and pollutant discharges from the municipality sources of the installation. The MS4 collects and conveys stormwater from storm drains, pipes, and ditches and discharges into the Tijeras Arroyo and the city of Albuquerque's MS4. Kirtland AFB has developed a Stormwater Management Plan as required by the MS4 permit.

According to the 2017 MS4 Annual Report, Kirtland AFB is still in the data collection phase and began collecting data and tracking dissolved oxygen, sediment control, and bacteria reduction levels in 2015 and will perform trend analysis when enough data is available. Programs to manage the use of pesticides and fertilizers have been in place on the installation since 2007 (KAFB 2017a).

Finally, Kirtland AFB operates under a 2017 CGP (#NMR100000), which expires 16 February 2022. It includes several guidelines to implement erosion and sedimentation control, pollution prevention, and stabilization on construction sites of 1 acre or more. If a project at Kirtland AFB is subject to the CGP requirements, the contractor must develop a site-specific SWPPP and provide the plan to the 377th Mission Support Group/Civil Engineering Installation Management – Environmental Management – Compliance (MSG/CEIEC) for review and approval. Upon approval, both the contractor and Kirtland AFB must submit Notices of Intent and be granted approval from USEPA before work begins.

Floodplains. The 100-year floodplain on the installation is associated with the Arroyo del Coyote and Tijeras Arroyo (see **Figure 2-1**). Arroyo del Coyote and Tijeras Arroyo floods occur infrequently and are characterized by high peak flows, small volumes, and short durations (KAFB 2018a). As stated in **Section 2.1** various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or AMAFCA.

3.4.2 Environmental Consequences

3.4.2.1 PROPOSED ACTION

The Proposed Action would result in short- and long-term impacts on local and regional water resources on and downstream of the installation. Intermittent, short-term, minor, adverse impacts would result from ground-disturbing activities associated with the Proposed Action; however, these impacts would be reduced by incorporating LIDs to promote stormwater retention and re-use and implementation of BMPs and environmental protection measures.

Long-term, minor, beneficial impacts on local and regional water resources would be anticipated to result from stormwater drainage improvements associated with the Proposed Action. Enhanced surface infiltration and subsurface water storage and recharge would occur. The Proposed Action would reduce the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation into surface waters.

Groundwater. The Proposed Action would result in short- and long-term impacts on groundwater. Ground-disturbing activities associated with the Proposed Action would result in an intermittent, short-term, negligible, adverse impact on groundwater. Construction and demolition activities would require minimal amounts of water, primarily for dust suppression. This water would be obtained from the Kirtland AFB water supply system. The annual water use (approximately 2,495 acre-feet) for the installation is well below the 6,000 acre-feet withdrawal allowed per year in the Water Rights Agreement with the state of New Mexico; therefore, it is anticipated that sufficient water resources would be available on the installation.

The Proposed Action would not affect the quality of regional groundwater resources. The average depth to groundwater beneath Kirtland AFB is 450 to 550 feet; therefore, groundwater would not be encountered during construction activities associated with the Proposed Action. Because of the depth to groundwater, it is also not anticipated that any potential petroleum or hazardous material spills during construction would reach groundwater. Recharge of the Santa Fe Aquifer most likely occurs east of the installation in the Manzanita Mountains and would not be affected by the Proposed Action. Proper housekeeping, maintenance of equipment, and containment of fuels and other potentially hazardous materials would be conducted to minimize the potential for a release of fluids. Therefore, implementation of the Proposed Action would not be expected to result in a significant impact on groundwater.

Long-term, minor, beneficial impacts on groundwater reservoirs underlying Kirtland AFB would result from improved surface water infiltration, storage, and recharge.

Surface Water. The Proposed Action would result in short- and long-term impacts on surface waters. Ground-disturbing activities associated with the Proposed Action would result in an intermittent, short-term, negligible to minor, adverse impact on surface water. If project activities are subject to CGP requirements (i.e., surface disturbance equal to or greater than 1 acre), the contractor must develop a site-specific SWPPP and provide the plan to 377 MSG/CEIEC for review and approval. Upon approval, both the contractor and Kirtland AFB must submit Notices of Intent and be granted approval from USEPA before work can begin. All BMPs outlined in the SWPPP would be implemented prior to any ground disturbance thereby reducing any adverse impact on surface water. The goal of the SWPPP is to reduce or eliminate stormwater pollution

from construction activities by planning and implementing appropriate pollution control practices to protect water quality. Soil disturbance from construction and demolition activities has the potential to result in a minor disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading. Development of new stormwater drainage systems and upgrade of existing systems would be designed with consideration for the Unified Facilities Code (UFC) LID requirements, in accordance with EISA Section 438, to maintain or restore the natural hydrologic functions of the area.

Construction activities would include the use of equipment; petroleum, oil, and lubricants; and hazardous materials that would be stored on site. The selected construction contractor would follow industry-standard BMPs during construction activities, which would include routine inspection of containers for proper condition and labeling; proper maintenance of equipment; use of drip pans and absorbent mats at refueling locations to collect leaks or spills; adherence to the guidelines outlined in the Kirtland AFB Hazardous Waste Management Plan (HWMP); and adherence to federal, state, and local regulations regarding the storage, use, and transportation of hazardous materials. Additionally, it is expected that the selected construction contractor would use good housekeeping measures such as installing silt fencing and performing street cleaning around construction areas to reduce the potential for erosion and equipment track out.

The Proposed Action would not generate contaminants or directly contribute to pollutant loads subject to a Total Maximum Daily Load (TMDL). Given the high rates of surface water infiltration and evapotranspiration at Kirtland AFB, it is not likely TMDL-regulated contaminants would reach impaired waterway segments.

The Proposed Action would not adversely affect Waters of the United States pursuant to the CWA. Any work proposed to occur within or adjacent to such waters would be carried out in compliance with Section 404 of the Act. Because the Tijeras Arroyo and Arroyo del Coyote are classified as ephemeral streams, it is anticipated that Kirtland AFB, AMAFCA, or the selected contractor would obtain necessary permits prior to project implementation. Therefore, assuming adherence to BMPs and environmental control measures, the Proposed Action would not be expected to result in a significant impact on surface waters. Restabilization and revegetation of areas, along with other BMPs to abate runoff and wind erosion, would result in a long-term, minor, beneficial impact on erosion and runoff. The Proposed Action would result in improved stormwater conveyance and a reduction in erosion and sedimentation of surface waters.

Floodplains. The Proposed Action would result in short- and long-term impacts on local and regional floodplains. Upgrades to culverts, lining channels with rock or concrete, installation of stormwater drainage inlets, or creating retention structures would result in a short-term, minor, adverse impact on floodplains. However, project-specific engineering design reviews and related studies would be conducted as necessary to determine if flood elevations or velocities would affect upstream and downstream conditions. For example, a hydrology and hydraulics study could be performed to model the flow of water during different rainfall events and predict anticipated changes to the function and extent of a watershed and stream. Kirtland AFB, AMAFCA, and ABCWUA would continue to coordinate their activities in order to ensure no

negative impacts would result to the other's activities or systems. Therefore, the Proposed Action would not be expected to result in a significant adverse impact on floodplains.

The Proposed Action would result in a long-term, minor, beneficial impact on floodplains. Development of new stormwater drainage systems and upgrade of existing systems would occur on USAF controlled lands on Kirtland AFB. Arroyo repair and erosion control measures would occur within the floodplains associated with Tijeras Arroyo and Arroyo del Coyote on Kirtland AFB. Project activities (e.g., arroyo bank stabilization and culvert improvement) would reduce erosion and abate stormwater runoff. The Proposed Action would result in improved stormwater conveyance and a reduction in erosion and sedimentation of surface waters.

3.4.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and the existing conditions discussed in **Section 3.4.1** would remain unchanged. Additionally, implementation of the No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs; and erosion of the arroyos on and downstream of the installation would continue.

3.5 Biological Resources

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. Laws protecting wildlife include the ESA, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act of 1940. Protected species are defined as those listed as threatened, endangered, or proposed or candidate for listing by USFWS or the NMDGF. Federal species of concern are not protected by law; however, these species could become listed, and are therefore given consideration when addressing biological resource impacts of an action.

Sensitive habitats include those areas designated by the USFWS as critical habitat protected by the ESA and sensitive ecological areas as designated by state or federal rulings. Sensitive habitats also include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitats).

The New Mexico Wildlife Conservation Act (NMSA 17-2-37) authorizes NMDGF to create a list of endangered or threatened wildlife within the state, and to take steps to protect and restore populations of species on the list. Actions causing the death of a state endangered animal are in violation of the Wildlife Conservation Act. In addition, USFWS and NMDGF maintain lists of species considered to be particularly sensitive or at risk.

3.5.1 Affected Environment

Kirtland AFB lies at the intersection of four major North American biotic provinces: the Great Plains, Great Basin, Rocky Mountains, and Chihuahuan Desert. Vegetation and wildlife found within the installation are influenced by each of these provinces, with the Great Basin being the most dominant influence. Elevations range from approximately 5,000 feet in the west to almost

8,000 feet in the Manzanita Mountains, providing a variety of ecosystems. Five canyons (i.e., Lurance, Sol se Mete, Bonito, Otero, and Madera) are in the eastern portion of the installation; a few smaller canyons occur on Manzano Base. Kirtland AFB is situated near three regional natural areas: the Sandia Mountain Wilderness Area, Sandia Foothills Open Space, and Rio Grande Valley State Park. The Sandia Mountain Wilderness Area, encompassing 37,877 acres, lies approximately 5 miles north of the eastern portion of the installation. This area is home to many species of plants and animals and supports an important raptor migration route (KAFB 2018a).

Kirtland AFB has an Integrated Natural Resources Management Plan (INRMP) in place, which was updated in 2018. The INRMP provides interdisciplinary strategic guidance for natural resources management on the installation for a period of 5 years. It is integrated with other planning functions and supports the military mission. The INRMP is focused on the achievement of 10 specific goals for the protection and improvement of the natural environment. The goals were formulated from a comprehensive analysis of mission requirements, regulatory requirements, the condition of the natural resources on Kirtland AFB, and a consideration of the value of the resources to the people who live and work on the installation. Implementation of the INRMP ensures that the installation continues to support present and future mission requirements while preserving, improving, and enhancing ecosystem integrity (KAFB 2018a).

Vegetation. Four main plant communities occur on Kirtland AFB: grassland (includes sagebrush steppe and juniper woodlands), piñon-juniper woodlands, ponderosa pine woodlands, and riparian/wetland/arroyo. In addition to the four main plant communities, Kirtland AFB also has improved areas, which refers to those areas that are landscaped/maintained throughout the installation. **Figure 3-3** presents the distribution of the vegetation communities on the installation. Grassland and piñon-juniper woodlands are the dominant vegetative communities on the installation. The riparian/wetland/arroyo community is confined to drainages and isolated areas inundated by surface water during part of the year. The ponderosa pine woodland community is found along the eastern boundary of the installation (KAFB 2018a).

- ***Grassland Community***. This community is found between elevations of 5,200 and 5,700 feet at Kirtland AFB. The grassland community on the installation is further delineated into two community types: sagebrush steppe in the western portion of the installation and juniper woodlands in the eastern portion. In sagebrush steppe, the understory is less dense, with cryptogamic crust covering areas of exposed ground. The juniper woodlands are similar to the grasslands to the east, except for the greater abundance of one-seeded juniper. The presence of this shrubby tree creates a savanna-like habitat in an otherwise treeless area. Juniper woodlands are found at a slightly higher elevation than the surrounding grassland. This habitat type provides a transition into piñon-juniper woodlands. Common grass species include ring muhly, Indian ricegrass, sixweeks grama, black grama, blue grama, and spike dropseed. Shrubs commonly found in the grassland community include sand sagebrush, winterfat, and broom snakeweed. Other species include purple threeawn, sixweeks threeawn, hairy grama, mesa dropseed, four-wing saltbush, Apache plume, plains prickly pear, and soapweed yucca. Transitional shrublands are common between grassland and

piñon-juniper woodland communities, with many species from both communities inhabiting these areas (KAFB 2018a).

- ***Piñon-Juniper Woodland Community***. The piñon-juniper woodland community ranges in elevation from 6,300 to 7,500 feet. This plant community is primarily composed of Colorado piñon pine and juniper, with an understory of shrubs and grasses. At most elevations, this community consists of open woodland with blue grama and, to a lesser degree, side-oats grama dominating the understory. Other species associated with this plant community are Rocky Mountain juniper, broom snakeweed, rubber rabbitbrush, threadleaf groundsel, and alderleaf mountain mahogany (KAFB 2018a).
- ***Ponderosa Pine Woodland Community***. The ponderosa pine woodland community is typically found in the highest elevations of the eastern portion of the installation. It is typically found between 7,600 and 7,988 feet. Common species include ponderosa pine, Colorado piñon pine, Rocky Mountain juniper, and Gambel oak. Intermingled with these species are creeping barberry, New Mexican locust, and snowberry. One-seeded juniper, hoptree, and alderleaf mountain mahogany are also present in ponderosa pine woodland (KAFB 2018a).
- ***Riparian/Wetland/Arroyo Community.*** The riparian/wetland/arroyo community consists of species that have a greater moisture requirement than species common to the other communities on the installation. These plant communities are found along the Tijeras Arroyo, Arroyo del Coyote, and at the various springs throughout the installation. Common species include cottonwood, hoptree, Apache plume, yerba mansa, and saltcedar. Most of the small, scattered wetlands on Kirtland AFB are in good condition and occur in conjunction with other plant communities (KAFB 2018a).
- ***Improved Areas.*** Approximately 1,980 acres are considered improved areas and are generally on the northern portion of the installation. These areas are landscaped or maintained. Kirtland AFB promotes water conservation landscaping by using xeriscape methods combined with native plant materials. Landscaping may be an involved process or something as simple as the upkeep of natural vegetation through weeding and mowing (KAFB 2018a).

The proposed stormwater drainage system development, upgrade, and maintenance activities would primarily occur in the grassland and juniper grassland communities, as well as the improved areas of the installation. The proposed arroyo repair and erosion control activities would occur in the riparian/wetland/arroyo community.

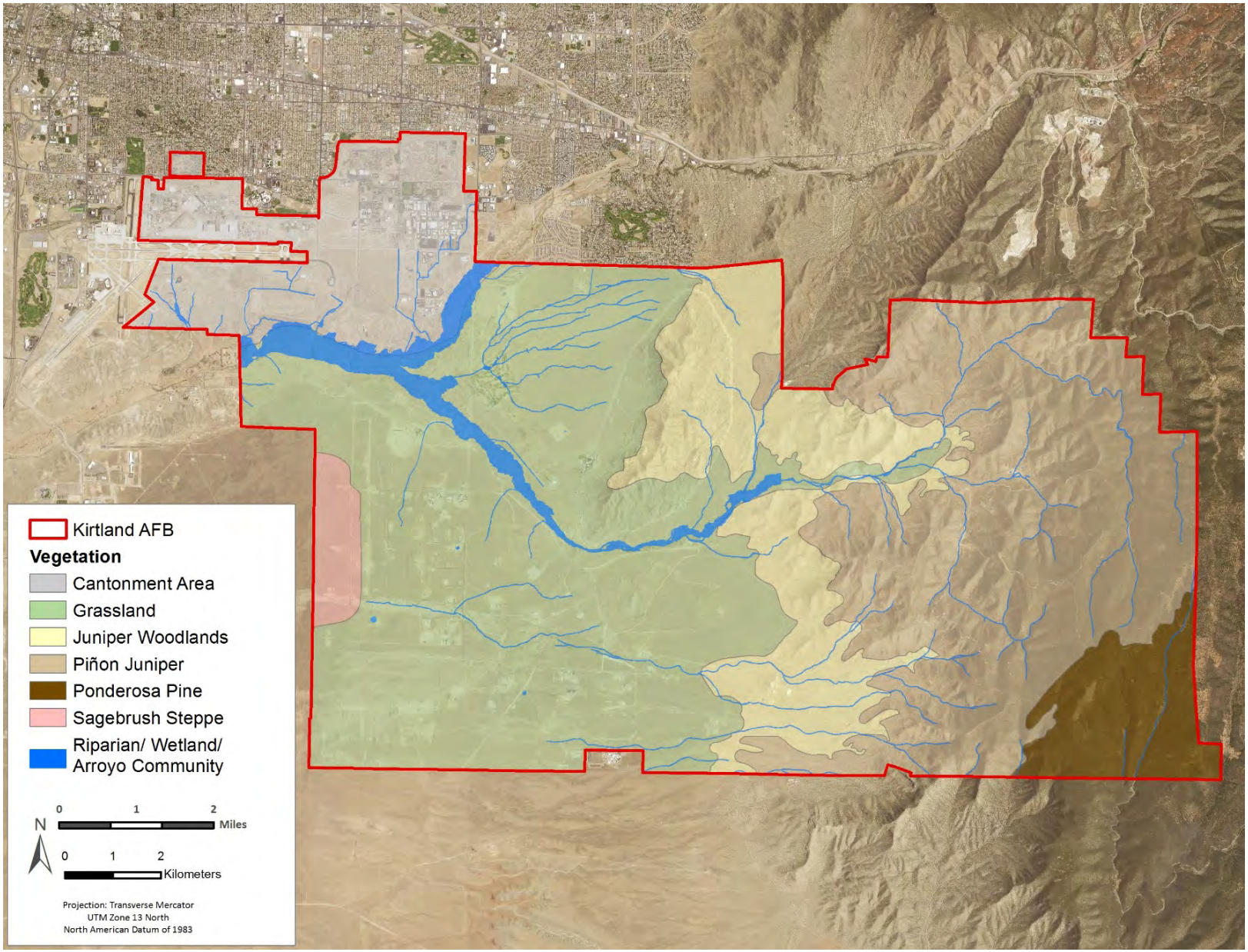

Figure 3-3. Vegetation Communities on Kirtland AFB

Wildlife Species and Habitat. Wildlife species found on Kirtland AFB are representative of the species' diversity common to the regional ecosystem (e.g., grassland, juniper woodland, piñon-juniper woodland, and ponderosa pine woodlands) and species common in grassland and semi-developed areas. Species can be transient and travel between communities, inhabit several communities, or exist in transitional areas between vegetation communities. Native fauna includes terrestrial and aquatic vertebrates and invertebrates. Terrestrial vertebrates include species such as large and small mammals, birds, amphibians, and reptiles. The only aquatic habitats on lands managed by Kirtland AFB are the small ponds at Tijeras Golf Course and isolated wetlands (KAFB 2018a).

Mammals commonly found on the installation include the desert cottontail, black-tailed jack rabbit, spotted ground squirrel, rock squirrel, Gunnison's prairie dog, silky pocket mouse, Ord's kangaroo rat, banner-tailed kangaroo rat, Merriam's kangaroo rat, western harvest mouse, deer mouse, white-footed deer mouse, northern grasshopper mouse, porcupine, black bear, and mule deer. Mammalian predators found in association with these species include the coyote, badger, kit fox, striped skunk, mountain lion, and bobcat (KAFB 2018a).

Reptiles and amphibians commonly found on the installation include the New Mexico whiptail lizard, short-horned lizard, lesser earless lizard, bull snake, western diamondback rattlesnake, prairie rattlesnake, desert massasauga, glossy snake, western box turtle, Woodhouse's toad, and red spotted toad. Many of the amphibian species have extensive periods of dormancy during dry conditions and rapid breeding cycles when temporary ponds occur after rains (KAFB 2018a).

Birds that could commonly occur on the installation include the horned lark, scaled quail, mourning dove, greater roadrunner, American crow, northern mockingbird, western meadowlark, wild turkey, brown-headed cowbird, and house finch. Raptor species known to occur or that may potentially occur include the northern harrier, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, and western burrowing owl. Additionally, turkey vultures are common scavengers in the area (Peterson 2010). The nesting season for most bird species that occur at Kirtland AFB runs from 1 March to 30 September.

Threatened and Endangered and State Listed Species. The USFWS and NMDGF maintain lists of plant and animal species that have been classified, or are potential candidates for classification, as threatened or endangered in Bernalillo County (see **Table 3-6**). According to the 2018 USFWS Information for Planning and Consultation Report, five threatened or endangered species could occur on Kirtland AFB or in the surrounding region (USFWS 2018). All five of these species have final designated or proposed critical habitat; however, there are no critical habitats on or near Kirtland AFB. No federally threatened or endangered species have been identified on the installation. Based on the data provided in the Biota Information System of New Mexico, there are 17 species listed by NMDGF as threatened or endangered (BISON-M 2017).

Table 3-6. Threatened and Endangered Species in Bernalillo County

Common Name	Scientific Name	NMDGF	USFWS	Critical Habitat
Spotted Bat	*Euderma maculatum*	T	-	-
Meadow Jumping Mouse	*Zapus luteus luteus*	E	E	Y
Brown Pelican	*Pelecanus occidentalis*	E	-	-
Common Black Hawk	*Buteogallus anthracinus*	T	-	-
Bald Eagle	*Haliaeetus leucocephalus*	T	-	-
Aplomado Falcon	*Falco femoralis*	E	-	-
Peregrine Falcon	*Falco peregrinus*	T	-	-
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	T	-	-
Least Tern	*Sternula antillarum*	E	-	-
Neotropic Cormorant	*Phalacrocorax brasilianus*	T	-	-
Yellow-billed Cuckoo (western pop)	*Coccyzus americanus occidentalis*	-	T	Proposed
Mexican Spotted Owl	*Strix occidentalis lucida*	-	T	Y
Broad-billed Hummingbird	*Cynanthus latirostris*	T	-	-
White-eared Hummingbird	*Hylocharis leucotis*	T	-	-
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E	E	Y
Bell's Vireo	*Vireo bellii*	T	-	-
Gray Vireo	*Vireo vicinior*	T	-	-
Baird's Sparrow	*Ammodramus bairdii*	T	-	-
Rio Grande Silvery Minnow	*Hybognathus amarus*	E	E	Y

Notes: E=Endangered; T=Threatened; Y=Yes
Source: BISON-M 2017

The five federally listed species that could occur on the installation, the New Mexico meadow jumping mouse, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Rio Grande silvery minnow, do not have suitable habitat and have not been identified on the installation. The New Mexico meadow jumping mouse prefers large wet meadows within floodplains. A 2016 survey conducted at Kirtland AFB did not detect the mouse or find desirable habitat for the species (KAFB 2018a). The Mexican spotted owl may migrate through Kirtland AFB at certain times of the year; however, this species is not known to utilize Kirtland AFB for extended periods of time. The southwestern willow flycatcher and yellow-billed cuckoo prefer riparian and forested habitat not found on the installation. The Rio Grande silvery minnow is a riverine fish that prefers low-gradient creeks and small to large rivers with slow to moderate flow. It is only found in one reach of the Rio Grande in New Mexico, which is off-installation (NatureServe 2017).

The 2018 USFWS Information for Planning and Consultation Official Species and Habitat List was received on 20 July 2018 under Consultation Code 02ENNM00-2018-SLI-1108. It was determined that there are no federally listed threatened or endangered species or critical habitat occurring within the project area (USFWS 2018). However, to ensure no impact, an updated species list from USFWS is required to be obtained within 90 days of starting construction activities.

Of those species known to occur in Bernalillo County, two state threatened species have the potential to occur on Kirtland AFB (KAFB 2018a). Biological surveys are conducted annually in order to monitor federal-listed, state-listed, and other special status species presence on Kirtland AFB. **Table 3-7** and the following text discuss species that are known to occur on the installation and are excerpted from the 2018 INRMP, unless otherwise noted.

Table 3-7. Kirtland AFB Species with Special Status

Species	Federal Status	State Status
Gray Vireo	-	Threatened
Peregrine Falcon	Species of Concern	Threatened
Loggerhead Shrike	-	Species of Greatest Conservation Need
Mountain Plover	-	Sensitive taxa
Western Burrowing Owl	Species of Concern	-
Long-legged Myotis	-	Sensitive taxa
Western Small-footed Myotis	-	Sensitive taxa
Gunnison's Prairie Dog	-	Sensitive taxa
Golden Eagle	Bald/Golden Eagle Protection Act	-

Notes: myotis = bat

- ***Gray vireo***. The gray vireo, a state-threatened species, is a small migratory songbird. They occur in colonies in several locations on Kirtland AFB throughout the withdrawn area. The highest density of colonies is within lower elevation piñon-juniper habitat from Coyote Canyon south to the Isleta boundary at elevations ranging from 5,900 to 6,600 feet. Gray vireo populations have increased on Kirtland AFB because of fire suppression activities and the subsequent increase of piñon-juniper stands.
- ***Peregrine falcon.*** The peregrine falcon, a state threatened species and federal species of concern, is a medium to large raptor. On Kirtland AFB, suitable nesting cliffs are in the canyons of the withdrawn area. The species is observed hunting throughout the entire installation. Threats to peregrine falcons include use of pesticides, predation, electrical line electrocution, and noise impacts from installation activities.
- ***Loggerhead shrike*.** The loggerhead shrike, a state species of greatest conservation need, is a small migratory songbird that occurs in grasslands west of the withdrawn area. The species is a year-round resident of Kirtland AFB; however, nesting shrikes are no longer found on the installation. The species breeds in grazed areas that have exposed ground and sparse vegetation and are not in close proximity to developed areas. The species is commonly encountered adjacent to Manzano Base and along the southern portion of the installation near the Starfire Optical Range, Giant Reusable Air Blast Simulator, and Chestnut sites.
- ***Mountain plover***. The mountain plover, a state sensitive taxa, is a small migratory songbird. The plover occurs in grasslands, typically within prairie dog towns. Potential nesting and brood-rearing habitat for the mountain plover at Kirtland AFB is limited to the southern grasslands directly north of the Pueblo of Isleta. Impacts to the mountain plover

population on the installation are a result of decreased Gunnison's prairie dog towns/colonies within the southern portion of the installation.

- ***Western burrowing owl.*** The western burrowing owl, a federal species of concern, is a small ground owl. Burrowing owls are migratory; however, some owls may occur on the installation during mild winters. The species is found on Kirtland AFB within developed areas where grasses are less dense and afford a greater line of sight for protection from predators and prey detection. Populations of burrowing owls have greatly decreased on the installation. Threats to the population include a decrease of the Gunnison's prairie dog population and incompatible land use
- ***Long-legged myotis and western small-footed myotis.*** Two bat species identified on Kirtland AFB, the long-legged myotis and western small-footed myotis, are state sensitive taxa. Habitat on the installation suitable for these species includes cliffs and abandoned mines throughout the withdrawn area. The species are nocturnal and feed on insects near water or rocky cliffs. Threats to the two species include a decrease of surface water and white-nose syndrome.
- ***Gunnison's prairie dog.*** The Gunnison's prairie dog, a state sensitive taxa, is a rodent within the squirrel family that occurs in colonies or towns. They are primarily within grasslands in the northern half of Kirtland AFB and in the cantonment area. Threats to the population include periodic plague epidemics and loss of habitat.
- ***Golden eagle.*** The golden eagle is a raptor, federally protected under the Bald and Golden Eagle Protection Act, which occurs on Kirtland AFB. Because of the size of the golden eagle, they are ranked at the top of the food chain as apex predators of avian species. Golden eagles have been observed during avian surveys conducted on the installation and nests have been identified on cliffs within the withdrawn area. Threats to the species include use of pesticides, predation, electrical line electrocution, and noise impacts from installation activities.

