Environmental Assessment

Griggs Reservoir Outfall Structure Modification Project

City of Alamogordo
Otero County, New Mexico

Section 595 Water Resources Development Act

Prepared By:

U. S. Army Corps of Engineers
Albuquerque District

DRAFT

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US Army Corps
of Engineers ®
Albuquerque District

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Draft Finding of No Significant Impact

Section 595 Water Resources Development Act

Griggs Reservoir Outfall Structure

Modification Project

City of Alamogordo, Otero County, New Mexico

The U.S. Army Corps of Engineers (USACE), Albuquerque District, in cooperation with, and at the request of the City of Alamogordo (City), New Mexico, is planning a project that would attenuate peak discharges and convey flows downstream to eliminate flooding within the project area which is focused around the Griggs Field Detention Reservoir (Griggs Reservoir) in the northern part of the City. The construction work is authorized under Section 595 of the Water Resources Development Act of 1999 (Public Law 106-53; 33 U.S.C. 2201 *et seq.*)(Act), as amended. The Act authorizes USACE to provide assistance for design and construction of water-related environmental infrastructure and resource protection and development projects in Idaho, Montana, rural Nevada, New Mexico, and rural Utah. The City of Alamogordo is the local sponsor. The duration of the proposed construction is anticipated to be under two years, and expected to begin July 2018.

The Proposed Action involves the improvement and modification of the degraded Griggs Reservoir located north of 26th Street and east of N. Florida Avenue to the west of White Sands Boulevard and south of Fairgrounds Road and the Jim R. Griggs Sports Complex. The proposal includes reconstruction and enlargement of the existing breached dam, embankment, and emergency spillway to allow 49 acre feet of water impoundment with less than 6 feet of embankment height, with construction of a connecting buried storm drain system. The outflow would discharge into the existing Dry Canyon channel, with the possible future construction of a regional outflow detention pond downstream and west from the dam, all completely located within City limits, on City owned and managed property. The Proposed Action is necessary to increase the capacity and reliability of the floodwater control systems, thereby increasing protection of the City's Public Works Yard, residential, and commercial properties immediately to the west and south of the project area from future flood events

The No-Action alternative is perceived as increasing current flood damage estimates as includes neither improvements to the existing breached, non-engineered Griggs Reservoir, nor improvements to the environment in and around the degraded reservoir. Impactful failures and continued overland flow from future flood events are possible with the continued build-up of the area, commercially and residentially.

Pursuant to Section 106 of the National Historic Preservation Act, USACE determined that there would be "No Properties Affected" by the proposed undertaking or on the historic and cultural resources of the region. USACE is currently consulting with the State Historic Preservation Office regarding these determinations.

The proposed project construction would not affect the quality of water in Alamogordo, nor any waters of the U.S., as the project lies within a closed basin and there are no permanent flowing surface waters subject to the provisions of Section 401 or Section 404 of the Clean Water Act, nor would a Department of the Army authorization be required. The Proposed Action would occur outside of the floodplain and would not significantly alter any use or natural feature of the area. Therefore, the planned action is consistent with Executive Order 11988 (Floodplain Management). The proposed work complies with Executive Order 11990 (Protection of Wetlands) as no jurisdictional wetlands occur within the project area.

There are no designated nor proposed critical habitats within the project area for any of the federally-listed threatened, endangered, or proposed species, pursuant to the Endangered Species Act. USACE has determined that there would be "No Effect" on special status species, or their designated or proposed critical habitat by the Proposed Action.

If any, only short-term, minor adverse effects to land use, water resources aesthetics, soils, air, noise, vegetation, and wildlife, would occur during construction. No long-term effects would occur to land use, water resources, climate, soils, air, wetlands or other waters of the U.S., special status species, floodplains, socioeconomics, environmental justice or cultural resources. Minor beneficial effects would occur to human health and safety. The proposed project would not result in any moderate or significant, short-term, long-term, or cumulative adverse effects.

The planned action has been fully coordinated with federal, state, tribal, and local agencies with jurisdiction over the ecological, cultural, and hydrological resources of the project area. Based upon these factors and others discussed in detail in the Environmental Assessment, the Proposed Action would not have a significant effect on the human environment. Therefore, an Environment Impact Statement will not be prepared for the proposed flood protection modifications and improvements.