It is assumed that all of the special status species that occur on the installation could occur within areas associated with the Proposed Action.

Critical Habitat. Critical habitats are those areas of land, air, or water that are essential for maintaining or restoring threatened or endangered plant or animal populations. Neither the NMDGF nor USFWS has designated or identified any critical habitat on Kirtland AFB.

Although not considered critical habitat, surveys and literature indicate that important habitats on the installation include: wetlands, which are rare in this region; prairie dog towns, which provide nesting habitat for the western burrowing owl; and areas between 5,900 and 6,600 feet containing open juniper woodlands, which are used as nesting habitat by the gray vireo (KAFB 2018a).

3.5.2 Environmental Consequences

3.5.2.1 PROPOSED ACTION

The Proposed Action would result in short- and long-term impacts on local and regional biological resources on and downstream of the installation.

Vegetation. The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on grassland and juniper grassland vegetation. Direct effects on vegetation from removal and crushing and indirect effects from soil compaction and potential for establishment of invasive species would occur. However, long-term, beneficial impacts would result from revegetation of disturbed sites with native species supporting the native plant community on the installation.

Crushing and soil compaction would occur when vehicles and equipment access, park, and maneuver around areas requiring upgrade, maintenance, or repair. These impacts would also occur during ditching and trenching for new and upgraded stormwater systems, as well as excavating, regrading, and filling/backfilling during maintenance and arroyo repair. Additionally, ground disturbance and transport of construction equipment could increase the potential for establishment of invasive plant species. Adverse impacts on vegetation would be minimized through the use of appropriate BMPs, such as cleaning construction equipment prior to entering the project area. 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. Revegetation of disturbed sites with native vegetation would further reduce the establishment of invasive species.

Wildlife Species and Habitat. The Proposed Action would result in intermittent, short-term, minor, adverse impacts on wildlife species and habitat. Stormwater drainage system development, upgrade, and maintenance and arroyo repair activities would result in temporary, minor degradation of wildlife habitat. Near- and in-water activities (i.e., culvert installation and arroyo repair) could result in direct and indirect impacts on aquatic species and their habitats from increases in erosion and sedimentation. In addition, hazardous materials could be inadvertently released into aquatic habitats during upgrade and repair activities. These actions would temporarily degrade aquatic habitat and directly and indirectly affect aquatic species. Adherence to BMPs and the project-specific SWPPPs would minimize sedimentation and reduce the risk of the release of hazardous materials into aquatic systems. All upland areas disturbed would be vegetated to prevent and control soil erosion, and to provide stability to final slopes. Vegetation establishment would be initiated as soon as practical.

Long-term, minor, beneficial impacts on aquatic and terrestrial habitat would result from stormwater drainage improvements associated with the Proposed Action. Stormwater drainage improvements would reduce the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation into surface waters. Restabilizing arroyos and upgrading stormwater systems would improve the flow of floodwater resulting in improved water quality because less erosion and sedimentation would occur during a flood event. Better water quality equates to better aquatic habitat. Additionally, the arroyo repairs and stormwater improvements would promote bank stabilization, resulting in beneficial impacts on terrestrial habitat.

Temporary displacement of mobile wildlife from noise, lighting, and other disturbances would occur from upgrade and repair activities. High-impact maintenance and repair 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

conclude. However, in order to avoid nest abandonment, these activities should occur outside of nesting season for migratory birds, typically 1 March to 30 September. These impacts would be short-term and BMPs would be implemented to minimize adverse impacts.

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 burrowing owls, rodents, and reptiles, could be impacted. However, vehicles associated with maintenance and repair activities are used primarily on the established roads, which limits the potential for impacts on burrowing species.

Threatened and Endangered and State Listed Species. The Proposed Action would result in no short- or long-term impacts on federally and state listed species. To ensure no impact, an updated species list from USFWS is required to be obtained within 90 days of starting any construction activities (USFWS 2018). Intermittent, short-term, negligible to minor, adverse impacts on state sensitive taxa could occur as a result of the Proposed Action (see **Table 3-7**).

Stormwater drainage system development, upgrade, and maintenance and arroyo repair and erosion control activities may disrupt or modify behavior (including breeding and nesting) as a result of increased noise or other disturbances. However, noise would be intermittent and temporary in nature. It is expected that when activities cease, species sensitive to noise would resume normal activities. Therefore, while activities may temporarily disturb individuals or populations, these effects are expected to be negligible. High-impact maintenance and repair activities that require heavy equipment should be conducted outside the nesting season, typically 1 March to 30 September, to the maximum extent possible.

If trees or shrubs suitable for bat roosting are cleared during the bat birthing or pup-rearing season (June to August), there is a risk that young bats could inadvertently be harmed or killed. Should vegetation removal need to occur during the bat birthing or pup-rearing season, a survey would be conducted by qualified personnel and areas containing young bats would be avoided until the roost is no longer occupied. With implementation of these BMPs, it is anticipated that the Proposed Action would not result in adverse impacts on the long-legged myotis and western small-footed myotis.

3.5.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repairs. Stormwater drainage problems would worsen and erosion of the arroyos on the installation would continue, affecting vegetation, wildlife habitat, and wildlife and protected species. Wildlife and protected species use surface waters and riparian areas for nesting or foraging. Water quality can affect them directly when they drink and indirectly when they feed on insects that spend part of their lives growing in water.

3.6 Cultural Resources

The term 'cultural resource' refers to any prehistoric or historic resources, such as archaeological sites, traditional cultural properties, districts, objects, and historic buildings/structures. The term 'historic property' refers specifically to a cultural resource that has

been determined to be eligible for inclusion to the NRHP. These resources are protected and identified under several federal laws and EOs. Five classes of historic properties are defined for listing in the NRHP: buildings, sites, districts, structures, and objects (26 CFR § 60.3). Federal laws include the NHPA (1966), the Archaeological 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 106 of the NHPA, the USAF is required to assess the effects of undertakings prior to initiation to ensure that there would be no adverse effects on historic properties (36 CFR § 800). Under this process, USAF evaluates the NRHP eligibility of resources within the proposed undertaking's APE and assesses the possible effects of the proposed undertaking on historic resources and determines if consultation with the SHPO and other parties, such as a THPO, is necessary. The APE is defined as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." Title 36 CFR § 60.4 defines the criteria used to establish significance and eligibility for the NRHP. Section 110 of the NHPA requires USAF to complete an inventory of historic properties on its land (36 CFR §§ 60, 63, 78, 79, and 800).

3.6.1 Affected Environment

In compliance with Section 110 of the NHPA, Kirtland AFB conducted an installation-wide survey of cultural resources in the early 2000s. Additional cultural resources surveys, as required by Section 106 of the NHPA, have been conducted on Kirtland AFB from the 1970s to present. A total of 740 archaeological sites have been identified within the boundaries of the installation. No traditional cultural properties have been identified within Kirtland AFB (Reynolds 2018).

Prehistoric archaeological sites on the installation contain artifacts such as ceramics, ground stone, lithics, and tools. Historic archaeological sites contain artifact scatters and structural remains related to military activities, mining, and ranching. Many of these sites occur within the undeveloped portion of the installation. There is a potential to encounter surface artifacts in these areas, which are protected under various federal regulations. The locations of these sites are protected and not disclosed to the general population. In addition to archaeological sites, a total of 583 historic properties, including bridges and culverts, were evaluated for NRHP eligibility and 271 were found to be eligible (Reynolds 2018).

The two major drainages on Kirtland AFB are Tijeras Arroyo and the watershed of Arroyo del Coyote. Smaller drainages are on the west side of Four Hills and along the lower slopes west of Mount Washington. Both major drainages are ephemeral and flow during spring snowmelt or after summer thunderstorms. Previous surveys show that the highest archaeological site density occurs adjacent to these arroyos. Approximately 30 percent of the known archaeological sites, some of the most significant sites on the installation, are within or adjacent to the arroyos. Human occupation encountered in these areas spans from the Folsom Period (9000 BC) through the Recent Historic Period (1960 AD). In addition to known archaeological sites, there is a high potential for the inadvertent discovery of additional cultural resources within the arroyos and floodplains (Reynolds 2018).

A geoarchaeological study of Kirtland AFB documented intact buried cultural resources along the arroyos and terraces, particularly west of the withdrawn area. These cultural resources are often buried by alluvium and eolian (windblown) sediments, which protect the cultural resources from various disturbances (e.g., bioturbation and erosion). The terraces bordering the lower portion of Tijeras Arroyo expose piedmont-slope alluvium over ancient Rio Grande alluvium. As previous research suggests, these alluvial deposits have the potential to contain intact buried cultural material along the lower side slopes and floodplain of the arroyo.

Sites that have been rapidly covered with sediments (such as alluvial deposits) often contain *in situ* deposits with better organic preservation and offer the greatest potential for establishing local cultural chronologies. The landforms that are most likely to contain these intact cultural materials are predominantly located along arroyos and within dunes along the floodplain and arroyo terraces. These intact subsurface archaeological deposits are often present in areas where no surface artifacts are present (KAFB 2009a).

The typical depth of archaeological sites on Kirtland AFB range from 1.6 to 3.3 feet. Stratigraphic profiles show potential cultural deposits at a depth of up to 9.8 feet along Tijeras Arroyo. Unless artifacts are detected in cut banks or erosional surfaces, many buried sites go undetected during standard archaeological pedestrian surveys. As a result, subsurface archaeological testing and monitoring is recommended for proposed actions in these areas in order to detect any possible intact, buried cultural resources. Most inadvertent discoveries of subsurface archaeological deposits on Kirtland AFB were identified along Tijeras Arroyo and Arroyo del Coyote. Therefore, these are the locations where archaeological testing and monitoring are most appropriate (KAFB 2009a).

Kirtland AFB has an ICRMP in place, which was completed in 2009 and is currently being updated. The ICRMP is an integral part of the installation's comprehensive plan and addresses the cultural resources on the installation. It integrates the Cultural Resources Management Program with ongoing mission activities and the property managed by Kirtland AFB, allows for the identification of conflicts between mission activities and cultural resources management, and provides guidelines for mitigating any such conflicts. The ICRMP provides guidelines and standard operating procedures to non-technical managers and planners in order to comply with the installation's legal responsibilities for the preservation of significant archaeological and historic resources (KAFB 2009b).

Because of the programmatic nature of this PEA, the APE is defined as the entire installation. No specific activities or locations have been determined at this time. As individual projects are developed, project-specific NEPA analysis would be conducted and Section 106 consultation would occur at that time.

3.6.2 Environmental Consequences

3.6.2.1 PROPOSED ACTION

The Proposed Action could result in intermittent, short-term, negligible to minor, adverse impacts on cultural resources. As specific projects are developed, separate NEPA analysis and Section 106 consultation would occur. The Proposed Action has the potential to result in an adverse effect on known cultural resources because of the concentration of cultural resources

surrounding the natural arroyos and waterways within Kirtland AFB; therefore, these are the locations where archaeological testing and monitoring would be most appropriate. Avoidance of known cultural resources sites would be taken into consideration when planning and developing stormwater drainage and arroyo repair projects. However, if project activities would be conducted adjacent to or could not be adjusted to avoid impacting a known archaeological site, then consultation with the SHPO/THPO would occur and mitigation measures would be developed in accordance with Section 106 of the NHPA.

Typical mitigation measures include the following:

- consultation with the Advisory Council on Historic Preservation
- development of a Memorandum of Agreement outlining the approach to minimize adverse effects on the resources
- partial or complete excavation of the resource
- development and implementation of a mitigation plan to offset the destruction of the resource.

Furthermore, it is recommended that any ground-disturbing activities take into consideration the potential for the discovery of previously undiscovered cultural resources. Considering the project aims to construct, repair, and maintain the drainage systems within Kirtland AFB, the proposed construction activities would occur within areas that have a high-probability to encounter intact, subsurface cultural resources. Areas within or adjacent to the arroyos on the installation have the highest incidence of inadvertent discoveries of cultural resources. Additionally, the known sites in these areas are some of the most significant sites on the installation. In order to minimize the potential impacts to unrecorded cultural deposits, it is recommended that subsurface archaeological surveys be conducted in any area where the construction would impact undisturbed areas within or adjacent to arroyos.

Should an inadvertent discovery of human or cultural remains occur, all project activities shall stop, the Kirtland AFB Cultural Resources Program Manager would be notified, and operational procedures outlined in the current ICRMP would be followed. This would ensure no adverse impacts would occur on the newly discovered cultural resources.

3.6.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures, and the existing conditions discussed in **Section 3.6.1** would remain unchanged. Continued erosion could unearth and damage or remove cultural resources.

3.7 Paleontological Resources

Paleontological resources are fossils, the remains of prehistoric plants and animals, that are important scientific and educational resources because of their use in 1) documenting the presence and evolutionary history of particular groups of extinct or extant organisms, 2) reconstructing the environments in which these organisms lived, and 3) determining the relative ages of the strata in which they occur and the geologic events that resulted in the

deposition of the sediments that formed these strata. Fossils, used in conjunction with geology, provide clues to help determine what ancient environments were like. Paleontological remains may be associated with archaeological sites, such as the bones of ancient bison. In these cases, the remains may be considered both archaeological and paleontological resources.

The American Antiquities Act of 1906 is the first law to establish that "objects of antiquity" on public lands are important public resources. It obligates federal agencies that manage the public lands to preserve for present and future generations the historic, scientific, commemorative, and cultural values of the archaeological and historic sites and structures on these lands. The act imposes penalties for removing or destroying antiquities and has been interpreted to protect paleontological resources.

3.7.1 Affected Environment

Paleontological resources are not uncommon at Kirtland AFB. The discovery of various fossils has served an important role in the study of past life and evolutionary theory. Fossils of ancient organisms dating back to the Paleozoic are found in the Sandia Formation and Madera Group limestones in the Los Moyos and Wild Cow formations. These specimens consist of various floral and faunal fossil assemblages. Fossils from more recent deposits of the late Cenozoic (Pliocene and Pleistocene to recent) have also been discovered near the installation. Pliocene and Pleistocene fossils found in the gravels and sand deposits by the Rio Grande and exposed in the area of Tijeras Arroyo include glyptodont, ground sloths, horse, and camel (KAFB 2009a).

A geoarchaeological study of Kirtland AFB documented that late Pleistocene and early Holocene fauna were found on the installation in older alluvium and along Coyote Canyon. A bison skull dating from 5600 to 5700 BP (before present) was found in an eroding cutbank in Tijeras Arroyo. Additional bison bones were found preserved in middle to late Holocene alluvial deposits in Coyote Canyon. Paleontological specimens were identified in deeply buried alluvial strata exposed in arroyo cut banks 9.8 to 13.1 feet below the modern surface (KAFB 2009a).

3.7.2 Environmental Consequences

3.7.2.1 PROPOSED ACTION

The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on paleontological resources. Based upon the geoarchaeological study, the Proposed Action has the potential to result in an adverse effect on paleontological resources because most of the fossils of ancient organisms discovered on Kirtland AFB have occurred in the areas surrounding the natural arroyos and waterways. Avoidance of known paleontological resources sites would be taken into consideration when planning and developing stormwater drainage and arroyo repair projects. However, it is recommended that any ground-disturbing activities take into consideration the potential for the discovery of previously undiscovered paleontological resources. Considering the project aims to construct, repair, and maintain the drainage systems within Kirtland AFB, the proposed construction activities would occur in areas that have a higher probability to encounter subsurface paleontological resources. Areas within or adjacent to the arroyos on the installation have the highest incidence of inadvertent discoveries of paleontological resources. In order to minimize potential impacts to unrecorded paleontological

deposits, it is recommended that subsurface surveys and monitoring be conducted in any area where the construction would impact undisturbed areas within or adjacent to arroyos.

Should an inadvertent discovery of paleontological materials occur, all project activities shall stop, the Kirtland AFB Cultural Resources Program Manager would be notified, and operational procedures outlined in the ICRMP would be followed as they would for archaeological resources. This would ensure no adverse impacts would occur on the newly discovered paleontological resources.

3.7.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures, and the existing conditions discussed in **Section 3.7.1** would remain unchanged. Continued erosion could unearth and damage or remove paleontological materials.

3.8 Infrastructure

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly man-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as “urban” or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. The infrastructure information in this section was primarily obtained from the 2016 IDP and provides a brief overview of each infrastructure component and comments on its existing general condition.

The infrastructure components discussed in this section include transportation, utilities, and solid waste management. Transportation is defined as the system of roadways, highways, and transit services near the installation and could be reasonably expected to be potentially affected by the Proposed Action. Utilities include electrical, natural gas, liquid fuel, water supply, sanitary sewer/wastewater, stormwater handling, and communications systems. Solid waste management primarily relates to the availability of landfills to support a population’s residential, commercial, and industrial needs.

3.8.1 Affected Environment

Transportation

Numerous modes of transportation are available at Kirtland AFB, including air, mass transit, and federal and state highway access. The Sunport, along the northwestern boundary of the installation, provides commercial and public aviation and military support, particularly for USAF and Air Force Reserve units. The airfield at the Sunport consists of two commercial carrier runways and one runway dedicated to general aviation (ABQ Sunport 2018). The Albuquerque Transit Department, ABQ RIDE, provides and operates public bus services throughout the city. Several bus routes regularly service Kirtland AFB (ABQ RIDE 2018).

The installation is approximately 4 miles east of Interstate (I)-25 and approximately 1.5 miles south of I-40. It is served from interstate highways and many state and local roads. The city of Albuquerque street grid includes several major arterials that tie directly into the installation,

including Eubank Boulevard, Wyoming Boulevard, Carlisle Boulevard, and Truman Street. These roadways serve north-south traffic flows. The east-west trending major arterial directly to the north of the installation is Gibson Boulevard. Other east-west arterials north of the installation include Zuni Boulevard and Central Avenue, the historic Route 66.

There are currently eight gated entrances from the city of Albuquerque to Kirtland AFB including Carlisle Gate, Truman Gate, Maxwell Gate, Gibson Gate, Wyoming Gate, Eubank Gate, and Hickam Gate. The eighth gate is the South Valley Gate, which is at Ira Sprecker Road south of the Sunport. The Hickam Gate, also known as the Contractor Gate, is the truck inspection gate. All other gates are entry/egress points for personnel working or living on the installation (KAFB 2016). The Gibson, Wyoming, Carlisle, Hickam, and South Valley gates currently have restricted hours.

There are approximately 430 miles of paved roads and 230 miles of unpaved roads on Kirtland AFB. Major arterials include Wyoming Boulevard, Gibson Boulevard, and Frost Street. Major east/west routes consist of Hardin Boulevard, Randolph Avenue, and Aberdeen Avenue. Minor arterials include Pennsylvania Street and 20th Street, which serve the SNL facilities. The primary transportation route to the southern portion of the installation is Pennsylvania Street (KAFB 2016).

Utility Systems

Electrical System. Kirtland AFB purchases electrical power from the Western Area Power Administration. Electric lines are placed above and below ground, feeding the 20 substations on the installation. The installation's average yearly consumption is approximately 407,010 kilowatt hours (KAFB 2016).

Natural Gas and Propane. Natural gas is supplied by Coral Energy and delivered in New Mexico Gas Company pipelines supplying the industrial complex, family housing, and heating plants on the installation. There are approximately 496,000 linear feet of natural gas mains on the installation (KAFB 2016). Rural portions of the installation do not receive natural gas service and rely on propane, which is delivered to and stored in local propane storage tanks.

Liquid Fuel. Liquid fuels are supplied to Kirtland AFB by contractors. The primary liquid fuels supplied include JP-8 (jet propellant [fuel] – type 8), diesel, and unleaded gasoline. Fuels are purchased in bulk, delivered to the installation by tanker truck, and stored in various-sized storage tanks across the installation. Liquid fuels at Kirtland AFB are primarily used to power military aircraft and ground-based vehicles (KAFB 2016).

Water Supply System. Water is supplied to Kirtland AFB by six groundwater wells and two distribution systems that have a collective water-pumping maximum capacity of 8.1 million gallons per day (mgd). The installation pumps an average of 5.5 mgd of treated, potable water through 160 miles of distribution mains (KAFB 2016). There are also approximately 50 miles of non-potable water pipeline serving the Tijeras Golf Course and providing water for fire protection.

Kirtland AFB has the right to divert approximately 6,400 acre-feet per year from the underground aquifer, which is equal to approximately 2 billion gallons of water (KAFB 2016). In

2017, Kirtland AFB pumped a total of 744 million gallons (2,283 acre-feet) of water. The installation can also purchase water from the ABCWUA to meet demand during peak periods; however, the amount of water purchased from the city has been negligible since 1998, and Kirtland AFB did not purchase any water from the city in 2017 (KAFB 2018b).

Sanitary Sewer/Wastewater System. Kirtland AFB does not have its own sewage treatment facility. Instead, the sanitary sewer system on the installation, which consists of approximately 491,000 linear feet of collection mains, transports wastewater to the city of Albuquerque treatment facility. The permissible discharge rate for Kirtland AFB is fixed at 70,805,000 gallons per month. The installation discharges an average of approximately 1.4 mgd, or approximately 42 million gallons per month (KAFB 2016). Some facilities in remote areas and other portions of the installation are not serviced by the sanitary sewer system; these facilities use isolated, onsite septic systems to dispose of wastewater.

Stormwater Handling. Most stormwater on the installation flows through the drainage patterns created by the natural topography and terrain. When required by project design, a retention basin is typically installed to maintain and collect stormwater. The northern portion of the installation, including housing, discharges by sheet flow and culverts toward Gibson Boulevard along the Kirtland AFB and city of Albuquerque boundary. Most of the stormwater collected on the installation is discharged through sheet flow, culverts, or open channel flow towards Tijeras Arroyo on the southern portion of the installation. Kirtland AFB is included in the existing MSGP, MS4, and CGP for authorization for stormwater discharge (KAFB 2016).

Communications System. The communication network on Kirtland AFB was constructed as two separate systems that were later connected to provide redundancy. The main information transfer node is on the west side of the installation. This facility is in need of additional capacity and expansion if the installation expands mission requirements. The Communication Main Switch Facility is on the east side of the installation. There are future projects to upgrade the copper cable. The network fiber in the installation communication system is in the process of being upgraded (KAFB 2016).

Solid Waste Management

Solid waste generated at Kirtland AFB is collected by a contractor and disposed of at the city of Albuquerque's Cerro Colorado Landfill. The Cerro Colorado Landfill receives approximately 1,700 tpy from Kirtland AFB (Wheelock 2018).

Kirtland AFB operates a construction and demolition waste-only landfill on the installation. This landfill accepts only construction and demolition waste from permitted contractors working on the installation, has a total gross capacity of 10.2 million cubic yards, and has a net waste capacity of 7.2 million cubic yards. As of 31 December 2017, the remaining capacity of the landfill is 2.47 million cubic yards. In 2016 and 2017, an average of 30,834 tons of construction and demolition waste per year were deposited into this landfill (Wheelock 2018). As of June 2012, the recycling of construction and demolition waste on the installation has been codified into the Kirtland AFB Construction Waste Management specification (Section 01 74 19) for all USAF construction and demolition projects on the installation.

Green waste generated from land clearing or ground maintenance on the installation is brought to the Kirtland AFB landfill for chipping. A Memorandum of Agreement with the ABCWUA has been established to exchange this chipped green waste for finished compost, which is used across the installation for landscaping purposes.

Kirtland AFB manages a recycling program to reduce the amount of solid waste sent to landfills. The installation recycles scrap metal under the Qualified Recycling Program and collects corrugated cardboard from over 70 drop-off points across the installation. Per the DoD Strategic Sustainability Performance Plan, the diversion rate goal is 60 percent by fiscal year (FY) 2015 and thereafter through FY 2020.

3.8.2 Environmental Consequences

3.8.2.1 PROPOSED ACTION

Transportation

The Proposed Action would result in short- and long-term impacts on the transportation system. Demolition, construction, and maintenance activities associated with the Proposed Action are expected to result in intermittent, short-term, negligible to minor, adverse impacts on area roadways because of a temporary increase in the number of construction-related vehicles accessing Kirtland AFB. However, early coordination with Kirtland AFB organizations would ensure necessary safety precautions are taken and would allow ample advance notice to affected commuters and personnel. Typical construction-related traffic would include delivery trucks, haul trucks, and passenger vehicles.

It is anticipated that all haul and delivery vehicles would access the installation at Hickam Street from Gibson Boulevard. During construction activities, installation roadways would be used by haul and delivery trucks; however, transportation is not expected to occur during peak travel times. No disruption in the flow of traffic on the installation is expected. Therefore, the Proposed Action would not be expected to result in a significant impact on transportation.

The Proposed Action would result in long-term, minor, beneficial impacts on the transportation system. Project activities such as constructing and repairing gutters, curbs, and bridge supports would reduce costly repairs to roadways and improve transportation on the installation.

Utility Systems

The Proposed Action is not anticipated to change or result in short- or long-term impacts on the following utility systems: electrical, natural gas and propane, liquid fuel, sanitary sewer/wastewater, and communications. No equipment or construction vehicles would utilize the installation's liquid fuel supply. Therefore, these utility systems are not discussed further.

Water Supply System. The Proposed Action would result in intermittent, short-term, negligible to minor, adverse impacts on the water supply system. The proposed construction and maintenance activities would require minimal amounts of water, primarily for dust suppression. Although water demand would increase slightly from construction and periodic maintenance activities, this increase would be temporary and would not be expected to exceed existing capacity. Kirtland AFB is allowed to divert up to 6,000 acre-feet (2 billion gallons) of water per year and in 2017 pumped only 2,283 acre-feet (744 million gallons) of water, which is less than

half of what is permitted; therefore, sufficient water resources would be available on the installation. Therefore, the Proposed Action would not be expected to result in a significant impact on the water supply system.

Stormwater Handling. The Proposed Action would result in short- and long-term impacts on stormwater handling on Kirtland AFB. Soil disturbance from construction and demolition activities has the potential to result in intermittent, short-term, minor, adverse impacts on stormwater handling by disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading. Implementation of BMPs and environmental protection measures described in **Section 3.4.2.1** would reduce these impacts. Therefore, the Proposed Action would not be expected to result in a significant impact on the stormwater handling system.

The Proposed Action would result in long-term, minor to moderate, beneficial impacts on stormwater handling by reducing the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation. Development of new stormwater drainage systems and upgrade of existing systems would be designed with consideration for the UFC LID requirements, in accordance with EISA Section 438, to maintain or restore the natural hydrologic functions of the area.

Solid Waste Management

The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on solid waste management. Construction activities associated with the Proposed Action would generate minimal amounts of solid waste. Construction debris generated would consist primarily of recyclable and reusable building materials, such as concrete, metals (e.g., piping and wiring), and vegetation. Should project activities be conducted within an area of known contamination, waste would be properly characterized prior to disposal. 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. Site-generated scrap materials would be separated and recycled off site. Clean fill material, ground-up asphalt, and broken-up cement would be diverted from the landfills and reused whenever possible.

The weights of all materials diverted for recycling or reuse would be reported to the Kirtland AFB Quality Recycling Program to be credited toward the DoD-mandated construction and demolition diversion rate of 60 percent. Nonhazardous construction and demolition waste that is not recyclable or reusable would be transported to the Kirtland AFB construction and demolition waste landfill for disposal. Therefore, the Proposed Action would not be expected to result in a significant impact on solid waste management.

3.8.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and soil erosion measures, and the existing conditions discussed in **Section 3.8.1** would remain unchanged. Additionally, the No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would

increase, requiring costly repairs and worsening traffic hazards during heavy rains; and erosion of the arroyos on the installation would continue.

3.9 Hazardous Materials and Wastes

Hazardous materials are defined by 49 CFR § 171.8 as "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 § 173. Transportation of hazardous materials is regulated by the US Department of Transportation regulations within 49 CFR §§ 105–180.

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 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 their associated regulatory requirements are specified in 40 CFR § 273. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected as part of waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps.

A toxic substance is a chemical or mixture of chemicals that may present an unreasonable risk of injury to health or the environment. These substances include asbestos-containing materials (ACMs), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). USEPA is given authority to regulate these substances by the Toxic Substances Control Act (15 USC § 53). USEPA has established regulations regarding asbestos abatement and worker safety under 40 CFR § 763, with additional regulations concerning emissions at 40 CFR § 61. Whether from LBP abatement or other activities, depending on the quantity or concentration, the disposal of the LBP waste is regulated by the RCRA at 40 CFR § 260. The disposal of PCBs is addressed in 40 CFR §§ 750 and 761. The presence of toxic substances, including describing their locations, quantities, and condition, assists in determining the significance of a proposed action.

DoD developed the Environmental Restoration Program (ERP) to facilitate thorough investigation and cleanup of contaminated sites on military installations (i.e., active installations, installations subject to Base Realignment and Closure, and Formerly Used Defense Sites). The Installation Restoration Program and Military Munitions Response Program (MMRP) are components of the ERP. The Installation Restoration Program requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites. The MMRP addresses non-operational rangelands that are suspected or known to contain unexploded ordnance (UXO), discarded military munitions, or munitions constituent contamination. A description of ERP activities provides a useful gauge of the condition of soils, water resources, and other resources that might be affected by contaminants. It also aids in the identification of

properties and their usefulness for given purposes (e.g., activities dependent on groundwater usage might be restricted until remediation of a groundwater contamination plume has been completed).

DOE developed the Office of Environmental Restoration and Waste Management in 1989. The goal of this office is to implement DOE's policy of ensuring that past, present, and future operations do not threaten human health or environmental health and safety. The DOE Environmental Management Office was reorganized in 1999 to implement procedures to meet these goals through five underlying offices. The Office of Site Closure is responsible for achieving closure of Environmental Restoration (ER) sites in a manner that is safe, cost-effective, and coordinated with stakeholders. As a facility operated for DOE under the Albuquerque Operations Office, SNL is part of this program. The current investigation being conducted at SNL under the ER program is intended to determine the nature and extent of hazardous and radioactive contamination and to restore any sites where such materials pose a threat to human health or the environment.

For the USAF, Air Force Policy Directive 32-70, *Environmental Quality*, and Air Force Regulation 32-7000 series incorporate the requirements of all federal regulations and other AFIs and DoD Directives for the management of hazardous materials, hazardous wastes, and toxic substances.

3.9.1 Affected Environment

Environmental Management System. Kirtland AFB has implemented an EMS program in accordance with International Organization for Standardization 14001 Standards; EO 13693, *Planning for Federal Sustainability in the Next Decade*; and AFI 32-7001, *Environmental Management*. The EMS policy prescribes to protect human health, natural resources, and the environment by implementing operational controls, pollution prevention environmental action plans, and training.

All personnel, to include contractors, are made aware of the Kirtland AFB EMS program. All project-related activities should be conducted in a manner that is consistent with relevant policies and objectives identified in the installation's EMS program. Project Managers shall ensure that all personnel are aware of environmental impacts associated with their activities and reduce those impacts by practicing pollution prevention techniques.

Hazardous Materials and Petroleum Products. AFI 32-7086, *Hazardous Materials Management*, establishes procedures and standards that govern management of hazardous materials throughout the USAF to be in compliance with the Emergency Planning and Community Right to Know Act. AFI 32-7086 applies to all USAF personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities.

Kirtland AFB has identified the 377 MSG/CEIEC as the responsible entity to oversee hazardous material tracking on the installation. Part of their responsibilities is to control the procurement and use of hazardous materials to support USAF missions, ensure the safety and health of personnel and surrounding communities, and minimize USAF dependence on hazardous materials. 377 MSG/CEIEC is charged with managing hazardous materials to reduce the

amount of hazardous waste generated on the installation in accordance with the Kirtland AFB HWMP.

The installation's Pest Management Plan establishes the strategy and methods for conducting a safe, effective, and environmentally sound integrated pest management program that reduces pollution and other risk factors associated with the use of pesticides (KAFB 2016b). The Kirtland AFB Spill Prevention, Control, and Countermeasures Plan provides operating procedures to prevent the occurrence of spills, control measures to prevent spills from entering surface waters, and countermeasures to contain and cleanup the effects of an oil spill that could impact surface waters (KAFB 2012b). Contractors bringing hazardous materials onto the installation must notify the 377 MSG/CEIEC Hazardous Material Program Team by submitting a completed Hazardous Material Worksheet and a list of all materials along with their associated Safety Data Sheets.

Toxic Substances. Components of the existing stormwater system are not suspected to contain ACMs, LBP, or PCBs.

Hazardous and Petroleum Wastes. USAF maintains an HWMP as directed by AFI 32-7042, *Waste Management*. This plan describes the roles and responsibilities of all entities at Kirtland AFB with respect to the waste stream inventory, waste analysis plan, hazardous waste management procedures, training, emergency response, and pollution prevention. The HWMP establishes the procedures to comply with applicable federal, state, and local standards for solid waste and hazardous waste management.

Kirtland AFB is a large-quantity generator of hazardous waste (Handler Identification #NM9570024423). Kirtland AFB and DOE/SNL maintain separate RCRA permits for all current operations that generate hazardous waste.

Environmental Restoration Program*.* There are 287 ERP sites and 6 area of concern sites throughout Kirtland AFB. These sites include known and suspected soil and groundwater contamination associated with landfills, oil/water separators, drainage areas, septic systems, fire training areas, and spill areas. Kirtland AFB is working to cleanup most sites to residential standards and to obtain no further action required approval from NMED. Once sites achieve the no further action required approval, they are closed because they no longer represent constraints for land use. Active ERP sites are in various stages of remediation and some sites, such as the former landfills, may require more than 30 years of monitoring before closure can be obtained (KAFB 2016).

Kirtland AFB also has 24 MMRP sites, with 7 remaining active. These sites are former impact areas that are primarily located along the outer perimeter and center of the installation. The sizes, types of munitions debris, and potential for UXO varies by location (KAFB 2013a, KAFB 2013b).

The DOE actively manages 11 open ER sites on Kirtland AFB that require or may require corrective action. These sites are on DOE-leased lands and include three groundwater areas of concern and eight solid waste management units. When such sites are no longer active, DOE personnel determine if a site meets NMED criteria for acceptable levels of risk to human health and the environment. If the criteria are met, DOE submits a Corrective Action Complete

proposal to NMED to modify its RCRA permit accordingly. As necessary, remediation is performed to meet NMED criteria for Corrective Action Complete status (SNL 2017b). **Figure 3-4** presents the location of active ERP, MMRP, and DOE ER sites on Kirtland AFB.

3.9.2 Environmental Consequences

3.9.2.1 PROPOSED ACTION

The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on hazardous materials and wastes.

Environmental Management System. The Proposed Action would not result in short- or long-term impacts on the installation's EMS program. Installation personnel conducting maintenance activities would continue to implement standard BMPs and comply with existing standard operating procedures and applicable federal and state laws governing the use, generation, storage, and transportation of hazardous materials. Contractors associated with construction activities would be made aware of the installation's EMS program by reviewing the environmental commitment statement and ensuring that construction activities are conducted in accordance with the policy and objectives of the EMS program. Contractors would ensure that employees are aware of environmental impacts and would reduce those impacts by practicing pollution prevention techniques. Therefore, the Proposed Action would not be expected to result in a significant impact on the EMS program.

Hazardous Materials and Petroleum Products. The Proposed Action would result in intermittent, short-term, negligible, adverse impacts should any hazardous materials or petroleum products be released into the environment. Construction equipment would use small quantities of hazardous materials and petroleum products such as solvents, hydraulic fluid, oil, antifreeze, and other hazardous materials. Hazardous materials could be used for minor equipment servicing and repair activities. The severity of a potential impact from an accidental release would vary based upon the extent of a release and the substance(s) involved.

Under the Proposed Action, Kirtland AFB, AMAFCA, and construction contractors would ensure the handling and storage of any hazardous materials and petroleum products is carried out in compliance with applicable laws and regulations[1]. Implementation of the Proposed Action would adhere to applicable management plans such as the installation's Integrated Pest Management Plan and Spill Prevention and Countermeasure Control Plan. The severity of a potential impact from an accidental release would vary based upon the extent of a release and the substance(s) involved. In accordance with the Kirtland AFB SWPPP, each project associated with the Proposed Action would be reviewed to ensure proper erosion and sediment control measures are considered and incorporated into project designs. Additionally, projects that would individually or cumulatively disturb 1 or more acres of land would obtain coverage under the 2017 NPDES CGP prior to construction. The CGP requires preparation and implementation of site-specific SWPPPs.

[1] Kirtland AFB, AMAFCA, and construction contractors would be subject to applicable laws and regulations pertaining to hazardous materials and wastes, as well as installation-specific protocols and procedures. These requirements would be written into contracts in accordance with the Kirtland AFB HWMP.

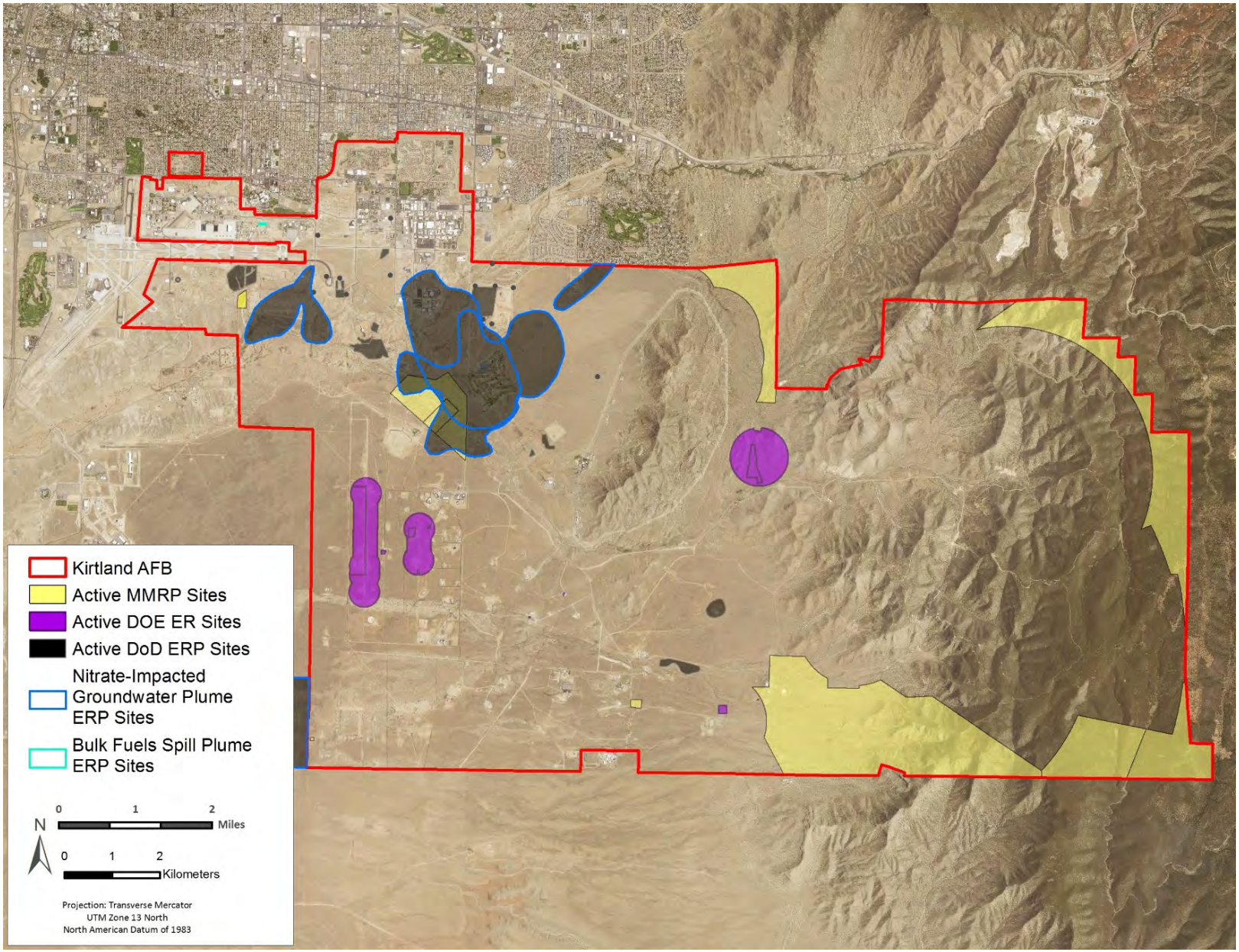

Figure 3-4. Active ERP, MMRP, and DOE ER Sites on Kirtland AFB

No storage tanks or hazardous materials and petroleum products storage areas would be affected under the Proposed Action. Although construction activities under the Proposed Action may require the temporary use of aboveground storage tanks onsite for power generation or equipment fuel, their use and maintenance would comply with applicable federal, state, and local laws and regulations, to include secondary containment. Aboveground storage tanks would be used temporarily and removed from each site upon project completion. Therefore, the Proposed Action would not be expected to result in a significant impact on hazardous materials management.

Toxic Substances. The Proposed Action would not result in the introduction or generation of toxic substances because components of the existing stormwater system are not suspected to contain ACMs, LBP, or PCBs.

Hazardous and Petroleum Wastes. The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on the generation of hazardous and petroleum wastes. Construction activities would require the use of hazardous materials and petroleum products, which would result in the generation of hazardous wastes and used petroleum products. Hydraulic fluids and petroleum products would be used in the 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 the manufacturer's specifications and drip mats would be placed under parked equipment as needed. Further, all hazardous and petroleum wastes generated from the Proposed Action would be handled, stored, and disposed of in accordance with the Kirtland AFB HWMP and federal, state, and local regulations.

It is possible that unknown, potentially hazardous wastes could be discovered or unearthed during implementation of the Proposed Action. In such cases, Kirtland AFB, AMAFCA, and construction contractors would immediately cease work, contact appropriate installation personnel, and await sampling and analysis results before taking any further action. Unknown wastes or soils determined to be contaminated or hazardous would be managed or disposed of in accordance with applicable laws and regulations. Therefore, the Proposed Action would not be expected to result in a significant impact on hazardous and petroleum waste management.

Environmental Restoration Program. The Proposed Action could result in intermittent, short-term, negligible, adverse impacts on or from ERP, MMRP, and DOE ER sites. The Proposed Action could adversely affect the human or natural environment should a project involving excavation intercept an ERP, MMRP, or DOE ER site. In such cases, the Proposed Action could result in contaminant migration via one or more environmental media (i.e., air, water, or soil pathways); however, the projects under the Proposed Action are not anticipated to occur within or adjacent to any ERP, MMRP, or DOE ER sites. In the event that a project associated with the Proposed Action would be conducted within or adjacent to an active ERP or DOE ER site, coordination with appropriate installation personnel would be conducted in order to avoid any impact on or from the site. Should a project associated with the Proposed Action be conducted within or adjacent to an MMRP site, all project personnel would attend a 30-minute UXO Awareness Training. Therefore, the Proposed Action would not be expected to result in a significant impact on or from ERP, MMRP, or DOE ER sites.

3.9.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures, and the existing conditions discussed in **Section 3.9.1** would remain unchanged.

3.10 Safety

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 agencies. These standards specify health and safety requirements, the amount and type of training required for workers, the use of personal protective equipment (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 or a potential fire hazard. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation process creates unsafe environments due to noise or fire hazards for nearby populations. Noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, and horns.

3.10.1 Affected Environment

Contractor Safety. All contractors performing construction and demolition activities are responsible for following federal and state of New Mexico safety regulations and are required to conduct construction and demolition activities in a manner that does not increase risk to workers or the public.

New Mexico is one of several states that administers its own occupational safety and health (OSH) program according to the provision of the federal OSHA of 1970, which permits a state to administer its own OSH program if it meets all of the federal requirements regarding the program's structure and operations. The New Mexico Occupational Health and Safety Bureau program has the responsibility of enforcing Occupational Health and Safety Regulations within the state of New Mexico. 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 is 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.

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." In order 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 or illness; a process for tracking incidents; funding for safety programs; metrics for measuring performance; safety goals; and methods to identify safety BMPs.

Public Safety. Kirtland AFB has its own emergency services department. The emergency services department 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 through the dissemination of public safety information to the installation. The Veterans Affairs Medical Center hospital and the 377th Medical Groups' Outpatient Clinic are the primary military medical facilities at Kirtland AFB. Several other hospitals and clinics, which are devoted to the public, are off-installation in the city of Albuquerque. These facilities include the Heart Hospital of New Mexico, University of New Mexico Hospital, and Kaseman Presbyterian Hospital (Google 2018).

The Albuquerque Fire Department provides fire suppression, crash response, rescue, emergency medical response, and hazardous substance response to the nearby city of Albuquerque. The department has 664 full-time, uniformed firefighter/emergency medical technicians; 22 fire engine companies; 7 frontline and 2 reserve fire ladder companies; 9 wildland fire or brush trucks; 3 frontline and 1 reserve hazardous material response units; 1 mobile command unit; and 20 frontline rescue and 7 rescue reserve medical response ambulances (AFD 2017). The city of Albuquerque also has approximately 831 sworn police officers available to provide law enforcement services (APD 2017). The Southeast Area Command (Phil Chacon Memorial Substation) borders the northwest corner of Kirtland AFB. A mutual service agreement is in place between the city of Albuquerque and Kirtland AFB.

3.10.2 Environmental Consequences

3.10.2.1 PROPOSED ACTION

The Proposed Action would result in short- and long-term impacts. Construction activities associated with the Proposed Action would result in short-term, negligible, adverse impacts on the safety of contractors, military personnel, and the public.

Long-term, minor, beneficial impacts on the safety of personnel and the public downstream of Kirtland AFB would be anticipated. Improved storm drainage on the installation would lessen the probability of adverse impacts from a 100-year flood event, including the resultant damage and inherent safety risks therein.

Contractor Safety. The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on contractor safety. Construction and demolition activities associated with the Proposed Action would slightly increase the health and safety risk to personnel within the project area. The selected construction contractor would be required to develop a comprehensive health and safety plan for each individual project containing site-specific guidance and direction to prevent or minimize potential risks. These plans would include, at a minimum, emergency response and evacuation procedures; operational manuals; PPE recommendations (e.g., breathing and hearing protection); protocols and procedures for handling, storing, and disposing of hazardous materials and wastes; 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 through daily briefings to review daily activities and potential hazards. Therefore, the Proposed Action would not be expected to result in a significant impact on contractor safety.

Military Personnel Safety. The Proposed Action would result in intermittent, short-term, negligible, adverse impacts on the health and safety of military personnel. Construction activities associated with the Proposed Action would comply with all applicable safety requirements and installation-specific protocols and procedures therein. The project areas would be appropriately delineated and posted with access limited to construction and maintenance personnel. Therefore, the Proposed Action would not be expected to result in a significant impact on military personnel safety.

Public Safety. The Proposed Action is not expected to result in short- or long-term adverse impacts on public health and safety. Because the proposed construction and demolition activities would occur within the boundaries of Kirtland AFB, an active military installation that is not open to the public, the Proposed Action would not pose a safety risk to the public or off-installation areas. Further, the project areas would be appropriately delineated and posted with access limited to construction and maintenance personnel. Therefore, the Proposed Action is not expected to result in a significant impact on public safety.

3.10.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures, and the

existing conditions discussed in **Section 3.10.1** would remain unchanged. Additionally, the No Action Alternative would result in stormwater drainage problems becoming worse as existing facilities silt up and deteriorate further; damage to roads, parking lots, and foundations would increase, requiring costly repairs and worsening traffic hazards during heavy rains; and erosion of the arroyos on the installation would continue. This could potentially result in greater safety hazards to installation personnel and the public.

3.11 Socioeconomics

Socioeconomics is the relationship between economics and social elements, such as population levels and economic activity. Factors that describe the socioeconomic environment represent a composite of several inter-related and non-related attributes. There are several factors that can be used as indicators of economic conditions for a geographic area, such as demographics, median household income, unemployment rates, percentage of families living below the poverty level, employment, and housing data. Data on employment identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on industrial, commercial, and other sectors of the economy provide baseline information about the economic health of a region.

3.11.1 Affected Environment

The Albuquerque Metropolitan Statistical Area (MSA) is considered the region of influence for socioeconomic effects of the Proposed Action. The population of the Albuquerque MSA, defined by the US Census Bureau for the 2010 US Census as Bernalillo, Sandoval, Torrance, and Valencia counties, was 887,077 people. The state of New Mexico's population totaled 2,059,179 in 2010 (USCB 2010a).

The population of Bernalillo County was 662,564 in 2010, representing 32 percent of the total population for the state of New Mexico. The population of Bernalillo County grew 19 percent from 2000 to 2010, while during this same time period Sandoval County experienced a 46.3 percent increase in population, Torrance County experienced a 3.1 percent decrease, and Valencia County grew by 15.7 percent. The growth rate in the Albuquerque MSA from 2000 to 2010 (24.5 percent) was much greater than the growth rate of the state of New Mexico (13.2 percent) and of the United States (9.7 percent) over the same time period. However, Torrance County was not included in the Albuquerque MSA for the 2000 US Census; therefore, when added to the 2000 US Census data for the Albuquerque MSA this represents a 21.6 percent increase in population. **Table 3-8** presents the 2000 and 2010 population data (USCB 2000, USCB 2010a).

Employment Characteristics. The three largest industries in the Albuquerque MSA in terms of percentage of the workforce employed within the industry are the educational services, and health care and social assistance industry (26 percent); the professional, scientific, and management, and administrative and waste management services industry (13 percent); and the retail trade industry (12 percent). The construction industry represents 7 percent of the workforce (USCB 2012–2016). In April 2018, the Bureau of Labor Statistics reported a 4.1 percent unemployment rate in the Albuquerque MSA while the United States had an unemployment rate of 3.7 percent (BLS 2018).

Table 3-8. Population in the Region of Influence as Compared to New Mexico and the United States (2000 and 2010)

Location	2000	2010	Percent Change
United States	281,421,906	308,745,538	9.7%
New Mexico	1,819,046	2,059,179	13.2%
Albuquerque MSA	712,738	887,077	24.5%*
Bernalillo County	556,678	662,564	19.0%
Sandoval County	89,908	131,561	46.3%
Valencia County	66,152	76,569	15.7%
Torrance County	16,911	16,383	-3.1%

Source: USCB 2000, USCB 2010a

Note: *Torrance County was not included in the Albuquerque MSA in the 2000 US Census. When the 2000 population of Torrance County is added to the 2000 population of the Albuquerque MSA, this represents a 21.6 percent increase in population.

Kirtland AFB. During FY 2016, 22,010 individuals were employed by Kirtland AFB, of which 4,173 were active-duty personnel. Direct payroll expenditures from the installation totaled over $2.4 billion. When non-payroll expenditures associated with Kirtland AFB are included, total expenditures exceeded $6.7 billion, with DoD expenditures representing approximately $3.3 billion of that total (KAFB 2017b).

3.11.2 Environmental Consequences

3.11.2.1 PROPOSED ACTION

The Proposed Action would result short- and long-term beneficial impacts. Construction activities associated with the Proposed Action would result in a short-term, negligible, beneficial impact on socioeconomics. Direct and indirect, beneficial impacts would result from increased payroll tax revenue and the purchase of construction materials and goods in the area resulting in a short-term, negligible, beneficial impact on the local economy of the Albuquerque MSA. The proposed construction activities would occur intermittently over several years and only require a small number of construction workers for each activity; therefore, the existing construction industry within the Albuquerque MSA should adequately provide enough workers to support construction activities associated with the Proposed Action. The temporary increase of construction workers at Kirtland AFB would represent a small increase in the total number of persons working on the installation, but no additional facilities (e.g., housing, schools) would be necessary to accommodate the workforce.

Long-term, negligible to minor, beneficial impacts on the socioeconomic environment at Kirtland AFB would result from improved conditions of stormwater drainage systems and arroyos through the development, upgrade, and maintenance of stormwater drainage systems and arroyo repair and erosion control measures on the installation. Damage to roads, parking lots, and foundations would decrease under the Proposed Action, resulting in a reduction in costly repairs. No long-term changes in employment would result under the Proposed Action. Therefore, the Proposed Action would not be expected to result in a significant impact on the socioeconomic environment.

3.11.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Kirtland AFB would not develop, upgrade, and maintain stormwater drainage systems or conduct arroyo repair and erosion control measures. The existing conditions discussed in **Section 3.11.1** would remain unchanged. However, repairs and renovations to the stormwater drainage system would become more costly to execute the longer they are delayed.

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4. Cumulative Impacts

CEQ defines cumulative impacts as "the impact on the environment which results 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 actions taking place over a period of time by various agencies (i.e., federal, state, and local) or individuals. 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. Reasonably foreseeable future actions consist of activities that have been approved and can be evaluated with regard to their impacts.