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Date

James L. Booth

Lieutenant Colonel, U.S. Army

District Commander

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LIST OF ACRONYMS USED

ACE	Annual Chance Exceedance
APE	Area of Potential Effect
ASTM	American Society for Testing and Materials
BFE	Base Flood Elevation
CMP	Corrugated Metal Pipe
CPR CoP	Climate Preparedness and Reslience Community of Practice
EA	Environmental Assessment
EDA	Economic Development Administration
EDR	Environmental Data Resources, Inc.
ESA	Endangered Species Act
FCA	Flood Control Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GRR/EA	General Reevaluation Report / Environmental Assessment
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HTRW	Hazardous, Toxic, and Radioactive Waste
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMED	New Mexico Environment Department
NM EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
NMDGF	New Mexico Department of Game and Fish
NMOSE	New Mexico Office of the State Engineer
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Registry of Historic Places
LERRD	Lands, Easements, Rights-of-way, Relocations, and Disposal Areas
OMRR&R Manual	Operation, Maintenance, Repair, Rehabilitiation, and Replacement Manual
PSDP	NMEID Prevention of Significant Deterioration Program
REC	Recognizable Environmental Conditions
SHPO	State Historic Preservation Office
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Office
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

1. INTRODUCTION

The City of Alamogordo, New Mexico (City), has been continually affected by flooding problems stemming from flash floods rolling down from Dry, Beeman, Marble and Alamo canyons, as well as several contributing unnamed arroyos, which has resulted in detailed studies. The 2010 Flood Insurance Study (FIS) includes past flood problems noting, "…eleven floods exceeding the capacity of the railroad's drainage structures and overtopped the tracks by as much as two feet." The significant flooding events and identified threats stem from the runoff associated with the Sacramento Mountains along the City's eastern boundary.

As was seen throughout most of New Mexico, the summer of 2006 brought several intense rainstorms. Otero County was declared a Federal Disaster Area due to severe flooding that resulted from the summer 2006 storms. In 2008, the associated fall-out from Hurricane Dolly brought significant rainfall to the Sacramento Mountains and along the feeders into the drainage systems which pass through the City, creating an extreme amount of storm run-off which the Griggs Field Detention Reservoir (Griggs Reservoir) was unable to contain. Subsequently, water flowed over the dam and created in excess of $500,000 in property damage throughout Alamogordo. In 2014, a similar flood event occurred in the City and, as with the 2008 event, flood damages surpassed $500,000. These and other flood events have filled the detention reservoir and severely impacted the Basin's ability to retain future flood waters, thence reducing the flood control system's capacity, and increasing the danger for area flooding. The latest FIS for Otero County, New Mexico, and Incorporated Areas became effective December 17, 2010. Revised floodplain maps from the FIS show 63 percent of the primary focus area to be in a floodplain.

In an effort to curb the damaging storm flows around Griggs Reservoir, the City contracted completion of a Drainage Management Plan for the Public Works Yard (Wilson & Co., 2013), incorporated throughout this Draft Environmental Assessment (EA), which included basin assessments, hydrologic and hydraulic analyses, and recommended watershed improvements that would attenuate peak discharges and convey flows downstream to eliminate flooding within the focus area, while providing flood control for the City. Following this Drainage Management Plan (Wilson & Co., 2013), in 2016 (updated in 2018) Wilson & Co. submitted a memo to the City, Final Design of Griggs Reservoir with their recommendations (Wilson & Co., 2018). These recommendations were subsequently reviewed by the City and carried forward for project design and implementation. A grant through the U.S. Department of the Treasury Economic Development Administration (EDA) was awarded in 2016 which initiated Federal due diligence requirements including public notice, and environmental reviews. In June 2017, design and technical specification were completed (Wilson & Co., 2017, updated 2018), as were a biological report and a cultural resources inventory (Tierra, 2017) and incorporated throughout this Draft EA.

Griggs Reservoir, a small basin located within the northern area of the Public Works Yard, was originally designed as a water supply facility, according to the 1946 drawings prepared by Ashley G. Classen and Associates. The New Mexico Office of the State Engineer's (NMOSE) files document a Phase I Inspection Report by the U.S. Army Corps of Engineers (USACE) dated 1981, which noted the Reservoir abandoned its function in the 1950's as the City of Alamogordo developed. At the time, the town was developing quickly, transforming itself from agricultural use to urban sprawl, hence, irrigation water demands dropped.

In the mid-1980's, the reservoir at the Public Works Yard was not on any of the NMOSE files. The NMOSE discovered a lack of information in their records, which led to a field inspection. The key finding of that inspection report was nonconformance with NMOSE dam safety requirements. The violation of the Dam Safety criteria led to the City breaching the existing embankment so it could no longer be used as a catch basin; this was based on cost, as the City did not have enough funds to bring the facility to current safety compliance.