This section briefly summarizes past, present, and reasonably foreseeable future projects within the same general geographic scope as the Proposed Action. The geographic scope of the analysis varies by resource area. For example, the geographic scope of the cumulative impacts on noise, geological resources, and safety is narrow and focused on the location of the resource. The geographic scope of air quality, infrastructure, and socioeconomics is broader and considers more county- or region-wide activities.

The past, present, and reasonably foreseeable future projects, identified below, make up the cumulative impact scenario for the Proposed Action. The Proposed Action's impacts on the individual resource areas analyzed in **Sections 3.1** through **3.11** are added to the cumulative impact scenario to determine the cumulative impacts of the Proposed Action. In accordance with CEQ guidance, the impacts of past actions are considered in aggregate as appropriate for each resource area without delving into the historical details of individual past actions.

4.1 Impact Analysis

4.1.1 Past Actions

Kirtland AFB has been used for military missions since the 1930s and has continuously been developed as DoD missions, organizations, needs, and strategies have evolved. Development and operation of training ranges have impacted thousands of acres with synergistic and cumulative impacts on soil, wildlife habitats, water quality, and noise. Beneficial impacts also have resulted from the operation and management of the installation including increased employment and income for Bernalillo County, the city of Albuquerque, and its surrounding communities; restoration and enhancement of sensitive resources such as Coyote Springs wetland areas; consumptive and nonconsumptive recreation opportunities; and increased knowledge of the history and pre-history of the region through numerous cultural resources surveys and studies.

4.1.2 Present and Reasonably Foreseeable Future Actions

Kirtland AFB is a large military installation that is continually evolving. Projects that were examined for potential cumulative impacts are included in **Table 4-1**.

1 **Table 4-1. Present and Reasonably Foreseeable Future Actions at Kirtland AFB**

Project Name	Description	Potential Relevance to Proposed Action
Military Projects		
New Military Training Activities	The 210 RED HORSE Squadron would construct a permanent laydown yard on the Base Exercise Evaluation Skills Training Area to store equipment to be used during monthly training activities. Monthly training activities involve the disturbance of up to 40 acres of ground and include the use of the abandoned dirt airstrip to practice demolishing, denying access to, and reconstructing airstrips; construction of forward operating bases to allow other units to train with the 210 RED HORSE Squadron tearing them down; and dirt movement for heavy-equipment training. This recurring training could last up to 5 days and involve approximately 120 personnel. The Pararescue/Combat Rescue Officer (PJ/CRO) school is proposing to construct an Urban Training Compound (UTC) on 25 acres within the Coyote Canyon Training Area. The UTC would consist of the placement of connexes on a gravel base to simulate a mock village similar to those found in the Middle East. Training activities would include pararescue and insertion/extraction helicopter operations. Other training activities would include small team tactics, climbing, and emergency medical. During training activities at the UTC, personnel would use smokes, ground burst simulators, trip flares, flash-bang pyrotechnics, booby trap simulators, and blanks/simunitions. When the UTC is not scheduled for use by PJ/CRO, it would be open for use by other groups. Therefore, it is anticipated that the UTC could be used on a monthly basis. USAF is proposing to begin firing .50-caliber M107 Barrett sniper rifles and M2 machine guns at Small Arms Range East. An existing building south of Forest Road 44 would be demolished in order to provide line of sight from the firing point to the target array. Approximately 240 acres would be cleared by tree removal and thinning to create firebreaks along Forest Roads 40, 40B, 530B, and 53. Small Arms Range East would continue to be available for training operations and deployment qualification 24 hours a day, 7 days a week. The 377th Security Forces Group (SFG) would begin using the M583A1 parachute illumination round at the M203 Range. This round has a burst height of 500 to 700 feet above ground surface when fired vertically, a candle burn rate of approximately 40 seconds, and an average candlepower of 90,000. The average class using the illumination round would consist of 15 to 30 students, once per month. It is anticipated that an average of 250 to 500 rounds would be dispensed per year. Training would occur during early morning hours, approximately 0300 to 0500, dependent upon coordination with the Federal Aviation Administration and air traffic scheduling. Prior to initial use of this round, firebreaks consisting of cleared paths totaling approximately 8 acres would need to be created. The cleared paths would also be used for emergency vehicle access in case of an accidental fire.	Creation of firebreaks/ cleared paths in the vicinity of the M203 Range have the potential to be in project vicinity; potential for construction overlap

Table 4-1. Present and Reasonably Foreseeable Future Actions at Kirtland AFB (continued)

Project Name	Description	Potential Relevance to Proposed Action
Military Projects (continued)		
Additional Development, Testing, Use, and Training at the Technical Evaluation Assessment Monitor Site (TEAMS)	The Defense Threat Reduction Agency and USAF propose to enhance the testing and training capabilities and use, as well as the functionality, of the TEAMS. Specifically, the proposed facilities and activities include a new radiological source storage facility, a mock train station, in-kind replacement of current TEAMS temporary buildings with permanent buildings, and potential increase in testing and training event personnel levels by up to 50 percent. Approximately 2.7 acres would be affected during construction activities.	Potential to be in project vicinity; potential for construction overlap
Construction, Operation, and Maintenance of a New Fire Station	USAF proposes to construct, operate, and maintain a new Fire Station south of the intersection of Pennsylvania Street and Powerline Road. The proposed structure would be approximately 7,300 square feet in size and one story high with three high-bay drive-through apparatus stalls.	Potential to be in project vicinity; potential for construction overlap
Demolition and Construction of Military Support Facilities	USAF proposes to demolish and construct, operate, and maintain several military personnel support facilities in the northwestern portion of the installation. The areas include the Visiting Officer Quarters, the Main Enlisted Dormitory Campus, the Noncommissioned Officer Academy, and Dormitory Campus 2. This project would include the demolition of facilities totaling approximately 498,000 square feet and construction of facilities totaling approximately 389,000 square feet, resulting in a net decrease of approximately 109,000 square feet of building space on the installation. Approximately 36 acres would be impacted by construction and demolition activities.	Potential to be in project vicinity; potential for construction overlap
Building Demolition at Kirtland AFB	USAF is in the process of demolishing 23 buildings totaling approximately 105,000 square feet to make space available for future construction and to fulfill its mission as installation host through better site utilization. None of the buildings proposed for demolition are currently occupied or used by installation personnel.	Potential to be in project vicinity; potential for construction overlap
Security Forces Complex	USAF proposes to construct, operate, and maintain a 42,500-square-foot security forces complex to provide adequate space and modern facilities to house all 377 SFG administrative and support functions in a consolidated location. The 377 SFG functions that would be transferred to the new security forces complex include a base operations center with command and control facility, administration and office space, training rooms, auditorium or assembly room, guard mount, hardened armory for weapons and ammunition storage, confinement facilities, law enforcement, logistics warehouse, general storage, vehicle garage with maintenance area, and associated communications functions. One existing building (879 square feet) within the footprint of the proposed security forces complex would be demolished. This project would result in an increase of 41,621 square feet of building space on the installation.	Potential to be in project vicinity; potential for construction overlap

Table 4-1. Present and Reasonably Foreseeable Future Actions at Kirtland AFB (continued)

Project Name	Description	Potential Relevance to Proposed Action
Military Projects (continued)		
Construct New Military Working Dog Facility	USAF proposes to construct, operate, and maintain a new military working dog facility that consists of 14 indoor/outdoor kennels, four isolation kennels, storage and staff space, restrooms, food storage room, a covered walkway, and a veterinarian examining room, totaling 8,000 square feet. A parking area with 25 spaces and new access roads would also be constructed as part of the project. Demolition of facilities totaling 2,520 square feet would also be included in this project, resulting in a net increase of 5,480 square feet of building space on the installation.	Potential to be in project vicinity; potential for construction overlap
New Deployable Structures Laboratory	AFRL is proposing to construct a new 4,125-square-foot high-bay addition to the southeast corner of Building 472. Proposed new construction would include structural pads on columns and trusses for anchoring an active gravity off-load support frame; high precision environmental controls (temperature and humidity with low air currents); Gantry crane; and optically diffuse wall coatings for the high precision optical motion metrology system (videogrammetry).	Potential to be in project vicinity; potential for construction overlap
Enhanced Use Lease	Kirtland AFB is in the process of leasing 107 acres of USAF property along Gibson Boulevard to Thunderbird Kirtland Development, Ltd., to develop a research park with office, industrial, laboratory, retail, and hospital facilities.	Potential to be in project vicinity; potential for construction overlap
Navigation Technology Satellite Integration Laboratory	AFRL is proposing to construct a 10,000-square-foot high bay laboratory south of Building 590. The facility would contain office space; Near Field Antenna Range and control room; vault; security vestibule; restrooms; loading dock; and conference, break, storage, communications, and mechanical rooms.	Potential to be in project vicinity; potential for construction overlap
High Power Joint Electromagnetic Non-Kinetic Strike Laboratory	AFRL is proposing to construct a 5,000-square-foot addition to Building 332 to include a heavy laboratory with shielding, a light laboratory, and office space to support new electromagnetics research.	Potential to be in the project vicinity; potential for construction overlap
21st Explosive Ordnance Division Expansion	The 21st Explosive Ordnance Division proposes facility expansion and site improvements for the Weapons of Mass Destruction Company Complex. This unit currently operates from a 90-acre property leased by the US Army within Kirtland AFB. The current site has seven structures, six of which are substandard and do not have adequate fire protection. The 21st Explosive Ordnance Division proposes to expand this site to a total of 280 acres, add three permanent structures totaling 40,000 square feet, demolish five of the six substandard structures (75,000 square feet), add two temporary storage containers, tie in to nearby utilities, construct water tanks for fire suppression, and construct several concrete pads for training activities. This project would result in a decrease of 35,000 square feet of building space on the installation.	Potential to be in project vicinity; potential for construction overlap

Table 4-1. Present and Reasonably Foreseeable Future Actions at Kirtland AFB (continued)

Project Name	Description	Potential Relevance to Proposed Action
Military Projects (continued)		
Kirtland Exhaust Helium Gas Recovery Facility	AFRL is proposing to construct a 3,700-square-foot facility between Buildings 580 and 581 to recover helium gas exhaust from experiments occurring within these buildings. The recovered gas would be reliquefied for reuse in the laboratories.	Potential to be in project vicinity; potential for construction overlap
Wildland Fire Management Plan	USAF proposes to implement the Tier 1 Wildland Fire Management Plan for Kirtland AFB. The plan includes development of a wildland fire training and certification program, funding for a wildland fire vehicle and equipment replacement program, and implementation of a fuels management program. Fuels management would reduce wildland fire hazard via prescribed fire, mechanical vegetation management, wildland fire infrastructure maintenance and development, and timber inventory monitoring.	No potential to be in project vicinity; potential for construction overlap
Renewable Energy Projects	USAF proposes to develop renewable energy projects at Kirtland AFB. The proposed project would include the installation of various renewable energy technologies installation-wide, up to a 20 megawatt solar photovoltaic array, and rooftop/carport solar photovoltaic systems.	Potential to be in project vicinity; potential for construction overlap
Realign Gibson Boulevard	USAF proposes to realign Gibson Boulevard from Louisiana Boulevard to the Gibson Gate because of an increase in security incidents at the Gibson Gate. The current access road is a five-lane extension of Gibson Boulevard. The Proposed Action would close the extension of Gibson Boulevard east of Louisiana Boulevard and reroute the Gibson Gate ingress/egress routes farther south on Louisiana Boulevard. The new four-lane roadway would be approximately 1,500 linear feet and include installation of street lights and appropriate stormwater drainage controls. The route to the Gibson Gate would change from a straight roadway to a serpentine roadway. Construction of the new roadway would be phased in order to allow continued access to the installation and Wherry Elementary using the current extension of Gibson Boulevard and during construction activities. Upon completion of the new roadway, the extension of Gibson Boulevard and associated street lights would be removed and curbing would be installed at the intersection of Gibson and Louisiana Boulevards to close the roadway. Construction is anticipated to begin the first quarter of FY 2019 and take approximately 6 months to complete.	Potential to be in project vicinity; no potential for construction overlap
Zia Park Area Development Plan	Zia Park is comprised of land bounded by Gibson Boulevard to the north, Pennsylvania Street to the east, Hardin Boulevard to the south, and Kirtland Road and Louisiana Boulevard to the west. Zia Park encompasses approximately 300 acres of land east of the airfield, in the center of the installation. Within the next 5 years, the New Mexico Army National Guard's 515th Regional Training Institute (RTI) proposes to relocate from Santa Fe to the area adjacent to the PJ/CRO Campus within Zia Park. The plan for Zia Park also includes the creation of an east-west vehicular connection for the installation in order to establish a cohesive community core.	Potential to be in project vicinity; potential for construction overlap; increased personnel with relocation of the 515 RTI

Table 4-1. Present and Reasonably Foreseeable Future Actions at Kirtland AFB (continued)

Project Name	Description	Potential Relevance to Proposed Action
Military Projects (continued)		
Zia Park Area Development Plan (continued)	Proposed projects include relocation of the 515 RTI; expansion of the PJ/CRO Campus; development of vehicular, pedestrian, and bicycle circulation; parking; and community facilities such as the medical/dental clinics, pharmacy, dining facility, unaccompanied housing, outdoor recreational facilities, and a state-of-the art physical fitness center. Proposed activities are projected to occur up to 20 years into the future and would complete the long-term vision for Zia Park.	
Non-Military Projects		
AMAFCA Louisiana-Gibson Regional Drainage Facility	AMAFCA proposes to construct a 30-acre-foot drainage facility on Kirtland AFB at the southeast quadrant of the Louisiana/Gibson intersection in order to collect and limit stormwater runoff. Currently, stormwater flow off Kirtland AFB is not controlled and causes damage downstream of the installation, contributing to flooding in the San Pedro/Gibson area. Proposed to begin in the fourth quarter of FY 2018.	Potential to be in project vicinity; no potential for construction overlap
ABCWUA Water Treatment Facility on Kirtland AFB	To accommodate future growth in Bernalillo County, ABCWUA proposes to construct a wastewater treatment plant on Kirtland AFB. This project is proposed to occur between 2027 and 2037 on approximately 60 acres of land near the western boundary of the installation, south of Tijeras Arroyo.	Potential to be in project vicinity; potential for construction overlap
Juan Tabo Hills West	Juan Tabo Hills West is Phase 4 of the Voltera Village community and sits on approximately 25 acres near Juan Tabo Boulevard and the Tijeras Arroyo. Phase 4 would consist of 250 single-family lots.	Not in project vicinity; potential for construction overlap
Sunport South Business Park *(formerly Valle del Sol)*	Sunport South Business Park is a proposed 330-acre business park expected to attract manufacturing, fabrication, warehousing, and distribution centers. It would be multi-modal to include access to the Sunport and an active rail spur. An additional 200 acres would be reserved for bike trails and walking paths. The site is south of the Sunport.	Not in project vicinity; potential for construction overlap
Sunport Boulevard Extension	The New Mexico Department of Transportation has proposed an expansion project for Sunport Boulevard from Broadway Boulevard to I-25, consisting of constructing a four-lane median divided urban arterial roadway. The roadway is approximately 0.5 mile in length and would contain twin bridges over the existing AMAFCA South Diversion Channel and twin bridges over Edmunds Street.	Not in project vicinity; potential for construction overlap

Table 4-1. Present and Reasonably Foreseeable Future Actions at Kirtland AFB (continued)

Project Name	Description	Potential Relevance to Proposed Action
Non-Military Projects (continued)		
Mesa del Sol Master Plan	Mesa del Sol is a 12,900-acre, mixed-use master planned community. It is bound by the Sunport along the northwestern edge, Kirtland AFB on the north and east, the Isleta reservation to the south, and I-25 to the west. The community would be built over 40 years and would cover 9,000 of the 12,900 acres. It is proposed to include 3,200 acres for park and open space; 4,400 acres for residential and supporting retail; 413 acres of office space; and 800 acres for schools, including university branches.	Not in project vicinity; potential for construction overlap
Albuquerque International Sunport Projects	The Sunport began the Terminal Improvement Project in February 2017. This project will refurbish and upgrade the ticketing, baggage claim, and exterior areas of the terminal. It is anticipated to take approximately 15 months to complete. Development began on the Destination Sunport project in March 2017. The project will transform decommissioned Runway 17/35, approximately 80 acres, into space for aviation and aerospace businesses, high tech companies, and retail. The Aviation Center of Excellence is the centerpiece of the development, which also features “The Landing” a 10-acre strip along Gibson Boulevard that would contain retail businesses. Future projects planned for the Sunport over the next 20 years include rehabilitation of various runways, taxiways, and aprons; installation/expansion of aprons and taxiways; removal/closure of taxiways; construction of an Aircraft Rescue Firefighting Facility; removal of the Belly Freight Building; construction of an addition to Concourse B; and construction of a Federal Inspection Services/International Terminal.	Not in project vicinity; potential for construction overlap
I-25 and Rio Bravo Interchange	The New Mexico Department of Transportation is currently reconstructing the I-25 and Rio Bravo Interchange and the Rio Bravo roadway corridor from University to the AMAFCA channel. Improvements include a new intersection layout at I-25/Rio Bravo and new roadway pavement and features within the right-of-way infrastructure including multi-modal improvements.	Not in project vicinity; potential for construction overlap
Valle de Oro Phase II	The USFWS is proposing to conduct restoration, development, and management activities on Valle de Oro National Wildlife Refuge in Bernalillo County. The refuge is 570 acres primarily located between 2nd Street SW and the Rio Grande in the South Valley, approximately 3.5 miles southwest of Kirtland AFB. Proposed activities include habitat restoration; construction of a visitor’s center, a parking lot, trails, and roads; vegetation and wildlife management; construction and management of AMAFCA stormwater drainage facilities, including a swale and water quality structures; and, in partnership with Mid-Rio Grande Conservancy District, align the Barr Interior Drain.	Potential to be in project vicinity; potential for construction overlap

4.2 Cumulative Impact Analysis by Resource Area

4.2.1 Noise

The noise generated by construction and maintenance activities of the Proposed Action would be intermittent, short-term, and temporary in nature. By adhering to the BMPs listed within this PEA and the city of Albuquerque's noise ordinance, the noise impacts generated by the Proposed Action and present and reasonably foreseeable future projects would result in only temporary increases in ambient noise levels during construction activities. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in significant cumulative impacts on sensitive noise receptors or the noise environment at Kirtland AFB or regionally.

4.2.2 Air Quality

Construction and maintenance activities under the Proposed Action would result in low levels of air emissions, well below the *de minimis* threshold limits, would not be regionally significant, and would be intermittent, short-term, and temporary in nature. BMPs outlined in **Section 3.2**, including dust suppression, stabilization of previously disturbed areas, and shutting down machinery and equipment when not in use for extended periods of time, are also consistent with those adhered to within the city of Albuquerque and would minimize impacts. These BMPs are typical measures listed within fugitive dust control construction permits issued by AEHD-AQD. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in significant cumulative impacts on air quality at Kirtland AFB or regionally.

4.2.3 Geological Resources

The Proposed Action would neither reduce prime farmland soils or agricultural production nor would it affect the local or regional geology. Ground-disturbing activities associated with the Proposed Action and present and reasonably foreseeable future projects would expose soils and increase their susceptibility to water and wind erosion. Over time, these activities could also result in the gradual alteration of topography downstream of select project locations because of minor changes in the direction, rate, and volume of surface water flows. Additionally, the use of heavy equipment or vehicles could result in soil compaction, altering their normal function relative to water storage, infiltration, or filtration; however, construction activities associated with the Proposed Action and present and reasonably foreseeable future projects would take the attributes of the topography and underlying soil types within a project area into consideration in the design of each potential project.

Kirtland AFB and AMAFCA would continue to coordinate activities on the installation in order to ensure neither negatively impacts the other's activities or systems on and off the installation and activities proposed in this PEA would be compatible with the Tijeras Arroyo Management Plan prepared by AMAFCA. BMPs outlined in **Section 3.3**, including those outlined in Fugitive Dust Control Permits, CGPs, and the development and implementation of SWPPPs, are also consistent with those adhered to within the city of Albuquerque and would be implemented to control erosion during ground-disturbing activities, which would minimize impacts. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable

future projects (see **Table 4-1**), would not result in significant cumulative impacts on geology and soils.

4.2.4 Water Resources

The Proposed Action would result short- and long-term impacts on local and regional water resources on and downstream of the installation. Adverse impacts would result from ground-disturbing activities associated with the Proposed Action and present and reasonably foreseeable future projects; however, these impacts would be reduced by incorporating LIDs to promote stormwater retention and re-use and implementation of BMPS and environmental protection measures. Stormwater drainage improvements would result in improved stormwater conveyance and a reduction in erosion and sedimentation of surface waters on and downstream of the installation.

Construction areas associated with the Proposed Action and present and reasonably foreseeable future projects on the installation and within the city of Albuquerque require all construction activities, regardless of size, to implement BMPs to ensure that stormwater pollutants are contained to the maximum extent practical and do not enter storm drainage systems. Project-specific CGP would be required for project areas larger than 1 acre; therefore, site-specific SWPPPs would be developed and all BMPs outlined therein would be implemented prior to any ground disturbance thereby reducing any adverse impact on surface waters. Soil disturbance from construction and demolition activities have the potential to result in a minor disruption of natural drainage patterns, contamination of stormwater discharge, and heavy sediment loading. Development of new stormwater drainage systems and upgrade of existing systems would be designed with consideration for the UFC LID requirements, in accordance with EISA Section 438, to maintain or restore the natural hydrologic functions of the area.

Short-term, adverse impacts on surface waters would be controlled through implementation of typical BMPs for equipment use and emergency equipment repair, such as containment of fuels and other potentially hazardous materials, secondary containment, and keeping spill kits onsite during construction and maintenance activities. The Proposed Action and projects presented in **Table 4-1** would be conducted in accordance with environmental considerations, including implementation of stormwater and erosion control as well as water conservation (e.g., using low flow toilets, etc.) measures. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on water resources.

4.2.5 Biological Resources

Construction and maintenance activities under the Proposed Action and present and reasonably foreseeable future projects on the installation and within the city of Albuquerque 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 appropriate BMPs, such as cleaning construction equipment prior to entering the project area and measures would be implemented to help prevent and control dissemination of invasive plant species during ground-disturbing activities. Revegetation of disturbed sites with native vegetation would further reduce the establishment of invasive species.

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 soon after activities conclude. Additionally, project activities would be scheduled 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 Kirtland AFB and within the surrounding natural areas, significant adverse impacts on these resources would not be expected.

Stormwater drainage improvements would reduce the velocity and energy of stormwater flows and detrimental effects of erosion and sedimentation into surface waters. Restabilizing arroyos and upgrading stormwater systems would improve the flow of floodwater resulting in improved water quality because less erosion and sedimentation would occur during a flood event. Improvements would promote bank stabilization, resulting in beneficial impacts on terrestrial habitat. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in a significant cumulative impact on biological resources.

4.2.6 Cultural Resources

The Proposed Action has the potential to result in an adverse effect on known cultural resources because of the concentration of cultural resources surrounding the natural arroyos and waterways within Kirtland AFB; therefore, these are the locations where archaeological testing and monitoring would be most appropriate. Avoidance of known cultural resources sites would be taken into consideration when planning and developing stormwater drainage and arroyo repair projects and present and reasonably foreseeable future projects on the installation and within the city of Albuquerque. However, if project activities would be conducted adjacent to or could not be adjusted to avoid impacting an archaeological site, then consultation with the SHPO/THPO would occur, and mitigation measures would be developed in accordance with Section 106 of the NHPA.

BMPs outlined in **Section 3.6**, to include compliance with all requirements and management measures identified in the Kirtland AFB ICRMP are typical measures and would ensure that inadvertent discoveries of cultural resources during project activities are properly addressed and would minimize impacts. If the footprint of a project area associated with the Proposed Action and present and reasonably foreseeable future projects on the installation and within the city of Albuquerque could not be adjusted to avoid impacting a site, then consultation with the SHPO/THPO would occur and mitigation measures would be developed in accordance with Section 106 of the NHPA.

Should an inadvertent discovery of human or cultural remains occur on Kirtland AFB, all project activities shall stop, the Kirtland AFB Cultural Resources Program Manager would be notified, and operational procedures outlined in the ICRMP would be followed. Should an inadvertent discovery occur within the city of Albuquerque, all project activities would stop and the discovery would be reported to the SHPO for assistance and further guidance. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in a significant cumulative impact on cultural resources.

4.2.7 Paleontological Resources

Based upon the geoarchaeological study at Kirtland AFB, the Proposed Action has the potential to result in an adverse effect on paleontological resources, because most of the fossils of ancient organisms discovered on the installation and in the surrounding region have occurred in the areas surrounding the natural arroyos and waterways. Avoidance of known paleontological resources sites would be taken into consideration when planning and developing the Proposed Action and present and reasonably foreseeable future actions on the installation and within the city of Albuquerque. However, it is recommended that any ground-disturbing activities take into consideration the potential for the discovery of previously undiscovered paleontological resources. Considering the Proposed Action aims to construct, repair, and maintain the drainage systems within Kirtland AFB, the proposed construction activities would occur within areas that have a higher probability to encounter subsurface paleontological resources. Areas within or adjacent to the arroyos on the installation and within the city of Albuquerque have the highest incidence of inadvertent discoveries of paleontological resources. In order to minimize potential impacts to unrecorded paleontological deposits, it is recommended that subsurface surveys and monitoring be conducted in any area where construction activities would impact undisturbed areas within or adjacent to arroyos.

Should an inadvertent discovery of paleontological materials occur on Kirtland AFB, all project activities shall stop, the Kirtland AFB Cultural Resources Program Manager would be notified, and operational procedures outlined in the ICRMP would be followed as they would for archaeological resources. Should an inadvertent discovery occur within the city of Albuquerque, all project activities would stop and the discovery would be reported to the New Mexico Museum of Natural History for assistance and further guidance. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in a significant cumulative impact on paleontological resources.

4.2.8 Infrastructure

The Proposed Action has the potential to adversely impact the following infrastructure: transportation, water resources, stormwater handling, and solid waste. These impacts are anticipated to be intermittent, short-term, and temporary in nature. BMPs outlined in **Section 3.7**, to include timing vehicle traffic to avoid peak travel hours and diverting materials that could be recycled or reused from landfills to the greatest extent possible, would further reduce any impacts. These BMPs are typical measures adhered to for construction projects on the installation and within the city of Albuquerque. Upgrade and construction of new infrastructure on and off the installation (see **Table 4-1**) would result in beneficial impacts from improved energy efficiency. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on infrastructure.

4.2.9 Hazardous Materials and Wastes

The Proposed Action and present and reasonably foreseeable actions on Kirtland AFB and within the city of Albuquerque would result in intermittent, short-term, temporary increases in the use of hazardous materials and petroleum products and generation of waste. BMPs outlined in **Section 3.8**, to include proper vehicle maintenance, proper procurement of hazardous

materials, and proper disposal of hazardous wastes would minimize impacts. The Proposed Action, as well as present and reasonably foreseeable future projects at Kirtland AFB and within the city of Albuquerque (see **Table 4-1**), would incorporate measures to limit or control hazardous materials and waste into their design and operation plans. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on hazardous materials and wastes.

4.2.10 Safety

No adverse cumulative impacts on health and safety would be expected from the Proposed Action and present and reasonably foreseeable future projects on the installation and within the city of Albuquerque. 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 within the city of Albuquerque. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in a significant cumulative impact on health and safety.

4.2.11 Socioeconomics

The Proposed Action, when combined with other past, present, and reasonably foreseeable actions on Kirtland AFB and within the city of Albuquerque, would continue to result in short-term, beneficial impacts on the region's economy through the purchase of construction materials and providing employment for construction personnel during project activities. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable future projects (see **Table 4-1**), would not result in a significant cumulative impact on socioeconomics.

4.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts would result from the Proposed Action. None of these impacts would be significant.

Energy. The Proposed Action would require the use of fossil fuels, a non-renewable natural resource, during construction and maintenance activities. The use of non-renewable resources is an unavoidable occurrence, although not considered significant.

Geological Resources. Construction activities associated with the Proposed Action would result in temporary soil disturbance; however, implementation of BMPs and erosion- and sedimentation-control measures would limit environmental impacts. Although soil disturbance would be unavoidable, the impact on geological resources would be negligible.

Hazardous Materials and Wastes. The use and generation of hazardous materials and wastes during construction and maintenance activities would be unavoidable; however, the materials and wastes would be handled in accordance with federal, state, and local policies and would not be expected to result in significant impacts.

4.4 Compatibility of the Proposed Action with the Objectives of Federal, Regional, and Local Land Use Plans, Policies, and Controls

The Proposed Action would occur entirely within Kirtland AFB. Construction and maintenance activities would not be incompatible with any current land uses on or adjacent to the installation. Kirtland AFB, AMAFCA, and ABCWUA would continue to coordinate activities on the installation in order to ensure neither negatively impacts the other's activities or systems on and off the installation and proposed activities would be compatible with the Tijeras Arroyo Management Plan prepared by AMAFCA. The Proposed Action would not conflict with any applicable off-installation land use ordinances and would follow all applicable permitting, building, and safety requirements.

4.5 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 uses of the biophysical components of the human environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period of less than 5 years. Long-term uses of the human environment include those impacts occurring over a period of more than 5 years, including permanent resource loss.

The Proposed Action would not require short-term resource uses that would result in long-term compromises of productivity. The Proposed Action would not result in intensification of land use at Kirtland AFB or within the surrounding area. Implementation of the Proposed Action would not represent a loss of open space. Therefore, it is anticipated that the Proposed Action would not result in any adverse cumulative impacts on land use or aesthetics.

4.6 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 use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). The irreversible and irretrievable commitment of resources that would result from 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 concrete and various construction materials and supplies. The 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 used for the Proposed Action would be irretrievably lost. This includes petroleum-based products (e.g., gasoline and diesel). During construction and maintenance activities, gasoline and diesel would be used for the operation of vehicles and construction equipment. 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.

Biological Resources. The Proposed Action would result in a negligible loss of vegetation and wildlife habitat. Direct effects on vegetation from vegetation removal and crushing and indirect effects from soil compaction and potential for establishment of invasive species would occur; however, revegetation of disturbed sites with native species would support a native plant community in the long-term. Minimal loss of wildlife would occur because of the Proposed Action; however, this would not constitute a significant adverse impact on biological resources.

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.

5. List of Preparers

This PEA has been prepared by HDR, Inc. (HDR) and associated team members under the direction of Kirtland AFB. The individuals who contributed to the preparation of this document are listed below and are from HDR unless otherwise noted:

Michelle Bare
General Studies
Years of Experience: 29

Timothy Didlake
B.S. Earth Sciences
Years of Experience: 10

Nicolas Frederick
M.S. Biology
B.S. Psychology
Years of Experience: 8

Megan Gambone
M.S. Biology
B.S. Environmental Science
Years of Experience: 12

Danielle Gascoyne (Stell)
B.S. Environmental Health
Years of Experience: 12

Leigh Hagan
M.E.S.M. Environmental Science and Management
B.S. Biology
Years of Experience: 13

Christopher Holdridge
M.S. Environmental Assessment
B.S. Environmental Science/Chemistry
Years of Experience: 20

Megan Koszarek
M.S. European Archaeology
Years of Experience: 6

Kathy Lemberg
B.A. Anthropology
Years of Experience: 12

Christopher McJetters
B.S. English
Years of Experience: 10

Darrell Molzan, PE
B.S. Civil Engineering
Years of Experience: 34

Cheryl Myers
A.A.S. Nursing
Years of Experience: 24

Steven Peluso, CHMM, CPEA
B.S. Chemical Engineering
Years of Experience: 30

Michael Robertson (Stell)
B.S. Crop and Soil Environmental Science
M.A. Environmental Policy and Planning
Years of Experience: 15

Patrick Solomon, CEP
B.S. Geography
M.S. Geography
Years of Experience: 24

Clayton Tinsley
M.A. Anthropology
Years of Experience: 25

Andrew Tuleya (Stell)
B.A. Geography/Planning
Years of Experience: 6

Valerie Whalon
B.S. Marine Science
M.S. Fisheries Sciences
Years of Experience: 24

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Intergovernmental and Stakeholder Coordination

Federal, State, and Local Agencies – Cooperating Agency Letters

Ms. Susan Lacy
DOE/NNSA Sandia Field Office
PO Box 5400
Albuquerque NM 87187

Mr. John Weckerle
DOE/NNSA Office of General Counsel
PO Box 5400
Albuquerque NM 87187

Mr. George Macdonnell, Chief
Environmental Resources Section
US Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque NM 87109

Mr. Tony Robinson, Regional Administrator
Federal Emergency Management Agency
Region VI
FRC 800 North Loop 288
Denton TX 76209-3698

Mr. Jerry Lovato, Executive Engineer
Albuquerque Metropolitan Arroyo Flood
Control Authority
2600 Prospect Avenue NE
Albuquerque NM 87107

Mr. Mark Sanchez, Executive Director
Albuquerque-Bernalillo County Water Utility
Authority
PO Box 568
Albuquerque NM 87103-0568

Cooperating Agency Letters

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

23 Jan 18

MEMORANDUM FOR DOE/NNSA/SANDIA FIELD OFFICE (SFO)
ATTN: MS. SUSAN LACY

FROM: HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB LA 71110

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

1. The Air Force requests SFO's formal participation in the preparation of a programmatic environmental assessment (PEA) to restore the MS4 that discharges from Kirtland AFB into the Tijeras Arroyo and the Rio Grande, as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR Part 1501.6, *Cooperating Agencies*.

2. Kirtland AFB's MS4 requires extensive work to maintain compliance with their MS4 Permit by restoring the system and modernize it to prevent future damage and. The Proposed Action will:

a. Remove sedimentation buildup in all ditches, culverts, pipes, and retention basins;

b. Install/repair all berms, retention structures, and erosion control vegitation in retention basins and other exterior stormwater storage areas to control runoff and discharges of suspended solids;

c. Install/repair outlet structures and erosion control features in arroyos;

3. As a cooperating agency, the Air Force requests SFO participate in various portions of the PEA development as may be required. Specifically, the Air Force asks for your support by:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which SFO has special expertise;

c. Making staff support available to enhance interdisciplinary review capability;

d. Responding, in writing, to this request.

4. The Air Force requires that the support of cooperating agency be timely to avoid unnecessary delays in the NEPA process. For further questions regarding this memo, our point of contact is Ms. Martha Garcia, 377 MSG/CEIEC, at (505) 846-6446, or martha.garcia.3@us.af.mil.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer

DETER...ASSURE...STRIKE!

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

23 Jan 18

MEMORANDUM FOR DOE/NNSA OFFICE OF GENERAL COUNSEL
ATTN: MR. JOHN WECKERLE

FROM: HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB LA 71110

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

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2. Kirtland AFB's MS4 requires extensive work to maintain compliance with their MS4 Permit by restoring the system and modernize it to prevent future damage and. The Proposed Action will:

a. Remove sedimentation buildup in all ditches, culverts, pipes, and retention basins;

b. Install/repair all berms, retention structures, and erosion control vegitation in retention basins and other exterior stormwater storage areas to control runoff and discharges of suspended solids;

c. Install/repair outlet structures and erosion control features in arroyos;

3. As a cooperating agency, the Air Force requests NNSA participate in various portions of the PEA development as may be required. Specifically, the Air Force asks for your support by:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which NNSA has special expertise;

c. Making staff support available to enhance interdisciplinary review capability;

d. Responding, in writing, to this request.

4. The Air Force requires that the support of cooperating agency be timely to avoid unnecessary delays in the NEPA process. For further questions regarding this memo, our point of contact is Ms. Martha Garcia, 377 MSG/CEIEC, at (505) 846-6446, or martha.garcia.3@us.af.mil.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer

DETER...ASSURE...STRIKE!

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

23 Jan 18

MEMORANDUM FOR CHIEF, ENVIRONMENTAL RESOURCES SECTION (MR. MACDONELL)
USACE, ALBUQUERQUE DISTRICT (CESPA-PM-LE)

FROM: HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB LA 71110

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

1. The Air Force requests USACE's formal participation in the preparation of a programmatic environmental assessment (PEA) to restore the MS4 that discharges from Kirtland AFB into the Tijeras Arroyo and the Rio Grande, as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR Part 1501.6, *Cooperating Agencies*.

2. Kirtland AFB's MS4 requires extensive work to maintain compliance with their MS4 Permit by restoring the system and modernize it to prevent future damage and. The Proposed Action will:

a. Remove sedimentation buildup in all ditches, culverts, pipes, and retention basins;

b. Install/repair all berms, retention structures, and erosion control vegitation in retention basins and other exterior stormwater storage areas to control runoff and discharges of suspended solids;

c. Install/repair outlet structures and erosion control features in arroyos;

3. As a cooperating agency, the Air Force requests USACE participate in various portions of the PEA development as may be required. Specifically, the Air Force asks for your support by:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which USACE has special expertise;

c. Making staff support available to enhance interdisciplinary review capability;

d. Responding, in writing, to this request.

4. The Air Force requires that the support of cooperating agency be timely to avoid unnecessary delays in the NEPA process. For further questions regarding this memo, our point of contact is Ms. Martha Garcia, 377 MSG/CEIEC, at (505) 846-6446, or martha.garcia.3@us.af.mil.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer

DETER...ASSURE...STRIKE!

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

23 Jan 18

MEMORANDUM FOR REGIONAL ADMINISTRATOR (MR. TONY ROBINSON)
FEMA, REGION VI

FROM: HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB LA 71110

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

1. The Air Force requests FEMA's formal participation in the preparation of a programmatic environmental assessment (PEA) to restore the MS4 that discharges from Kirtland AFB into the Tijeras Arroyo and the Rio Grande, as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR Part 1501.6, *Cooperating Agencies*.

2. Kirtland AFB's MS4 requires extensive work to maintain compliance with their MS4 Permit by restoring the system and modernize it to prevent future damage and. The Proposed Action will:

a. Remove sedimentation buildup in all ditches, culverts, pipes, and retention basins;

b. Install/repair all berms, retention structures, and erosion control vegitation in retention basins and other exterior stormwater storage areas to control runoff and discharges of suspended solids;

c. Install/repair outlet structures and erosion control features in arroyos;

3. As a cooperating agency, the Air Force requests FEMA participate in various portions of the PEA development as may be required. Specifically, the Air Force asks for your support by:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which FEMA has special expertise;

c. Making staff support available to enhance interdisciplinary review capability;

d. Responding, in writing, to this request.

4. The Air Force requires that the support of cooperating agency be timely to avoid unnecessary delays in the NEPA process. For further questions regarding this memo, our point of contact is Ms. Martha Garcia, 377 MSG/CEIEC, at (505) 846-6446, or martha.garcia.3@us.af.mil.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer

DETER...ASSURE...STRIKE!

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

23 Jan 18

MEMORANDUM FOR EXECUTIVE ENGINEER, ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY (MR. JERRY LOVATO)

FROM: HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB LA 71110

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

1. The Air Force requests AMAFCA's formal participation in the preparation of a programmatic environmental assessment (PEA) to restore the MS4 that discharges from Kirtland AFB into the Tijeras Arroyo and the Rio Grande, as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR Part 1501.6, *Cooperating Agencies*.

2. Kirtland AFB's MS4 requires extensive work to maintain compliance with their MS4 Permit by restoring the system and modernize it to prevent future damage and. The Proposed Action will:

a. Remove sedimentation buildup in all ditches, culverts, pipes, and retention basins;

b. Install/repair all berms, retention structures, and erosion control vegitation in retention basins and other exterior stormwater storage areas to control runoff and discharges of suspended solids;

c. Install/repair outlet structures and erosion control features in arroyos;

3. As a cooperating agency, the Air Force requests AMAFCA participate in various portions of the PEA development as may be required. Specifically, the Air Force asks for your support by:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which AMAFCA has special expertise;

c. Making staff support available to enhance interdisciplinary review capability;

d. Responding, in writing, to this request.

4. The Air Force requires that the support of cooperating agency be timely to avoid unnecessary delays in the NEPA process. For further questions regarding this memo, our point of contact is Ms. Martha Garcia, 377 MSG/CEIEC, at (505) 846-6446, or martha.garcia.3@us.af.mil.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer

DETER...ASSURE...STRIKE!

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

23 Jan 18

MEMORANDUM FOR EXECUTIVE DIRECTOR, ALBUQUERQUE-BERNALILLO COUNTY WATER UTILITY AUTHORITY (MR. MARK SANCHEZ)

FROM: HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB LA 71110

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

1. The Air Force requests ABCWUA's formal participation in the preparation of a programmatic environmental assessment (PEA) to restore the MS4 that discharges from Kirtland AFB into the Tijeras Arroyo and the Rio Grande, as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR Part 1501.6, *Cooperating Agencies*.

2. Kirtland AFB's MS4 requires extensive work to maintain compliance with their MS4 Permit by restoring the system and modernize it to prevent future damage and. The Proposed Action will:

a. Remove sedimentation buildup in all ditches, culverts, pipes, and retention basins;

b. Install/repair all berms, retention structures, and erosion control vegitation in retention basins and other exterior stormwater storage areas to control runoff and discharges of suspended solids;

c. Install/repair outlet structures and erosion control features in arroyos;

3. As a cooperating agency, the Air Force requests ABCWUA participate in various portions of the PEA development as may be required. Specifically, the Air Force asks for your support by:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which ABCWUA has special expertise;

c. Making staff support available to enhance interdisciplinary review capability;

d. Responding, in writing, to this request.

4. The Air Force requires that the support of cooperating agency be timely to avoid unnecessary delays in the NEPA process. For further questions regarding this memo, our point of contact is Ms. Martha Garcia, 377 MSG/CEIEC, at (505) 846-6446, or martha.garcia.3@us.af.mil.

BRIAN C. LEE, GS-15, DAF
Senior Civil Engineer

DETER...ASSURE...STRIKE!

Cooperating Agency Responses

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
4101 JEFFERSON PLAZA NE
ALBUQUERQUE, NM 87109-3435

REPLY TO
ATTENTION OF

26 February 2018

Planning, Project and Program Management Division
Planning Branch
Environmental Resources Section

377 MSG/CEIEC
ATTN: Ms. Martha Garcia
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117

SUBJECT: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

Dear Ms. Garcia:

Thank you for your request for the US Army Corps of Engineers Albuquerque District to participate in your project as a cooperating agency. The Environmental Resources Section is available to do a cursory review of documents as part of the scoping process. However, given our budgetary constraints and other funded workload, we are unable to assume responsibility for developing information and preparing analyses on issues and are unable to make staff support available for interdisciplinary review without a formal project agreement in place.

If you are in need of additional support, members of our organization would be available to meet with you to further discuss the project and could prepare a budget estimate and schedule. If you are interested in setting up a formal project agreement with our agency, you can contact the Albuquerque District Military and IIS Section Project Manager, Ms. Amanda Tapia-Pittman at 505-342-3210 or Amanda.A.Tapia-Pittman@usace.army.mil.

Sincerely,

George MacDonell
Chief, Environmental Resources Section

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
To: Bare, Michelle
Subject: FW: Preliminary Cooperating Agency Inquiry
Date: Thursday, April 12, 2018 11:19:46 AM

Michelle,
I believe I might have failed to send this to you. ABCWUA requested to be counted as a CA.
-MEG

-----Original Message-----
From: Stomp, John M. <jstomp@abcwua.org>
Sent: Friday, December 15, 2017 9:33 AM
To: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE <martha.garcia.3@us.af.mil>; Billings, Rick M. <rbillings@abcwua.org>
Cc: BARE, MICHELLE P CTR USAF AFGSC 377 MSG/CEIE <michelle.bare.ctr@us.af.mil>; CICCARELLI, CARL J GS-14 USAF AFGSC 377 ABW/JA <carl.ciccarelli@us.af.mil>
Subject: [Non-DoD Source] RE: Preliminary Cooperating Agency Inquiry

Martha:

We would like to be a Cooperating Agency as we are planning a wastewater treatment facility on KAFB adjacent to the Tijeras Arroyo. We are contemplating using the treated effluent for aquifer storage and recovery by discharging and allowing it to infiltrate into the aquifer. Please coordinate with Rick Billings of the Water Authority on the Cooperative Agreement. Thank you very much. John

-----Original Message-----
From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE [mailto:martha.garcia.3@us.af.mil]
Sent: Thursday, October 19, 2017 12:19 PM
To: Stomp, John M. <jstomp@abcwua.org>
Cc: BARE, MICHELLE P CTR USAF AFGSC 377 MSG/CEIE <michelle.bare.ctr@us.af.mil>; CICCARELLI, CARL J GS-14 USAF AFGSC 377 ABW/JA <carl.ciccarelli@us.af.mil>
Subject: Preliminary Cooperating Agency Inquiry

Good afternoon, Mr. Stomp.

I am with the NEPA Office at Kirtland AFB. We are developing a programmatic storm drainage and Tijeras arroyo work Environmental Assessment and are in the process of determining our Cooperating Agencies (CAs).

Per CEQ regulations (40 CFR 1500-1508) we are required to invite anyone with "jurisdiction by law and/or special expertise" to be a CA. The CEQ regs also state that an agency being invited must be legally capable of entering into an agreement to become a CA. Because of the Tijeras Arroyo Interceptor, Kirtland AFB thinks you should be invited; so I am respectfully requesting ABCWUA's interpretation on " an agency being invited must be legally capable of entering into an agreement to become a CA", in order to determine whether or not to send you a formal CA Letter.

Any input you can provide would be greatly appreciated.
Respectfully,
Martha E. Garcia
Kirtland AFB NEPA Program Manager
377 MSG/CEIEC
Phone: 505-846-6446
DSN: 246-6446

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
To: "Jaynes, Kevin"
Cc: CLARK, MELISSA B GS-13 USAF AFGSC 377 MSG/CEIE; BARE, MICHELLE P CTR USAF AFGSC 377 MSG/CEIE
Subject: RE: FEMA Region 6 - cooperating agency status - Kirtland MS4 Project
Date: Friday, February 9, 2018 7:37:00 AM
Attachments: Final DOPAA_KAFB Upgrade to Storm Drainage Systems.pdf

Good morning Kevin,

I, too, am so sorry we kept missing each other's calls. Thank you for taking the time to send me an email.

I certainly understand and fully support the higher priorities your Agency is engaged in right now. By requesting a letter be sent to FEMA, I was thinking of your Agency's special expertise and experience with flooding, so I think the document reviews would be most beneficial. I have attached our tentatively "Final DOPAA" to this email.

I was hoping FEMA might be able to provide high level "sanity checks" and/or call out any faulty impact analysis should you see it. My main goal is to ensure Kirtland AFB avoid planning any future actions in/to the arroyo that would then cause flooding issues to ourselves and folks upstream/downstream.

I will be out of the office until 20 Feb, so I have copied my Supervisor – Ms. Clark – and my contract support person – Ms. Bare should you wish to discuss anything prior to my return.

Thank you very much for your time reviewing this document and any future assistance you are able to provide.

Respectfully,
Martha E. Garcia
NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Boulevard, SE
Building 20685, Suite 116a
Kirtland AFB, NM 87117
Phone: 505-846-6446
DSN: 246-6446
Email: martha.garcia.3@us.af.mil

From: Jaynes, Kevin [mailto:Kevin.Jaynes@fema.dhs.gov]
Sent: Thursday, February 8, 2018 1:12 PM
To: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE <martha.garcia.3@us.af.mil>

Subject: [Non-DoD Source] FEMA Region 6 - cooperating agency status - Kirtland MS4 Project

Afternoon Martha,

Sorry we keep missing each other.

For the request we received, FEMA is interested in the offer to participate, but would first like to get a little more from your perspective on expectations, timing and level of effort.

FEMA is an non-regulatory agency, we have no major environmental laws to uphold/enforce. We do and are involved extensively with floodplain mapping and insurance as you are probably very aware from the NFIP program and flood rate maps.

My questions are along the lines of what you would expect from FEMA as far as timing of the project, travel or meetings, and duration. My regional staff and I are still very engaged with the Hurricane Harvey recovery and response in Texas and any more on our list of things to do is tough. We certainly have experience in working with other agencies primarily in the document review category for content and the like, but would have very little to offer by way of field investigative or engineering support. If there are any preliminary write ups or project descriptions that we could preview to see how we could best assist, that you could share, it would be most appreciated.

I will be in and out of the office today until 4 p.m. central and then off tomorrow (Friday 2/9). Should be back in the office Monday.

Look forward to talking to you.

Kevin Jaynes, Regional Environmental Officer
FEMA Region 6
800 N. Loop 288, Denton, TX 76209
Desk (940)-383-7224
Cell (940)-230-5126
Kevin.jaynes@fema.dhs.gov

U.S. Department of Homeland Security
FEMA Region 6
800 North Loop 288
Denton, TX 76209-3698

FEMA

April 3, 2018

Brian C. Lee, Senior Civil Engineer
Department of the Air Force
HQ AFGSC/A4C
841 Fairchild Avenue
Barksdale AFB, LA 71110

RE: Cooperating Agency Request for Restoration and Modernization of the Municipal Separate Storm Sewer System (MS4) on Kirtland AFB, NM

Dear Brian C. Lee,

I am in receipt of your letter from January 23, 2018, formally requesting the Federal Emergency Management Agency (FEMA) Region 6 participation in the preparation of a Programmatic Environmental Assessment (PEA) for evaluation of storm water drainage features associated with Kirtland Air Force Base, Albuquerque, New Mexico. Mr. Kevin Jaynes, Regional Environmental Officer, has been in communication with Ms. Martha Garcia, NEPA Program Manager, Kirtland Air Force Base as to the status of the PEA and the level of effort and availability that FEMA Region 6 Environmental and Historic Preservation (EHP) staff could assist. The understanding is that the document is progressing well within schedule and that FEMA would provide value in the effort by offering to participate as a cooperating agency to provide interdisciplinary review of the preliminary document as required and requested. It is FEMA's understanding that this effort would be within the coming 4 to 6 weeks and be coordinated through Ms. Garcia and Mr. Jaynes to execute that review request.

FEMA Region 6 certainly appreciates your invitation to provide support in the spirit of the National Environmental Policy Act and Unified Federal Review and looks forward to the production of a quality document which will be of value to your efforts. Please encourage Ms. Garcia to continue communicating and coordinating with Mr. Jaynes at (940) 230-5126 or kevin.jaynes@fema.dhs.gov to ensure that we are able to assist to the best of our ability.

Sincerely,

Sandra Keefe
Mitigation Division Director

cc: Kevin Jaynes, Regional Environmental Officer, FEMA Region 6
Kristin Fontenot, Director, FEMA Office of Environmental Planning and Historic Preservation

www.fema.gov

From: Jaynes, Kevin
To: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
Subject: [Non-DoD Source] RE: FEMA R6 comments
Date: Friday, September 14, 2018 10:55:32 AM
Attachments: Undeliverable Approve Check Draft PEA - KAFB Upgrade to Storm Drainage Systems - SUSPENSE Monday 24 September 2018.msg

---

Martha,

Have reviewed my comments back against the PEA, I am comfortable with the CRM section and that SHPO consultation has and will continue. Thank you.

The voting was kicked back to my email, so hopefully it went through.

Kevin Jaynes, Regional Environmental Officer
FEMA Region 6
800 N. Loop 288, Denton, TX 76209
Desk (940)-383-7224
Cell (940)-230-5126
Kevin.jaynes@fema.dhs.gov

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE [mailto:martha.garcia.3@us.af.mil]
Sent: Friday, April 27, 2018 9:48 AM
To: Jaynes, Kevin <Kevin.Jaynes@fema.dhs.gov>
Subject: RE: FEMA R6 comments

Will do.

From: Jaynes, Kevin <Kevin.Jaynes@fema.dhs.gov>
Sent: Friday, April 27, 2018 8:44 AM
To: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE <martha.garcia.3@us.af.mil>
Subject: [Non-DoD Source] RE: FEMA R6 comments

Thanks, If there is anything that is off-track or doesn't make sense, please let me know.

KJ

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE [mailto:martha.garcia.3@us.af.mil]
Sent: Friday, April 27, 2018 9:39 AM
To: Jaynes, Kevin <Kevin.Jaynes@fema.dhs.gov>
Subject: RE: FEMA R6 comments

Kevin,

No problem. I was going to check in with you today, just to make sure my firewall didn't block your email.
Thank you for taking the time to review, I appreciate your input.

V/R

Martha E. Garcia
NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Boulevard, SE
Building 20685, Suite 116a
Kirtland AFB, NM 87117
Phone: 505-846-6446
DSN: 246-6446
Email: martha.garcia.3@us.af.mil

From: Jaynes, Kevin <Kevin.Jaynes@fema.dhs.gov>
Sent: Friday, April 27, 2018 8:09 AM
To: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE <martha.garcia.3@us.af.mil>
Subject: [Non-DoD Source] FEMA R6 comments

Martha,
Attached for your consideration.

Thanks again for the opportunity, and my apologies for not being as timely. Hurricane Harvey response/recovery is still demanding so much of my time and resources.

v/r

Kevin Jaynes, Regional Environmental Officer
FEMA Region 6
800 N. Loop 288, Denton, TX 76209
Desk (940)-383-7224
Cell (940)-230-5126
Kevin.jaynes@fema.dhs.gov

From:	Stomp, John M.
To:	GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
Cc:	Billings, Rick M.
Subject:	[Non-DoD Source] RE: Check Draft PEA - KAFB Upgrade to Storm Drainage Systems - SUSPENSE Monday 24 September 2018
Date:	Wednesday, November 14, 2018 8:07:23 AM
Attachments:	image001.png image003.png image004.png

Martha:

I really appreciate your patience because Rick has not returned and may not return. I looked at the comments briefly including the Programmatic EA and don't have any additional comments. Our comments were not specifically addressed, but realizing that no specific projects have been identified at this point means we will need to continue to work with KAFB. As you know, there are significant erosion issues along the Tijeras arroyo that affect the Water Authority's Tijeras interceptor some of which has caused emergency actions on the part of the Water Authority due to grading and drainage issues not being adequately addressed upstream. Thanks for the opportunity to work with you on this and please let me know if we need to meet or discuss further. Happy Thanksgiving! John

John M. Stomp III
Chief Operating Officer
Albuquerque Bernalillo County Water Utility Authority
P.O. Box 568 | Albuquerque NM | 87103-0568
505.289.3150 (office)
jstomp@abcwua.org

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE <martha.garcia.3@us.af.mil>
Sent: Tuesday, November 13, 2018 3:25 PM
To: Stomp, John M. <jstomp@abcwua.org>
Cc: Billings, Rick M. <rbillings@abcwua.org>
Subject: RE: Check Draft PEA - KAFB Upgrade to Storm Drainage Systems - SUSPENSE Monday 24 September 2018

Good afternoon Mr. Stomp,

I'm finally getting time to circle back to this project. I had originally put it out for a back check of comments in mid-September. I know you were hoping to have a chance to back check Mr. Billing's comments in early October. Then I realized, I might not have actually sent the attached documents to you. At any rate, if Mr. Billings is still out, would you be able to look at his comments and let me know if there are any which might still need to be resolved?

Respectfully,

Martha E. Garcia
NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Boulevard, SE
Building 20685, Suite 116a
Kirtland AFB, NM 87117
Phone: 505-846-6446
DSN: 246-6446
Email: martha.garcia.3@us.af.mil

AGENCY DISTRIBUTION LIST

Federal, State, and Local Agencies – Scoping Letters

Ms. Amy Leuders
Southwest Regional Director
US Fish & Wildlife Service
PO Box 1306
Albuquerque NM 87103-1306

Ms. Priscilla J. Avila
Acting Regional Director and Regional Environmental Specialist
Bureau of Indian Affairs
Southwest Regional Office
1001 Indian School Road NW
Albuquerque NM 87104

Ms. Danita Burns, District Manager
Bureau of Land Management
New Mexico State Office
Albuquerque District Office
100 Sun Avenue NE, Suite 330
Pan American Building
Albuquerque NM 87109-4676

Ms. Jennifer L. Faler, Area Manager
Bureau of Reclamation
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque NM 87102-2352

Mr. Stephen Spencer
Regional Environmental Officer
US Department of Interior
Office of Environmental Policy & Compliance - Albuquerque Region
1001 Indian School Road NW, Suite 348
Albuquerque NM 87104

Mr. Kelvin L. Solco, Regional Administrator
Federal Aviation Administration
Southwest Region
10101 Hillwood Parkway
Fort Worth TX 76177-1524

Ms. Pearl Armijo, District Conservationist
Natural Resources Conservation Service
Albuquerque Service Center
100 Sun Avenue NE, Suite 160
Albuquerque NM 87109

Mr. George Macdonnell, Chief
Environmental Resources Section
US Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque NM 87109

Ms. Anne L. Idsal, Regional Administrator
US Environmental Protection Agency, Region 6
1445 Ross Avenue
Fountain Pl 12th Floor, Suite 1200
Dallas TX 75202-2733

Ms. Cheryl Prewitt, Regional Environmental Coordinator
US Forest Service
Southwestern Region
333 Broadway Boulevard SE
Albuquerque NM 87102-3407

Ms. Susan Lacy
DOE/NNSA Sandia Field Office
PO Box 5400
Albuquerque NM 87187

Mr. John Weckerle
DOE/NNSA Office of General Counsel
PO Box 5400
Albuquerque NM 87187

The Honorable Martin Heinrich
US Senate
400 Gold Avenue SW, Suite 1080
Albuquerque NM 87102

The Honorable Tom Udall
US Senate
400 Gold Avenue SW, Suite 300
Albuquerque NM 87102

The Honorable Steve Pearce
US House of Representatives
3445 Lambros Loop NE
Los Lunas NM 87031

The Honorable Michelle Lujan Grisham
US House of Representatives
400 Gold Avenue SW, Suite 680
Albuquerque NM 87102

The Honorable Ben R. Luján
US House of Representatives
1611 Calle Lorca, Suite A
Santa Fe NM 87505

Dr. 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

Mr. Aubrey Dunn
Commissioner of Public Lands
New Mexico State Land Office
310 Old Santa Fe Trail
Santa Fe NM 87501

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

Mr. Clyde Ward, Assistant Commissioner for Commercial Resources
New Mexico State Land Office
PO Box 1148
Santa Fe NM 87504

Ms. Jennifer L. Hower
Office of General Counsel & Environmental Policy
New Mexico Environment Department
1190 St. Francis Drive, Suite N4050
Santa Fe NM 87505

Mr. Jeff M. Witte, Director/Secretary
New Mexico Department of Agriculture
3190 S. Espina
Las Cruces NM 88003

Mr. Ken McQueen, Cabinet Secretary
New Mexico Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe NM 87505

Development Management/Department Director
Bernalillo County Planning Section
111 Union Square SE, Suite 100
Albuquerque NM 87102

Department Director
City of Albuquerque Planning Department
PO Box 1293
Albuquerque NM 87103

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

Ms. Julie Morgas Baca, Bernalillo County Manager
Bernalillo County Manager's Office
One Civic Plaza NW, 10th Floor
Albuquerque NM 87102

Ms. Alicia Manzano
Interim Director of Communications
City of Albuquerque Office of the Mayor
PO Box 1293
Albuquerque NM 87103

Bernalillo County Board of Commissioners
One Civic Plaza NW, 10th Floor
Albuquerque NM 87102

Albuquerque City Councilmembers
One Civic Plaza NW, 9th Floor, Suite 9087
Albuquerque NM 87102

Mr. Jerry Lovato, Executive Engineer
Albuquerque Metropolitan Arroyo Flood Control Authority
2600 Prospect Avenue NE
Albuquerque NM 87107

Example Scoping Letter

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

Colonel Richard W. Gibbs, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland Air Force Base NM 87117

Ms. Danita T. Burns, District Manager
Bureau of Land Management
New Mexico State Office
Albuquerque District Office
Pan American Building
100 Sun Avenue NE, Suite 330
Albuquerque NM 87109-4676

Dear Ms. Burns

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing a Programmatic Environmental Assessment (PEA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and damage-avoiding measures at Kirtland Air Force Base (AFB). Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Development of new stormwater drainage systems and upgrade of existing systems would include: ditching/trenching, the installation of reinforced concrete pipe, vegetation, environmentally-friendly soil stabilizers, rip-rap, and gabion structures, and the construction of drop inlets, flow control structures, and retention structures. Arroyo repair activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing/repairing box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed and banks.

The purpose of the Proposed Action is to upgrade stormwater drainage systems on Kirtland AFB to meet current standards, reduce flooding and standing water issues, and address erosion and sedimentation issues that occur on the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated to the point where extensive work is needed to reestablish an effective stormwater drainage system. Ditches, culverts, and pipes have sedimented and retention basins are eroded and sedimented. Standing stormwater created by clogged ditches and flat ground surfaces poses hazards to traffic and undermines roads, parking lots, and foundations. Outdoor storage areas require berms and retention structures to control stormwater runoff. Revegetation and other measures are needed to control discharges of suspended solids. Outlet structures are nonexistent, causing erosion of

arroyos during storms. Arroyo work is required to repair erosion damage and reduce the potential for additional damage in the future.

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 PEA Addressing Upgrade of the Stormwater Drainage System at Kirtland AFB is available at *http://www.kirtland.af.mil* under the "Environment" button at the bottom of the webpage. We look forward to and welcome your participation in this process. Please respond within 30 days of receipt of this letter to ensure your concerns are adequately addressed in the PEA.

Please send your written responses to the NEPA Program Manager, 377 MSG/CEIEC, 2050 Wyoming Boulevard SE, Suite 116, Kirtland AFB, NM 87117 or via email to KirtlandNEPA@us.af.mil.

Sincerely

RICHARD W. GIBBS, Colonel, USAF
Commander

Federal, State, and Local Agencies – Scoping Letter Responses

From: 377 MSG/CEIE NEPA Environmental
To: Bare, Michelle
Subject: FW: DOPAA for the PEA Addressing Upgrade of the Stormwater Drainage System
Date: Tuesday, May 8, 2018 8:03:04 AM
Attachments: image001.png
image002.png
image003.png
image004.png

From: Prewitt, Cheryl -FS <cprewitt@fs.fed.us>
Sent: Monday, May 7, 2018 1:00 PM
To: 377 MSG/CEIE NEPA Environmental <KirtlandNEPA@us.af.mil>
Cc: Prewitt, Cheryl -FS <cprewitt@fs.fed.us>
Subject: [Non-DoD Source] DOPAA for the PEA Addressing Upgrade of the Stormwater Drainage System

Dear Sir or Madam,

I reviewed the Description of the Proposed Action and Alternatives for the Programmatic Environmental Assessment Addressing Upgrade of the Stormwater Drainage System at Kirtland Air Force Base, New Mexico.

The Forest Service has no concerns regarding the proposed actions at this time.

I look forward to reviewing the EA.

Thank you for including the Forest Service in your planning process.

Sincerely,
Cheryl Prewitt

Cheryl Prewitt
Regional Environmental Coordinator
Forest Service
Southwestern Region
p: **505-842-3454**
cprewitt@fs.fed.us
333 Broadway Blvd SE
Albuquerque, NM 87102
www.fs.fed.us

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Donald L. Jaramillo

STATE OF NEW MEXICO
DEPARTMENT OF GAME & FISH

One Wildlife Way, Santa Fe, NM 87507
Post Office Box 25112, Santa Fe, NM 87504
Tel: (505) 476-8000 | Fax: (505) 476-8123
For information call: (888) 248-6866

www.wildlife.state.nm.us

11 May 2018

NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Blvd SE
Suite 116
Kirtland AFB, NM 87117

RE: Kirtland Air Force Base Stormwater drainage and arroyo repair; NMDGF No. 18438

Dear NEPA Program Manager:

The Department of Game and Fish (Department) has reviewed your request for information regarding the above referenced project, and provides the following recommendations to minimize or eliminate impacts to wildlife.

Open trenches and ditches can trap small mammals, amphibians and reptiles, and can cause injury to large mammals. Periods of highest activity for many of these species include night time, summer months, and wet weather.

- Trench during the cooler months (October – March).
- Trenching and back-filling should occur concurrently to minimize the amount of open trench at any given time. Avoid leaving trenches open overnight.
- Where trenches cannot be back-filled within 8 hours, construct escape ramps at the ends and at least every 300 feet or at close as 100 feet where endangered or threatened species are present. Escape ramps can be short lateral trenches, earthen ramps, or wooden planks sloping to the surface. The slope should be less than 45 degrees. Alternatively, open trenches can be covered with boards or other sturdy materials to exclude wildlife.
- Inspect trenches that have been left open at minimum of every 8 hours, and remove animals prior to back-filling, especially where threatened, endangered, or sensitive species occur. Release the animals at least 100 yards from the trench, unless it will be closed immediately after the inspection.
- Divert water around construction site whenever possible.

- Preserve natural areas within the project site. Strive to maintain the natural drainage system of the site, including natural stream channels, wetlands, and floodplains. Design, construct, and maintain the site to protect or restore the natural hydrology.

- Following construction, disturbed areas should be re-vegetated using native species that approximate pre-disturbance plant community composition or native plant communities appropriate for the site. Short-term erosion control seed mixes are available for temporary control of surface erosion during project implementation; native mixes should be used for temporary as well as permanent erosion control. Native plants and materials should also be used for landscaping. All seed mixtures should be certified as weed-free. Contact the Department for a list of native plant materials vendors for New Mexico.

- Maintain a vegetated buffer zone along all watercourses and ephemeral arroyos to minimize erosion and sediment delivery.

- Use properly engineered drainage swales and other vegetated channel systems instead of storm sewers, lined channels, curbs, and gutters. Vegetated swales should be gently sloped (4:1) so that small wildlife is able to maneuver them.

- Efforts should be made during construction to minimize impacts on vegetative communities. Existing roads and rights-of-way should be used for all transportation. Off-road driving should be avoided. Staging areas should be located in previously disturbed sites and kept as small as possible.

With implementation of these recommendations during construction, the Department believes that this project as proposed is unlikely to adversely affect wildlife or wildlife habitats.

Thank you for the opportunity to review and comment on the proposed project. If you have any questions, please contact Malia Volke, Ph.D., Aquatic and Riparian Habitat Specialist, at malia.volke@state.nm.us or 505-476-8160.

Sincerely,

Malia Volke

Malia Volke, Ph.D., Aquatic and Riparian Habitat Specialist
Ecological and Environmental Planning Division

cc: USFWS NMES Field Office
Chuck Schultz, NMDGF Northwest Regional Habitat Biologist

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

Susana Martinez
Governor

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
SANTA FE, NEW MEXICO 87501
PHONE (505) 827-6320 FAX (505) 827-6338

May 21, 2018

Colonel Richard W. Gibbs, USAF
Commander 377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland Air Force Base 87117

Re: Kirtland Air Force Base (KAFB) storm water drainage system upgrade Draft Programmatic Environmental Assessment (PEA) (HPD log 107738)

Dear Colonel Gibbs:

On behalf of the New Mexico State Historic Preservation Officer,(SHPO) want to thank you for notifying our office of the aforementioned undertaking, and an invitation to consult under Section 106 (aka Section 306108 Title 54 USC) of the National Historic Preservation Act (NHPA). This letter provides SHPO comments for the undertaking and recommendations on how we may proceed with the Section 106 consultation.

I was unable to locate the PEA on Kirtland's website, but reviewed the undertaking's Description of the Proposed Action and Alternatives (DOPAA). While the DOPAA provides a general overview of the undertaking, it does not provide enough information to assess the undertaking's effect to historic properties.

Our records show that most of KAFB has been surveyed to identify and evaluate historic properties. It is not clear, however, that KAFB has completed consultation on these properties' eligibility for listing in the National Register of Historic Places (NRHP). Once the undertaking's direct areas of potential effects (APE) are defined, it may be necessary to complete NRHP evaluations.

Section 106 consultation must be substantially complete before a Finding of No Significant Impact (FONSI) for the environmental assessment. SHPO recommends that KAFB develop a programmatic agreement (PA) per 36 CFR 800.4.b.2 and 800.14, the implementing regulations for Section 106. The PA should be developed in consultation with the Advisory Council for Historic Preservation (ACHP), the SHPO, and other parties. The benefit of a PA is that it may define exemptions from Section 106 consultation as well as allow for phased identification and evaluation as APEs are defined and affects can be assessed. It may also define standard treatments that may be used to resolve adverse effects, if any, to historic properties.

SHPO agrees that meetings to discuss the undertaking and the development of a PA will be productive. Please propose a range of times and dates that you or your representatives may be able to meet, and we will do our best to accommodate.

Please do not hesitate to contact me if you have any questions regarding these comments. I can be reached by telephone at (505) 827-4225 or by email at bob.estes@state.nm.us

Sincerely,

Bob Estes

Bob Estes Ph.D.
HPD staff Archaeologist
Log: 107738

CC: David H. Reynolds
Kirtland AFB Cultural Resources and Natural Resources Program Manager
377 MSG/CEIEC
2050 Wyoming Blvd SE
Building 20685 Room 119a
Kirtland AFB, 87117-5663

State of New Mexico
ENVIRONMENT DEPARTMENT

Office of the Secretary

Harold Runnels Building
1190 Saint Francis Drive, PO Box 5469
Santa Fe, NM 87502-5469
Telephone (505) 827-2855 Fax (505) 827-2836
www.env.nm.gov

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary

J. C. BORREGO
Deputy Secretary

May 22, 2018

NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Blvd SE Suite 116
Kirtland AFB, NM 87117
By email to: KirtlandNEPA@us.af.mil

The New Mexico Environment Department (NMED) has reviewed the scoping letter for the proposed Kirtland Airforce Base Stormwater Drainage Updates and offers the following comments:

NMED Drinking Water Bureau

New Mexico Environment Department Drinking Water Bureau (NMED DWB) does not anticipate any negative impact to public water supply wells resulting from implementation of this project. The Montessa Park Tanto Well and Kirtland Air Force Base Well #4 and Well #16 lie within 1,000 feet of the project area. The project may provide additional protection from surface runoff for these active public water supply wells.

NMED Ground Water Quality Bureau

The project is not expected to have any adverse impacts on ground water quality in the area of the potential effect. However, implementation of the project may involve the use of heavy equipment thereby leading to a possibility of contaminant releases (e.g., fuel, hydraulic fluid, etc.) associated with equipment malfunctions. The GWQB advises all parties involved in the project to be aware of notification requirements for accidental discharges contained in 20.6.2.1203 NMAC. Compliance with the notification and response requirements will further ensure the protection of ground water quality in the vicinity of the project.

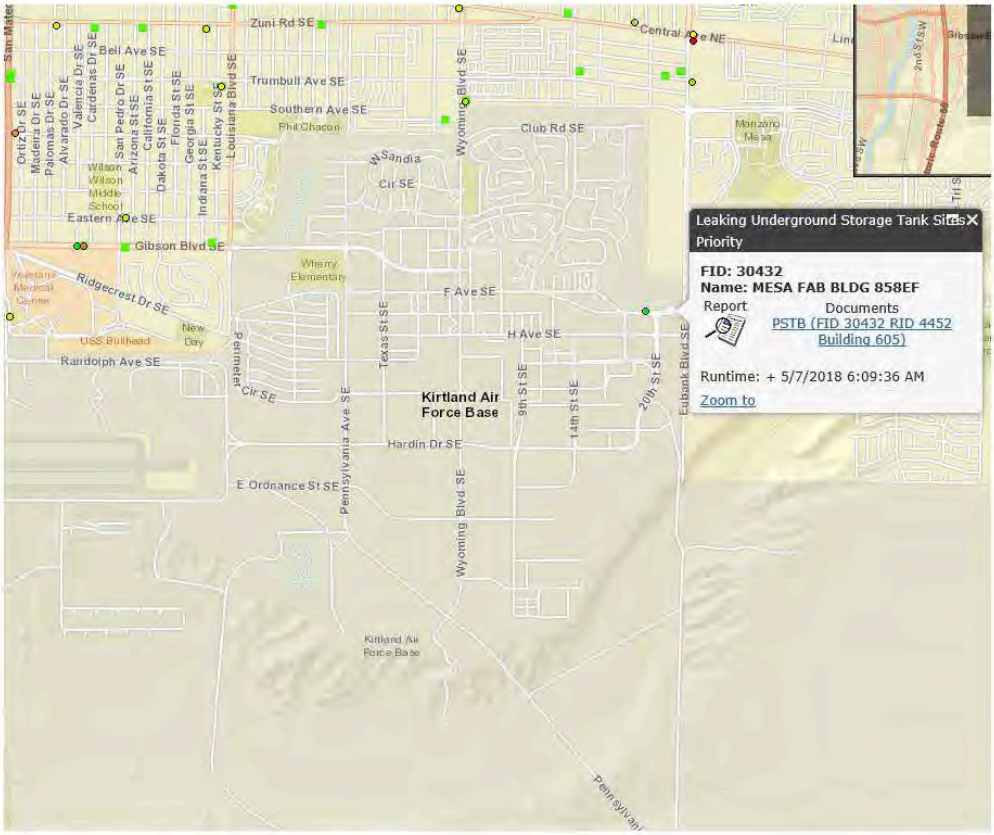
A copy of the Ground and Surface Water Protection Regulations, 20.6.2 NMAC, is available at http://164.64.110.239/nmac/parts/title20/20.006.0002.pdf .

NMED Petroleum Storage Tank Bureau Comments

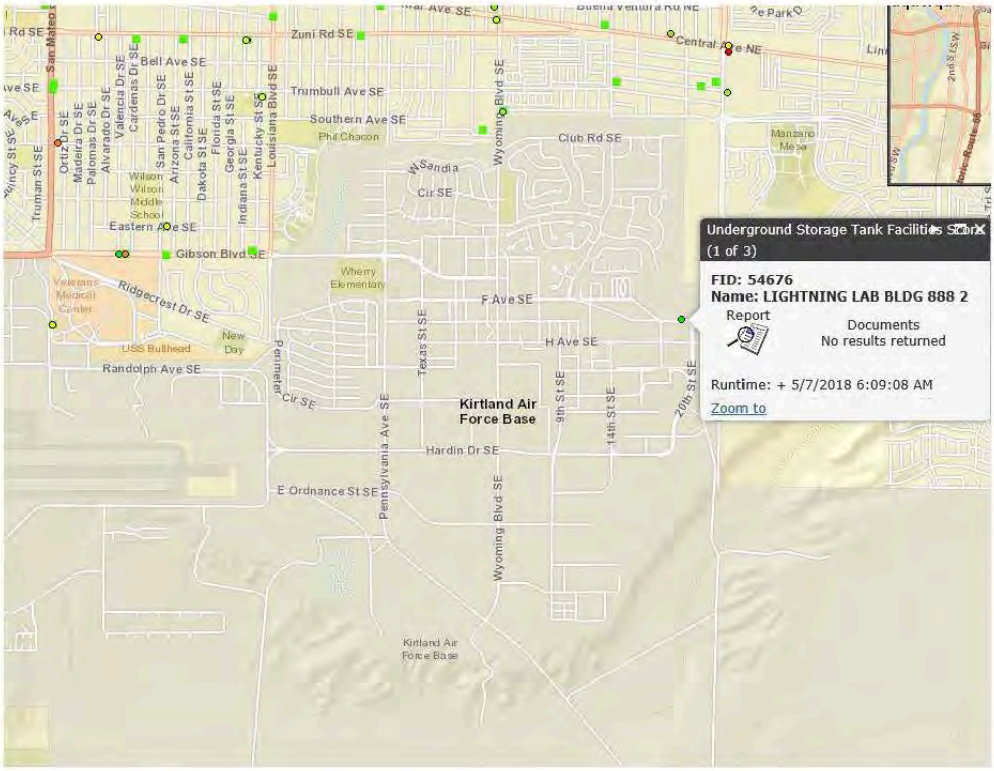
Staff have searched our databases for facilities and releases that may affect or be affected by KAFB's stormwater drainage upgrades. There may be additional facilities or releases that could affect or be affected by the project that we do not have records for or for which records are incomplete. Instructions for searching our online records are given at the end of these comments. If you have further questions, please call the Petroleum Storage Tank Bureau at 505-476-4397. As it is not clear where all stormwater drainage upgrades will occur from the information given, please evaluate whether these facilities will be affected by or affect your project.

Albuquerque Frequency Surveillence (sic) Unit, Bldg 20599, Wyoming and Pennsylvania Rds, Kirtland AFB, Facility 26437. According to PSTB records, there was one UST here that has been removed. This is a leaked tank site at which no further action is currently required.

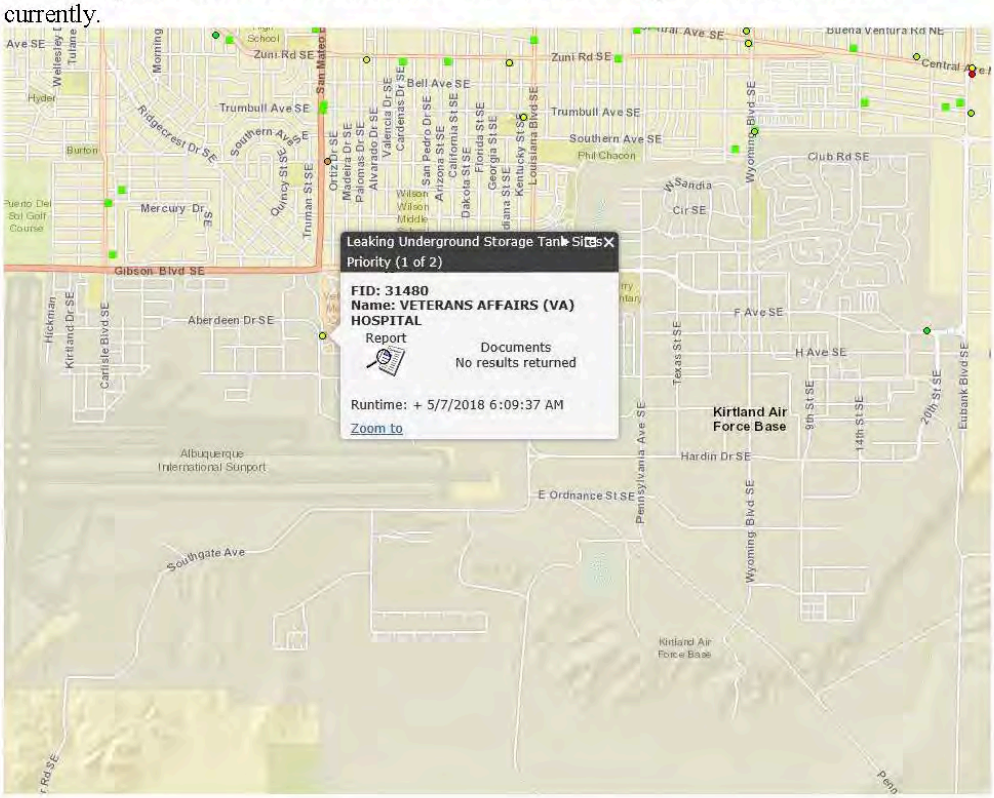
Mesa FAB Bldg 858EF, 1515 Eubank SE, Albuquerque, Facility ID 30432. PSTB records show 24 above ground storage tanks, 13 of which have been removed or separated from this facility and made into their own facilities, 10 of which are exempt from regulation by PSTB, and one of which is currently in use. This is a leak site whose status is listed as Investigation, Federal Facility. Again, if you need more information, please contact the Petroleum Storage Tank Bureau.



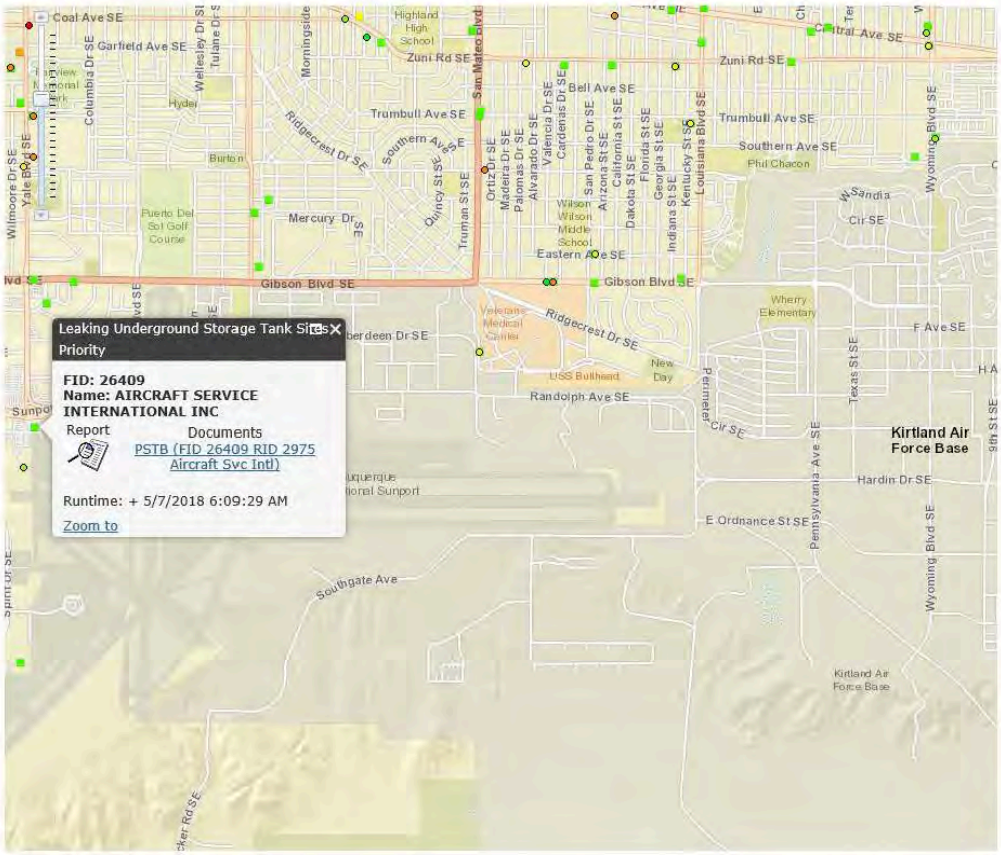
Lightning Lab Bldg 888 2, 1515 Eubank Blvd SE, Albuquerque, Facility 54676. PSTB database shows one UST currently in use. Not listed as a LUST site.



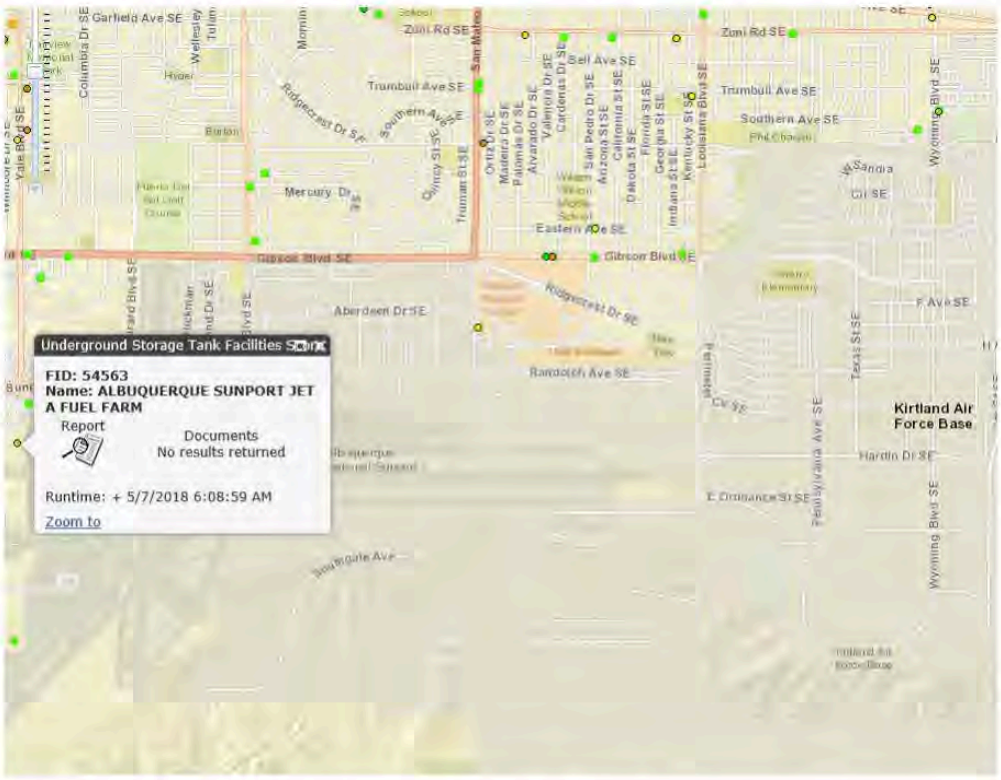
Veterans Affairs Hospital, 1501 San Pedro Dr SE, Albuquerque, Facility ID 31480. PSTB tank database shows 18 USTs, 10 of which have been removed and 8 of which are currently in use. This facility has a record of two releases. No further action is required for either release currently.



Aircraft Service International, Inc, 3113 Yale Blvd SE, Albuquerque. PSTB databases show four USTs, all of which have been removed. This is a LUST site with two releases. No further action is currently required for either release.



Albuquerque Sunport Jet A Fuel Farm, 2200 Sunport Blvd SE, Albuquerque, Facililty ID 54563. PSTB records show two USTs currently in use. Not listed as having any releases.



In addition, PSTB's tank database lists the following facilities. As it is not clear where these facilities are located or where all stormwater drainage upgrades will occur from the information given, please evaluate whether these facilities will be affected by or affect your project:

- Kirtland Air Force Base -No1032, Building 1032, Kirtland AFB, Facility 51863. Four above ground storage tanks currently in use, not listed as a LUST site.
- Kirtland Air Force Base 701, Building 702, Kirtland AFB, Facility Id 51862. One above ground storage tank currently in use is listed at this facility, not listed as a LUST site.
- Kirtland Air Force Base 20147, Building 20147, AAFEES East Express, Kirtland AFB, Facility 51865. Four ASTs listed, currently in use. Not listed as a LUST site.
- Kirtland Air Force Base 20359, Building 20359, Kirtland AFB., Facility 51866. Four ASTs listed, currently in use. Not listed as a LUST site.
- Kirtland Air Force Base 27500, Building 27500, Kirtland AFB, Facility 51867. One AST listed, currently in use. Not listed as a LUST site.
- Kirtland Air Force Base 381, Building 381, Kirtland AFB, Facility 51928. Two ASTs listed, currently in use. Not listed as a LUST site.
- Kirtland West Side Express Bldg 972, AAFEES West Express, 2090 Truman ST SE, Kirtland AFB. Two ASTs listed, currently in use. Not listed as a LUST site.
- Kirtland AFB Well #16, Bldg 25951, Randolph Ave & Ridgecrest Ave, Kirtland AFB. One AST listed, currently in use. Not listed as a LUST site.
- Kirtland AFB, DISA, Bldg #323, Carlisle Blvd SE & Hamilton, Kirtland AFB. One AST listed, currently in use. Not listed as a LUST site.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Albuquerque District Office
100 Sun Ave., N.E.
Pan American Bldg., Suite 330
Albuquerque, New Mexico 87109
www.blm.gov/nm

In Reply Refer to:
1790 (A0100)

June 21, 2018

NEPA Program Manager
377 MSG/CEIE
2050 Wyoming Boulevard SE, Suite 116
Kirtland Air Force Base NM 87117

Attn: NEPA Program Manager

Dear Colonel Gibbs,

I received your letter regarding the Programmatic Environmental Assessment (EA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and damage-avoiding measures at Kirtland Air Force Base. The Bureau of Land Management (BLM) does not have any comments at this time.

If you have, any questions please feel free to contact me at (505) 761-8951.

Sincerely,

Danita Burns
District Manager

Endangered Species Act Section 7 Determination of No Effect

DEPARTMENT OF THE AIR FORCE
377TH CIVIL ENGINEER DIVISION (AFGSC)

20 July 2018

DETERMINATION OF EFFECT FOR ENDANGERED SPECIES ACT REQUIREMENTS

FROM: 377 MSG/CEIEC
2050 Wyoming Blvd SE
Kirtland AFB NM 87117

SUBJECT: Endangered Species Act (ESA) Section 7 Compliance for Stormwater Drainage Systems Maintenance and Arroyo Improvements on Kirtland Air Force Base

In accordance with Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), Kirtland Air Force Base (AFB) has conducted an effect determination for the Stormwater Drainage Systems Maintenance and Arroyo Improvements on Kirtland Air Force Base project. All interrelated and interdependent actions were analyzed during the project review.

The 2018 United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) Official Species and Habitat List was received on 20 July 2018 (Consultation Code: 02ENNM00-2018-SLI-1108). The following table details the effect determination and rationale used for analysis of potential impacts to federally listed endangered species and critical habitat as a result of the proposed project.

Species/Critical Habitat	Effect Determination	Rationale
New Mexico Jumping Mouse *Zapus hudsonius luteus*	No Effect	Kirtland AFB conducted a New Mexico Jumping Mouse survey in 2016 and determined the species is not present nor is there suitable habitat within the proposed action area.
Mexican Spotted Owl *Strix occidentalis lucida*	No effect	The Mexican spotted owl may migrate through Kirtland AFB at certain times of the year; however, this species is not known to nest or utilize the proposed action area.
Southwestern Willow Flycatcher *Empidonax traillii lucida*	No effect	The southwestern willow flycatcher occupies the riparian area within the Rio Grande and its associated floodplain. These areas are not located within the proposed action area.
Yellow-billed Cuckoo *Coccyzus americanus*	No Effect	The yellow-billed cuckoo occupies riparian woodlands with cottonwoods. While this habitat occurs on Kirtland AFB in the proposed action area, on-going avian surveys have not identified this species on the installation.
Rio Grande Silvery Minnow *Hybognathus amarus*	No effect	Rio Grande silvery minnow is a riverine fish that prefers low-gradient creeks and small to large rivers with slow to moderate flow. It is only found within one reach of the Rio Grande. This reach is not located within the proposed action area.

Kirtland AFB has determined that the project will have no effect to federally listed endangered species or critical habitat. An updated species list from the USFWS is required within 90 days prior to initiation of any construction activities.

REYNOLDS.DAVID.HILL.1408909402 Digitally signed by REYNOLDS.DAVID.HILL.1408909402 Date: 2018.07.20 11:16:38 -06'00'

David H. Reynolds
Natural Resources Program Manager

Attachment:
USFWS IPaC Official Species and Habitat List Consultation Code: 02ENNM00-2018-SLI-1108

United States Department of the Interior

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

In Reply Refer To:
Consultation Code: 02ENNM00-2018-SLI-1108
Event Code: 02ENNM00-2018-E-02312
Project Name: Stormwater/Arroyo PEA

July 20, 2018

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

To Whom It May Concern:

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

FEDERALLY-LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

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

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

The scope of federally listed species compliance not only includes direct effects, but also any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects that may occur in the action area. The action area includes all areas to be affected, not merely the immediate area involved in the action. Large projects may have effects outside the immediate area to species not listed here that should be addressed. If your action area has suitable habitat for any of the attached species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts.

Candidate Species and Other Sensitive Species

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

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

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

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

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

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

WETLANDS AND FLOODPLAINS

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. These habitats should be conserved through avoidance, or mitigated to ensure that there would be no net loss of wetlands function and value.

We encourage you to use the National Wetland Inventory (NWI) maps in conjunction with ground-truthing to identify wetlands occurring in your project area. The Service's NWI program website, www.fws.gov/wetlands/Data/Mapper.html integrates digital map data with other resource information. We also recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands.

MIGRATORY BIRDS

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

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

BALD AND GOLDEN EAGLES

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

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

We also suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding State fish, wildlife, and plants.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. We appreciate your efforts to identify and avoid impacts to listed and sensitive species in your project area. For further consultation on your proposed activity, please call 505-346-2525 or email nmesfo@fws.gov and reference your Service Consultation Tracking Number.

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Consultation Code: 02ENNM00-2018-SLI-1108

Event Code: 02ENNM00-2018-E-02312

Project Name: Stormwater/Arroyo PEA

Project Type: LAND - DRAINAGE

Project Description: The USAF is proposing to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and damage-avoiding measures at Kirtland AFB. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. These activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, and other drainage infrastructure; and clearing drainage pipes. Arroyo repair activities could include restabilizing, excavating, filling, and lining arroyo banks and constructing and repairing box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.00725527083509N106.46808812118992W

Counties: Bernalillo, NM

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
New Mexico Meadow Jumping Mouse *Zapus hudsonius luteus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7965	Endangered

Birds

NAME	STATUS
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196	Threatened
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Rio Grande Silvery Minnow *Hybognathus amarus* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1391	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Native American Tribes – Scoping Letters

Governor Kurt Riley
Pueblo of Acoma
PO Box 309
Acoma Pueblo NM 87034

Governor Dwayne Herrera
Pueblo of Cochiti
PO Box 70
Cochiti Pueblo NM 87072

Chairman Timothy L. Nuvangyaoma
Hopi Tribal Council
PO Box 123
Kykotsmovi AZ 86039

Governor J. Robert Benavides
Pueblo of Isleta
PO Box 1270
Isleta NM 87022

Governor Paul S. Chinana
Pueblo of Jemez
PO Box 100
Jemez Pueblo NM 87024

President Levi Pesata
Jicarilla Apache Nation
PO Box 507
Dulce NM 87528

Governor Virgil A. Siow
Pueblo of Laguna
PO Box 194
Laguna NM 87026

President Arthur "Butch" Blazer
Mescalero Apache Tribe
PO Box 227
Mescalero NM 88340

Governor Phillip A. Perez
Pueblo of Nambe
Route 1 Box 117-BB
Santa Fe NM 87506

President Russell Begaye
Navajo Nation
PO Box 7440
Window Rock AZ 86515

Governor Peter Garcia, Jr.
Ohkay Owingeh Pueblo
PO Box 1099
San Juan Pueblo NM 87566

Governor Craig Quanchello
Pueblo of Picuris
PO Box 127
Peñasco NM 87553

Governor Joseph M. Talachy
Pueblo of Pojoaque
78 Cities of Gold
Santa Fe NM 87506

Governor Richard Bernal
Pueblo of Sandia
481 Sandia Loop
Bernalillo NM 87004

Governor Anthony Ortiz
Pueblo of San Felipe
PO Box 4339
San Felipe Pueblo NM 87001

Governor Terrence Garcia
Pueblo of San Ildefonso
02 Tunyo Po
Santa Fe NM 87506

Governor Glenn Tenorio
Pueblo of Santa Ana
2 Dove Road
Santa Ana Pueblo NM 87004

Governor J. Michael Chavarria
Pueblo of Santa Clara
PO Box 580
Española NM 87532

Governor Thomas Moquino, Jr.
Pueblo of Santo Domingo
PO Box 99
Santo Domingo Pueblo NM 87052

Governor Gilbert Suazo, Sr.
Pueblo of Taos
PO Box 1846
Taos NM 87571

Governor Frederick Vigil
Pueblo of Tesuque
Route 42 Box 360-T
Santa Fe NM 87506

Chairman Ronnie Lupe
White Mountain Apache Tribe
PO Box 700
Whiteriver AZ 85941

Governor Carlos Hisa
Ysleta del Sur Pueblo
117 S Old Pueblo Road
PO Box 17579-Ysleta Station
El Paso TX 79907

Governor Anthony Delgarito
Pueblo of Zia
135 Capitol Square Drive
Zia Pueblo NM 87053-6013

Governor Val R. Panteah, Sr.
Pueblo of Zuni
PO Box 339
Zuni NM 87327

Chairman Jeff Haozous
Fort Sill Apache Tribe of Oklahoma
Route 2, Box 121
Apache OK 73006

Chairman Harold Cuthair
Ute Mountain Ute Tribe
PO Box JJ
Towaoc CO 81334-0248

Example Tribal Scoping Letter

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

Colonel Richard W. Gibbs, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland Air Force Base NM 87117

Governor Carlos Hisa
Ysleta del Sur Pueblo
117 S Old Pueblo Road
PO Box 17579-Ysleta Station
El Paso TX 79907

Dear Governor Hisa

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing a Programmatic Environmental Assessment (PEA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and damage-avoiding measures at Kirtland Air Force Base (AFB). Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Development of new stormwater drainage systems and upgrade of existing systems would include: ditching/trenching, the installation of reinforced concrete pipe, vegetation, environmentally-friendly soil stabilizers, rip-rap, and gabion structures, and the construction of drop inlets, flow control structures, and retention structures. Arroyo repair activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing/repairing box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed and banks.

The purpose of the Proposed Action is to upgrade stormwater drainage systems on Kirtland AFB to meet current standards, reduce flooding and standing water issues, and address erosion and sedimentation issues that occur on the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated to the point where extensive work is needed to reestablish an effective stormwater drainage system. Ditches, culverts, and pipes have sedimented and retention basins are eroded and sedimented. Standing stormwater created by clogged ditches and flat ground surfaces poses hazards to traffic and undermines roads, parking lots, and foundations. Outdoor storage areas require berms and retention structures to control stormwater runoff. Revegetation and other measures are needed to control discharges of suspended solids. Outlet structures are nonexistent, causing erosion of arroyos during storms. Arroyo work is required to repair erosion damage and reduce the potential for additional damage in the future.

Pursuant to Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations Part 800) and Executive Order 13175, *Consultation and Coordination With Indian Tribal Governments*, the USAF would like to initiate government-to-government consultation to allow you or your designee the opportunity to identify any comments, concerns, and suggestions relevant to the NEPA compliance process concerning the Proposed Action. A copy of the Final Description of the Proposed Action and Alternatives for the PEA Addressing Upgrade of the Stormwater Drainage System at Kirtland AFB is available at *http://www.kirtland.af.mil* under the "Environment" button at the bottom of the webpage. As we move forward through this process, we welcome your participation and input.

Please contact my office at (505) 846-7377 if you would like to meet to discuss the proposed project or proceed with the Section 106 consultation.

Sincerely

Richard W. Gibbs

RICHARD W. GIBBS, Colonel, USAF
Commander

Native American Tribes – Scoping Response Letters

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
To: Danny D. Naranjo
Cc: CLARK, MELISSA B GS-13 USAF AFGSC 377 MSG/CEIE; REYNOLDS, DAVID H GS-12 USAF AFGSC 377 MSG/CEIEC
Subject: RE: Upgrade of the Storm water Drainage System at KAFB consultation
Date: Friday, May 11, 2018 11:22:22 AM
Attachments: Final DOPAA_KAFB Upgrade to Storm Drainage Systems_Reduced.pdf

Good morning Danny,

I believe we met when Kirtland AFB came up to discuss the Military Training PEA activities back in 2016. Hope you have been well.

I am attaching the following document on this action: the Final DOPAA.

As soon as we get a Draft PEA to review, I will make sure you receive a copy to review as well.

I look forward to working with you again.

V/R

Martha E. Garcia
NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Boulevard, SE
Building 20685, Suite 116a
Kirtland AFB, NM 87117
Phone: 505-846-6446
DSN: 246-6446
Email: martha.garcia.3@us.af.mil

From: Danny D. Naranjo <ddnaranjo@santaclarapueblo.org>
Sent: Friday, May 11, 2018 10:19 AM
To: 377 MSG/CEIE NEPA Environmental <KirtlandNEPA@us.af.mil>
Subject: [Non-DoD Source] Upgrade of the Storm water Drainage System at KAFB consultation

Good morning, we have received a letter for consultation on the above stated project and we have concerns with the project and would like to be a consulting party. If you can send me any other information on the project for review I would greatly appreciate it thank you.

Danny Naranjo
Land and Cultural Resources Technician
ddnaranjo@santaclarapueblo.org
(505)692-6285 Ext.#1234

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
To: Bare, Michelle
Subject: FW: Upgrade of the Storm water Drainage System at KAFB consultation
Date: Tuesday, June 5, 2018 1:59:20 PM

From: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE
Sent: Tuesday, June 5, 2018 1:39 PM
To: 'Danny D. Naranjo' <ddnaranjo@santaclarapueblo.org>
Cc: REYNOLDS, DAVID H GS-12 USAF AFGSC 377 MSG/CEIEC <david.reynolds.37@us.af.mil>
Subject: RE: Upgrade of the Storm water Drainage System at KAFB consultation

Hi Danny,

You are correct. DOPAAs typically don't contain much specific information on the individual resource areas, that information will come in the body of the EA when we actually start analyzing impacts to the various resource areas.

Right now this is being written as a programmatic EA, which means we don't have specific actions, or locations for those actions, determined. When we do these, we typically look at possible impacts to resource areas from a 30,000 foot level.

I believe it is our intention to put a requirement in the Cultural Resource Section that states as specific projects are developed in the future, Section 106 consultations will be required on a project-by-project basis.

When the next version of the document is prepared, I will forward it to you, so you can see how we are handling Cultural Resources from a programmatic level.

Let Dave or I know if you have any other concerns at this time.

V/R

Martha E. Garcia
NEPA Program Manager
377 MSG/CEIEC
2050 Wyoming Boulevard, SE
Building 20685, Suite 116a
Kirtland AFB, NM 87117
Phone: 505-846-6446
DSN: 246-6446
Email: martha.garcia.3@us.af.mil

From: Danny D. Naranjo <ddnaranjo@santaclarapueblo.org>
Sent: Wednesday, May 30, 2018 11:39 AM

To: GARCIA, MARTHA E CIV USAF AFGSC 377 MSG/CEIE <martha.garcia.3@us.af.mil>
Subject: [Non-DoD Source] RE: Upgrade of the Storm water Drainage System at KAFB consultation

Good Morning after reviewing the document this was little mention of cultural / historic resources within the project area. Has a class III resources survey taken place in the proposed areas? If so we would like to request a copy of the report to help with our consultation efforts. We would like to know if any cultural resources will be effected during the project, and what is being done to protect these resources? Any other information you can provide me regarding this project and cultural resources in the area will be greatly appreciated. Thank you in advanced.

- Danny Naranjo

AGENCY DISTRIBUTION LIST

Federal, State, and Local Agencies – Public Notice Letters

Ms. Amy Leuders
Southwest Regional Director
US Fish & Wildlife Service
PO Box 1306
Albuquerque NM 87103-1306

Ms. Priscilla J. Avila
Acting Regional Director and Regional Environmental Specialist
Bureau of Indian Affairs
Southwest Regional Office
1001 Indian School Road NW
Albuquerque NM 87104

Ms. Danita Burns, District Manager
Bureau of Land Management
New Mexico State Office
Albuquerque District Office
100 Sun Avenue NE, Suite 330
Pan American Building
Albuquerque NM 87109-4676

Ms. Jennifer L. Faler, Area Manager
Bureau of Reclamation
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque NM 87102-2352

Mr. Stephen Spencer
Regional Environmental Officer
US Department of Interior
Office of Environmental Policy & Compliance - Albuquerque Region
1001 Indian School Road NW, Suite 348
Albuquerque NM 87104

Mr. Kelvin L. Solco, Regional Administrator
Federal Aviation Administration
Southwest Region
10101 Hillwood Parkway
Fort Worth TX 76177-1524

Ms. Pearl Armijo, District Conservationist
Natural Resources Conservation Service
Albuquerque Service Center
100 Sun Avenue NE, Suite 160
Albuquerque NM 87109

Mr. George Macdonnell, Chief
Environmental Resources Section
US Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque NM 87109

Ms. Anne L. Idsal, Regional Administrator
US Environmental Protection Agency, Region 6
1445 Ross Avenue
Fountain Pl 12th Floor, Suite 1200
Dallas TX 75202-2733

Ms. Cheryl Prewitt, Regional Environmental Coordinator
US Forest Service
Southwestern Region
333 Broadway Boulevard SE
Albuquerque NM 87102-3407

Ms. Susan Lacy
DOE/NNSA Sandia Field Office
PO Box 5400
Albuquerque NM 87187

Mr. John Weckerle
DOE/NNSA Office of General Counsel
PO Box 5400
Albuquerque NM 87187

The Honorable Martin Heinrich
US Senate
400 Gold Avenue SW, Suite 1080
Albuquerque NM 87102

The Honorable Tom Udall
US Senate
400 Gold Avenue SW, Suite 300
Albuquerque NM 87102

The Honorable Xochiti Torres Small
US House of Representatives
PO Box 2250
Las Cruces NM 88004

The Honorable Debra Haaland
US House of Representatives
PO Box 25443
Albuquerque NM 87125

The Honorable Ben R. Luján
US House of Representatives
1611 Calle Lorca, Suite A
Santa Fe NM 87505

Dr. 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

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

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

Mr. Clyde Ward, Assistant Commissioner for Commercial Resources
New Mexico State Land Office
PO Box 1148
Santa Fe NM 87504

Ms. Jennifer L. Hower
Office of General Counsel & Environmental Policy
New Mexico Environment Department
1190 St. Francis Drive, Suite N4050
Santa Fe NM 87505

Mr. Jeff M. Witte, Director/Secretary
New Mexico Department of Agriculture
3190 S. Espina
Las Cruces NM 88003

Mr. Ken McQueen, Cabinet Secretary
New Mexico Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe NM 87505

Development Management/Department Director
Bernalillo County Planning Section
111 Union Square SE, Suite 100
Albuquerque NM 87102

Department Director
City of Albuquerque Planning Department
PO Box 1293
Albuquerque NM 87103

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

Ms. Julie Morgas Baca, Bernalillo County Manager
Bernalillo County Manager's Office
One Civic Plaza NW, 10th Floor
Albuquerque NM 87102

Ms. Alicia Manzano
Director of Communications
City of Albuquerque Office of the Mayor
PO Box 1293
Albuquerque NM 87103

Bernalillo County Board of Commissioners
One Civic Plaza NW, 10th Floor
Albuquerque NM 87102

Albuquerque City Councilmembers
One Civic Plaza NW, 9th Floor, Suite 9087
Albuquerque NM 87102

Mr. Jerry Lovato, Executive Engineer
Albuquerque Metropolitan Arroyo Flood Control Authority
2600 Prospect Avenue NE
Albuquerque NM 87107

Example Public Notice Letter

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

Colonel Richard W. Gibbs, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland Air Force Base NM 87117

Ms. Danita T. Burns, District Manager
Bureau of Land Management
New Mexico State Office
Albuquerque District Office
Pan American Building
100 Sun Avenue NE, Suite 330
Albuquerque NM 87109-4676

Dear Ms. Burns

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations, and the United States Air Force (USAF) NEPA regulations, the USAF has prepared a Programmatic Environmental Assessment (PEA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland AFB. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Project activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, or other drainage infrastructure; and any required repair, maintenance, or cleaning of the stormwater pipe network. Arroyo repair and erosion control activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing and repairing bridge supports, box culverts, bank protection, grade control and energy dissipation structures, stilling basins, and other structures to assist in stabilizing the arroyo integrity and grades.

The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation transfer that occurs across the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated and clogged to the point where extensive work is needed to reestablish and maintain an effective stormwater drainage system. Ditches, culverts, pipes, and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. The Proposed Action would reduce the velocity and energy of stormwater flows, which in turn would reduce the detrimental effects of erosion and sedimentation into surface waters.

In accordance with Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, as amended, by EO 12416, *Intergovernmental Review of Federal Programs*, I am requesting your participation in the NEPA document review and comment process. As required by EO 11988, *Floodplain Management*, and Air Force Instruction 32-7064, *Integrated Natural Resources Management*, early public notification for potential floodplain impacts was provided in the Albuquerque Journal on Monday, 23 July 2018. Copies of the Draft PEA and the proposed Finding of No Significant Impact/Finding of No Practicable Alternative (FONSI/FONPA) are available at *http://www.kirtland.af.mil* under the "Environment" button at the bottom of the webpage. If, after review of the Draft PEA and proposed FONSI/FONPA, 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 process. Please respond within 30 days of receipt of this letter to ensure your concerns are adequately addressed in the PEA.

Please send your written responses to the NEPA Program Manager, 377 MSG/CEIEC, 2050 Wyoming Boulevard SE, Suite 116, Kirtland AFB NM 87117, or via email to *KirtlandNEPA@us.af.mil*.

Sincerely

RICHARD W. GIBBS, Colonel, USAF
Commander

Example Section 7 Letter – Public Notice Period

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

Colonel Richard W. Gibbs, USAF
Commander
377th Air Base Wing
2000 Wyoming Boulevard SE
Kirtland Air Force Base NM 87117

Ms. Amy Leuders, Regional Director
US Fish & Wildlife Service
Southwest Regional Office
PO Box 1306
Albuquerque NM 87103-1306

Dear Ms. Leuders

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations, and the United States Air Force (USAF) NEPA regulations, the USAF has prepared a Programmatic Environmental Assessment (PEA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland AFB. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Project activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, or other drainage infrastructure; and any required repair, maintenance, or cleaning of the stormwater pipe network. Arroyo repair and erosion control activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing and repairing bridge supports, box culverts, bank protection, grade control and energy dissipation structures, stilling basins, and other structures to assist in stabilizing the arroyo integrity and grades.

The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation transfer that occurs across the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated and clogged to the point where extensive work is needed to reestablish and maintain an effective stormwater drainage system. Ditches, culverts, pipes, and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. The Proposed Action would reduce the velocity and energy of stormwater flows, which in turn would reduce the detrimental effects of erosion and sedimentation into surface waters.

In accordance with Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416, *Intergovernmental Review of Federal Programs*, I am requesting your participation in the NEPA document review and comment process. As required

by EO 11988, *Floodplain Management*, and Air Force Instruction 32-7064, *Integrated Natural Resources Management*, early public notification for potential floodplain impacts was provided in the Albuquerque Journal on Monday, 23 July 2018. Copies of the Draft PEA and the proposed Finding of No Significant Impact/Finding of No Practicable Alternative (FONSI/FONPA) are available at *http://www.kirtland.af.mil* under the "Environment" button at the bottom of the webpage. If, after review of the Draft PEA and proposed FONSI/FONPA, 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 process. Please respond within 30 days of receipt of this letter to ensure your concerns are adequately addressed in the PEA.

Pursuant to Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 United States Code 1531 et seq.), Kirtland AFB conducted an effect determination for this project. All interrelated and interdependent actions were analyzed during that review. The 2018 USFWS Information for Planning and Consultation Official Species and Habitat List was received on 20 July 2018 under Consultation Code 02ENNM00-2018-SLI-1108. It was determined that there are no federally listed threatened or endangered species or critical habitat and no state-listed threatened or endangered species occurring within the project area. However, to ensure no impact, an updated species list from the USFWS would be obtained within 90 days of the start of construction activities.

Please send your written responses to the NEPA Program Manager, 377 MSG/CEIEC, 2050 Wyoming Boulevard SE, Suite 116, Kirtland AFB NM 87117, or via email to *KirtlandNEPA@us.af.mil*.

Sincerely

RICHARD W. GIBBS, Colonel, USAF
Commander

Example Section 106 Letter – Public Notice Period

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

Colonel Richard W. Gibbs, USAF
Commander
377th Air Base Wing
2000 Wyoming Boulevard SE
Kirtland Air Force Base NM 87117

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

Dear Dr. Pappas

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations, and the United States Air Force (USAF) NEPA regulations, the USAF has prepared a Programmatic Environmental Assessment (PEA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland AFB. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Project activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, or other drainage infrastructure; and any required repair, maintenance, or cleaning of the stormwater pipe network. Arroyo repair and erosion control activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing and repairing bridge supports, box culverts, bank protection, grade control and energy dissipation structures, stilling basins, and other structures to assist in stabilizing the arroyo integrity and grades.

The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation transfer that occurs across the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated and clogged to the point where extensive work is needed to reestablish and maintain an effective stormwater drainage system. Ditches, culverts, pipes, and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. The Proposed Action would reduce the velocity and energy of stormwater flows, which in turn would reduce the detrimental effects of erosion and sedimentation into surface waters.

In accordance with Section 106 of the National Historic Preservation Act of 1966 (36 Code of Federal Regulations [CFR] Part 800), as amended, Kirtland AFB transmitted a consultation letter to the State Historic Preservation Officer (SHPO). The SHPO responded that once the Areas of Potential Effect (APEs) for specific projects are defined, it may be necessary to complete National Register of Historic Places consultation. The SHPO recommended that Section 106 consultation be substantially complete before preparing a Finding of No Significant Impact (FONSI) and further recommended the development of a programmatic agreement (PA) per 36 CFR 800.4.b.2 and 800.14 (HPD Log 107738). However, because specific projects have not yet been determined, the development of a PA is not feasible at this time. Because of the programmatic nature of the PEA, the APE is defined as the entire installation. No specific activities or locations have been determined at this time. As individual projects are developed, project-specific NEPA analysis would be conducted and Section 106 consultation would occur at that time.

Copies of the Draft PEA and the proposed FONSI/Finding of No Practicable Alternative (FONPA) are available at *http://www.kirtland.af.mil* under the "Environment" button at the bottom of the webpage. If, after review of the Draft PEA and proposed FONSI/FONPA, 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 process. Please respond within 30 days of receipt of this letter to ensure your concerns are adequately addressed in the PEA.

Please send your written responses to the NEPA Program Manager, 377 MSG/CEIEC, 2050 Wyoming Boulevard SE, Suite 116, Kirtland AFB NM 87117, or via email to *KirtlandNEPA@us.af.mil.*

Sincerely

RICHARD W. GIBBS, Colonel, USAF
Commander

Native American Tribes – Public Notice Letters

Governor Kurt Riley
Pueblo of Acoma
PO Box 309
Acoma Pueblo NM 87034

Governor Dwayne Herrera
Pueblo of Cochiti
PO Box 70
Cochiti Pueblo NM 87072

Chairman Timothy L. Nuvangyaoma
Hopi Tribal Council
PO Box 123
Kykotsmovi AZ 86039

Governor J. Robert Benavides
Pueblo of Isleta
PO Box 1270
Isleta NM 87022

Governor Paul S. Chinana
Pueblo of Jemez
PO Box 100
Jemez Pueblo NM 87024

President Levi Pesata
Jicarilla Apache Nation
PO Box 507
Dulce NM 87528

Governor Virgil A. Siow
Pueblo of Laguna
PO Box 194
Laguna NM 87026

President Arthur "Butch" Blazer
Mescalero Apache Tribe
PO Box 227
Mescalero NM 88340

Governor Phillip A. Perez
Pueblo of Nambe
Route 1 Box 117-BB
Santa Fe NM 87506

President Russell Begaye
Navajo Nation
PO Box 7440
Window Rock AZ 86515

Governor Peter Garcia, Jr.
Ohkay Owingeh Pueblo
PO Box 1099
San Juan Pueblo NM 87566

Governor Craig Quanchello
Pueblo of Picuris
PO Box 127
Peñasco NM 87553

Governor Joseph M. Talachy
Pueblo of Pojoaque
78 Cities of Gold
Santa Fe NM 87506

Governor Richard Bernal
Pueblo of Sandia
481 Sandia Loop
Bernalillo NM 87004

Governor Anthony Ortiz
Pueblo of San Felipe
PO Box 4339
San Felipe Pueblo NM 87001

Governor Terrence Garcia
Pueblo of San Ildefonso
02 Tunyo Po
Santa Fe NM 87506

Governor Glenn Tenorio
Pueblo of Santa Ana
2 Dove Road
Santa Ana Pueblo NM 87004

Governor J. Michael Chavarria
Pueblo of Santa Clara
PO Box 580
Española NM 87532

Governor Thomas Moquino, Jr.
Pueblo of Santo Domingo
PO Box 99
Santo Domingo Pueblo NM 87052

Governor Gilbert Suazo, Sr.
Pueblo of Taos
PO Box 1846
Taos NM 87571

Governor Frederick Vigil
Pueblo of Tesuque
Route 42 Box 360-T
Santa Fe NM 87506

Chairman Ronnie Lupe
White Mountain Apache Tribe
PO Box 700
Whiteriver AZ 85941

Governor Carlos Hisa
Ysleta del Sur Pueblo
117 S Old Pueblo Road
PO Box 17579-Ysleta Station
El Paso TX 79907

Governor Anthony Delgarito
Pueblo of Zia
135 Capitol Square Drive
Zia Pueblo NM 87053-6013

Governor Val R. Panteah, Sr.
Pueblo of Zuni
PO Box 339
Zuni NM 87327

Chairman Jeff Haozous
Fort Sill Apache Tribe of Oklahoma
Route 2, Box 121
Apache OK 73006

Chairman Harold Cuthair
Ute Mountain Ute Tribe
PO Box JJ
Towaoc CO 81334-0248

Example Tribal Public Notice Letter

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

Colonel Richard W. Gibbs, USAF
Commander
377th Air Base Wing
2000 Wyoming Boulevard SE
Kirtland Air Force Base NM 87117

Governor Carlos Hisa
Ysleta del Sur Pueblo
117 S Old Pueblo Road
PO Box 17579-Ysleta Station
El Paso TX 79907

Dear Governor Hisa

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations, and the United States Air Force (USAF) NEPA regulations, the USAF has prepared a Programmatic Environmental Assessment (PEA) to evaluate the proposal to develop, upgrade, and maintain stormwater drainage systems and conduct arroyo repair and erosion control measures on USAF controlled lands at Kirtland AFB. Stormwater drainage system activities would include developing stormwater systems where none exist, upgrading and repairing existing systems, and future maintenance. Project activities could include excavating existing retention basins and culverts/gullies; constructing berms; constructing and repairing gutters, curbs, or other drainage infrastructure; and any required repair, maintenance, or cleaning of the stormwater pipe network. Arroyo repair and erosion control activities could include restabilizing, excavating, filling, and lining arroyo banks, and constructing and repairing bridge supports, box culverts, bank protection, grade control and energy dissipation structures, stilling basins, and other structures to assist in stabilizing the arroyo integrity and grades.

The purpose of the Proposed Action is to meet current stormwater drainage system standards, reduce flooding and standing water issues, and address erosion and sedimentation transfer that occurs across the installation. The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated and clogged to the point where extensive work is needed to reestablish and maintain an effective stormwater drainage system. Ditches, culverts, pipes, and retention basins annually experience sediment build-up and substantial erosion due to monsoon storm events. The Proposed Action would reduce the velocity and energy of stormwater flows, which in turn would reduce the detrimental effects of erosion and sedimentation into surface waters.

Pursuant to Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations Part 800), the USAF would like to initiate government-to-government consultation to allow you or your designee the opportunity to identify any comments, concerns, and

suggestions relevant to the NEPA compliance process concerning the Proposed Action. Copies of the Draft PEA and proposed Finding of No Significant Impact/Finding of No Practicable Alternative are available at *http://www.kirtland.af.mil* under the "Environment" button at the bottom of the webpage. For technical information, please contact my NEPA Program Manager, Ms. Martha E. Garciá, directly at martha.garcia.3@us.af.mil or (505) 846-6446.

Please contact my office at (505) 846-7377 if you would like to meet to discuss the proposed project or proceed with the Section 106 consultation.

Sincerely

RICHARD W. GIBBS, Colonel, USAF
Commander

B

Air Quality Support Documentation

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

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impacts associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: KIRTLAND AFB
County(s): Bernalillo
Regulatory Area(s): Albuquerque, NM

b. Action Title: Programmatic Environmental Assessment Addressing Upgrade of the Stormwater Drainage System at Kirtland Air Force Base (AFB), New Mexico

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1/2019

e. Action Description:

Stormwater Drainage Systems. Development of new stormwater drainage systems and upgrade of existing systems would include ditching/trenching; installation of reinforced concrete pipe, vegetation, environmentally-friendly soil stabilizers, rip-rap, and gabion structures; and construction of drop inlets, flow control structures, and retention structures. Ditching/trenching would require use of a backhoe or trencher to excavate a linear trench to install a pipe or other infrastructure. Trench lining, using reinforcement technologies such as trench boxes, would stabilize the trench during excavation and installation of pipes and other infrastructure. Pipes would be settled in the trench and surrounded with bedding material. Reinforced concrete pipe would be installed to assist in channelizing and diverting water flow where necessary.

Culverts, fully enclosed structures that run underneath a road to allow water to flow from one side of the road to another, would be installed, which would require excavation of the road. In order to prevent erosion, vegetation would be planted, environmentally-friendly soil stabilizers would be applied, or rip-rap, consisting of loose stone, would be used to form a foundation for breakwater or other structures. Gabion structures, consisting of a wire mesh cage filled with cobble or small boulder material, could be used to dissipate energy from flowing water and provide bed protection or bank stabilization.

A drop inlet is an access point to underground storm drains. It is usually precast concrete with a grate between the gutter and the inlet to keep debris out of the storm sewer lines. Installation of drop inlets would accompany construction of gutters and require excavation and storm drains to be present. Flow control structures are designed to control stormwater runoff. These structures trap sediment, dissipate energy, and can be used to redirect water around problem areas. Retention structures are lined, excavated areas for water to collect when it drains. Outlet structures are usually constructed of concrete with metal grates that lead from detention and retention basins into the storm sewer or other destination. Together, these structures reduce the amount of sediment going to the storm sewer and help manage stormwater flow.

Maintenance activities would include cleaning, excavating, regrading, filling, and backfilling. Debris would be cleaned from existing stormwater drains and drainage infrastructure by snaking, water blasting, or using hand tools or other equipment. Excessive soil would be removed by excavating, and regrading would be conducted to change the elevation of an area to direct water flow and allow for better drainage away from structures. Filling consists of filling an area that has been impacted by erosion and backfilling consists of refilling an excavated area with the material that was taken out during excavation or with other material if specified. Excavating, regrading, filling, and backfilling would require the use of a backhoe and other heavy equipment.

Arroyo Repair. Arroyo repair activities could include restabilizing, excavating, filling, and lining arroyo banks and constructing and repairing bridge supports, box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed and banks. Gabion structures and rip-rap could be used to dissipate energy from flowing water and as grade control structures to provide the arroyo bed and banks with stabilization and

protection. Box culverts, typically precast or cast in place concrete structures, could be constructed to protect the arroyo bed and banks.

Various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or AMAFCA. ABCWUA owns and maintains sanitary sewer lines on the installation, several of which traverse tributaries or are adjacent to the Tijeras Arroyo. The three organizations would continue to coordinate their activities in order to ensure no negative impacts would result to the other's activities or systems. It is assumed that up to 3 acres of land would typically be disturbed annually by activities associated with the Proposed Action; however, it is conservatively assumed that up to 10 acres of land could be disturbed annually.

f. Point of Contact:

Name: Timothy Didlake
Title: Contractor
Organization: HDR
Email: timothy.didlake@hdrinc.com
Phone Number: (484) 612-1124

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2019

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Albuquerque, NM			
VOC	1.353		
NOx	8.522		
CO	7.954	100	No
SOx	0.018		
PM^{10}	56.201		
$PM^{2.5}$	0.419		
Pb	0.000		
NH3	0.004		
CO2e	1705.0		

2020 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Albuquerque, NM			
VOC	0.000		
NOx	0.000		
CO	0.000	100	No
SOx	0.000		
PM^{10}	0.000		
$PM^{2.5}$	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

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

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

25 July 2018

Timothy Didlake, Contractor

DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: KIRTLAND AFB
County(s): Bernalillo
Regulatory Area(s): Albuquerque, NM

- Action Title: Programmatic Environmental Assessment Addressing Upgrade of the Stormwater Drainage System at Kirtland Air Force Base (AFB), New Mexico

- Project Number/s (if applicable):

- Projected Action Start Date: 1/2019

- Action Purpose and Need:

The purpose of the Proposed Action is to upgrade stormwater drainage systems on Kirtland AFB to meet current standards, reduce flooding and standing water issues, and address erosion and sedimentation issues that occur on the installation.

The Proposed Action is needed because existing stormwater drainage facilities on Kirtland AFB have deteriorated to the point where extensive work is needed to reestablish an effective stormwater drainage system. Ditches, culverts, and pipes have sedimented and retention basins are eroded and sedimented. Standing stormwater created by clogged ditches and flat ground surfaces poses hazards to traffic and undermines roads, parking lots, and foundations. Outdoor storage areas require berms and retention structures to control stormwater runoff. Revegetation and other measures are needed to control discharges of suspended solids. Outlet structures are nonexistent, causing erosion of arroyos during storms. Arroyo work is required to repair erosion damage and reduce the potential for additional damage in the future.

- Action Description:

Stormwater Drainage Systems. Development of new stormwater drainage systems and upgrade of existing systems would include ditching/trenching; installation of reinforced concrete pipe, vegetation, environmentally-friendly soil stabilizers, rip-rap, and gabion structures; and construction of drop inlets, flow control structures, and retention structures. Ditching/trenching would require use of a backhoe or trencher to excavate a linear trench to install a pipe or other infrastructure. Trench lining, using reinforcement technologies such as trench boxes, would stabilize the trench during excavation and installation of pipes and other infrastructure. Pipes would be settled in the trench and surrounded with bedding material. Reinforced concrete pipe would be installed to assist in channelizing and diverting water flow where necessary.

Culverts, fully enclosed structures that run underneath a road to allow water to flow from one side of the road to another, would be installed, which would require excavation of the road. In order to prevent erosion, vegetation would be planted, environmentally-friendly soil stabilizers would be applied, or rip-rap, consisting of loose stone, would be used to form a foundation for breakwater or other structures. Gabion structures, consisting of a wire mesh cage filled with cobble or small boulder material, could be used to dissipate energy from flowing water and provide bed protection or bank stabilization.

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change the elevation of an area to direct water flow and allow for better drainage away from structures. Filling consists of filling an area that has been impacted by erosion and backfilling consists of refilling an excavated area with the material that was taken out during excavation or with other material if specified. Excavating, regrading, filling, and backfilling would require the use of a backhoe and other heavy equipment.

Arroyo Repair. Arroyo repair activities could include restabilizing, excavating, filling, and lining arroyo banks and constructing and repairing bridge supports, box culverts, bank protection, and grade control structures to assist in stabilizing the arroyo bed and banks. Gabion structures and rip-rap could be used to dissipate energy from flowing water and as grade control structures to provide the arroyo bed and banks with stabilization and protection. Box culverts, typically precast or cast in place concrete structures, could be constructed to protect the arroyo bed and banks.

Various portions of the stormwater drainage and arroyo systems on the installation are owned or maintained by either Kirtland AFB or AMAFCA. ABCWUA owns and maintains sanitary sewer lines on the installation, several of which traverse tributaries or are adjacent to the Tijeras Arroyo. The three organizations would continue to coordinate their activities in order to ensure no negative impacts would result to the other's activities or systems. It is assumed that up to 3 acres of land would typically be disturbed annually by activities associated with the Proposed Action; however, it is conservatively assumed that up to 10 acres of land could be disturbed annually.

- Point of Contact

Name: Timothy Didlake
Title: Contractor
Organization: HDR
Email: timothy.didlake@hdrinc.com
Phone Number: (484) 612-1124

- Activity List:

Activity Type		Activity Title
2.	Construction/Demolition	All construction and demolition associated with the Proposed Action

2. Construction/Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Bernalillo
Regulatory Area(s): Albuquerque, NM

- Activity Title: All construction and demolition associated with the Proposed Action

- Activity Description:

Assumptions:
Up to 10 acres of land would be disturbed annually by activities associated with the Proposed Action.
2019 has been used as an example year. Similar emissions would occur annually each following year.
Site grading would occur over an area measuring 10 acres (435,600 ft^2).
Trenching would occur over an area measuring 2 feet wide and 3 miles long (31,680 ft^2).
Asphalt paving would occur over an area measuring 3 acre (130,680 ft^2).

- Activity Start Date

Start Month: 1
Start Month: 2019

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2019

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.352704
SO_x	0.017614
NO_x	8.522086
CO	7.953854
PM^{10}	56.200863

Pollutant	Total Emissions (TONs)
$PM^{2.5}$	0.418880
Pb	0.000000
NH_3	0.003551
CO_2e	1705.0

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2019

- Phase Duration
Number of Month: 12
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 435,600
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	3	8

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

2.1.3 Site Grading Phase Emission Factor(s)

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

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0786	0.0013	0.4574	0.5139	0.0214	0.0214	0.0070	119.75
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0982	0.0014	0.6490	0.5786	0.0316	0.0316	0.0088	132.96
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0595	0.0012	0.3971	0.3522	0.0158	0.0158	0.0053	122.63
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.2226	0.0024	1.6948	0.8387	0.0682	0.0682	0.0200	239.58
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0471	0.0007	0.3018	0.3630	0.0159	0.0159	0.0042	66.904

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

	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.340	000.002	000.276	003.604	000.008	000.007		000.024	00328.206
LDGT	000.416	000.003	000.480	005.057	000.010	000.009		000.025	00423.247
HDGV	000.764	000.005	001.218	016.264	000.023	000.020		000.044	00760.998
LDDV	000.119	000.003	000.146	002.473	000.004	000.004		000.008	00318.976
LDDT	000.281	000.004	000.446	004.521	000.007	000.006		000.008	00458.185
HDDV	000.618	000.013	006.194	002.048	000.195	000.179		000.030	01519.413
MC	002.745	000.003	000.847	013.480	000.027	000.024		000.054	00396.763

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb/1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

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

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

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

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

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

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

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

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2019

- Phase Duration
Number of Month: 12
Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 31,680
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

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

- Construction Exhaust (default)

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

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

2.2.3 Trenching / Excavating Phase Emission Factor(s)

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

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0786	0.0013	0.4574	0.5139	0.0214	0.0214	0.0070	119.75
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0982	0.0014	0.6490	0.5786	0.0316	0.0316	0.0088	132.96
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0595	0.0012	0.3971	0.3522	0.0158	0.0158	0.0053	122.63
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.2226	0.0024	1.6948	0.8387	0.0682	0.0682	0.0200	239.58
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM^{10}**	**$PM^{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0471	0.0007	0.3018	0.3630	0.0159	0.0159	0.0042	66.904

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

	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	Pb	NH_3	CO_2e
LDGV	000.340	000.002	000.276	003.604	000.008	000.007		000.024	00328.206
LDGT	000.416	000.003	000.480	005.057	000.010	000.009		000.025	00423.247
HDGV	000.764	000.005	001.218	016.264	000.023	000.020		000.044	00760.998
LDDV	000.119	000.003	000.146	002.473	000.004	000.004		000.008	00318.976
LDDT	000.281	000.004	000.446	004.521	000.007	000.006		000.008	00458.185
HDDV	000.618	000.013	006.194	002.048	000.195	000.179		000.030	01519.413
MC	002.745	000.003	000.847	013.480	000.027	000.024		000.054	00396.763

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb/1 Acre Day)
ACRE: Total acres (acres)
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H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

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

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

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

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

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

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

2.3 Paving Phase

2.3.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2019

- Phase Duration

Number of Month: 12
Number of Days: 0

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2.3.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 130,680

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

2.3.3 Paving Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	CH_4	CO_2e
Emission Factors	0.0786	0.0013	0.4574	0.5139	0.0214	0.0214	0.0070	119.75
Graders Composite								
	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	CH_4	CO_2e
Emission Factors	0.0982	0.0014	0.6490	0.5786	0.0316	0.0316	0.0088	132.96

Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	CH_4	CO_2e
Emission Factors	0.0595	0.0012	0.3971	0.3522	0.0158	0.0158	0.0053	122.63
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	CH_4	CO_2e
Emission Factors	0.2226	0.0024	1.6948	0.8387	0.0682	0.0682	0.0200	239.58
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	CH_4	CO_2e
Emission Factors	0.0471	0.0007	0.3018	0.3630	0.0159	0.0159	0.0042	66.904

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

	VOC	SO_x	NO_x	CO	PM^{10}	$PM^{2.5}$	Pb	NH_3	CO_2e
LDGV	000.340	000.002	000.276	003.604	000.008	000.007		000.024	00328.206
LDGT	000.416	000.003	000.480	005.057	000.010	000.009		000.025	00423.247
HDGV	000.764	000.005	001.218	016.264	000.023	000.020		000.044	00760.998
LDDV	000.119	000.003	000.146	002.473	000.004	000.004		000.008	00318.976
LDDT	000.281	000.004	000.446	004.521	000.007	000.006		000.008	00458.185
HDDV	000.618	000.013	006.194	002.048	000.195	000.179		000.030	01519.413
MC	002.745	000.003	000.847	013.480	000.027	000.024		000.054	00396.763

2.3.4 Paving 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 (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1/27) * (1/HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1/27): Conversion Factor cubic feet to cubic yards (1 yd^3/27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1/HC): Conversion Factor cubic yards to trips (1 trip/HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

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

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

- Off-Gassing Emissions per Phase

$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43,560: Conversion Factor square feet to acre (43,560 ft^2/acre)^2/acre)

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