Historically, Alamogordo has had Federal support to address its flood issues. The Flood Control Act of 1962 (P.L. 87-874, Section 101); subsequently modified by the Energy and Development Act of 2004 (P.L. 108-137, Section 105), originally authorized a single diversion channel that would capture flood flows from the Sacramento Mountains to the east and route those flows safely around the perimeter of the City. Due to the amount of time that had elapsed without action taken per the 1962 authorization, increased development within the City, and the changed hydrologic criteria, the project feasibility was later reevaluated which resulted in an integrated USACE Final General Reevaluation Report/Environmental Assessment (GRR/EA, 1998). The GRR/EA modified the original project by recommending two diversion channels, the North Diversion Channel and the South/McKinley Diversion Channel, along with two flood debris basins structures that would intercept flood flows from canyons and arroyos. While the McKinley projects have moved forward, the Griggs Basin was not included in the modified project. However, with the increased use and development in the area, flood protection in the north central portion of the City has been deemed necessary not only by area entities, but also by USACE and EDA.

1.1 Project Purpose and Need

This Griggs Reservoir Outfall Structure Modification Project Draft EA analyzes alternatives for providing increased flood protection to the City of Alamogordo, New Mexico. The USACE, Albuquerque District, in cooperation with, and at the request of, the City, and in-line with the recommendations included in the Drainage Management Plan (Wilson & Co., 2013), proposes to alleviate, mitigate and control flooding in the northern section of Alamogordo caused by large quantities of rainwater originating from the 1,900 acres of watershed in the Sacramento Mountains along the eastern edge of the City and down through the Griggs Basin watershed located upstream of the Public Works Yard, residential, and commercial properties.

The proposed infrastructure modifications and construction are needed to increase the capacity and reliability of the floodwater control systems, thereby protecting the City from future flood events, including major impacts like those realized from Hurricane Dolly in 2008 and from the 2014 event which resulted in excess of $500,000, each, in damages to businesses and homes in the region. The proposed project is also associated with an on-going plan developed by the City and USACE to minimize the risk of flood-related property damage through the phased construction of flood-control facilities. The City is the business, economic, residential hub and county seat for Otero County.

The proposed project includes modification of the Griggs Reservoir by reconstructing and enlarging the existing dam, embankment and emergency spillway to allow 49 acre feet of water impoundment with less than 6 feet of embankment height, with construction of a connecting buried storm drain system. The outflow would discharge into the existing Dry Canyon channel, with the possible future construction of a regional outflow detention pond downstream and west from the dam, completely located within City limits and on City-managed property, including an acquired 50 feet by 630.75 feet (0.724 acres) right-of-way along N. Florida Avenue. The spillway would be designed to pass the 0.01 annual chance exceedance (ACE) event (100-year storm event) and the Griggs Reservoir Detention Basin will detain the 0.5 annual chance exceedance event (2-year storm event) prior to overtopping (Wilson & Co., 2017, updated 2018).

Future work described in the Drainage Management Plan (Wilson & Co., 2013) and in the Wilson & Co. recommendation memo to the City (Wilson & Co., 2018) identifies flood control improvements and modifications that would ultimately provide adequate detention and conveyance of the 100-year, 24-hour storm runoff to north central Alamogordo while addressing immediate flooding concerns and protecting the Public Works Yard and surrounding areas, including minimizing the risk of property damage to existing residences, businesses and future development.

Federal costs would be $1,975,000 (USACE and EDA), and the non-Federal costs would be $325,000 (City). The proposed drainage system modifications and improvements may be constructed in various phases based on priority needs. The duration of the proposed construction would be under two years, and is planned to start July 2018.

1.2 Project Location

The proposed project is located in northern Alamogordo, in Otero County of the south-central part of New Mexico, about 200 miles south of Albuquerque, in the Tularosa (closed) basin.

Specifically, the proposed project area lies within the northern section of the City of Alamogordo, to the west of White Sands Boulevard and south of Fairgrounds Road and the Jim R. Griggs Sports Complex (Figure 1). The eastern portion of the project would be located at the Griggs Field Detention Reservoir north of 26th Street and east of N. Florida Avenue.

The proposed project area falls within portions of Sections 7 and 8, Township 16 South, Range 10 East, New Mexico Principal Baseline and Meridian, as indicated on the Alamogordo North, NM, 7.5-minute U.S. Geological Survey Quadrangle Map (Figure 1).

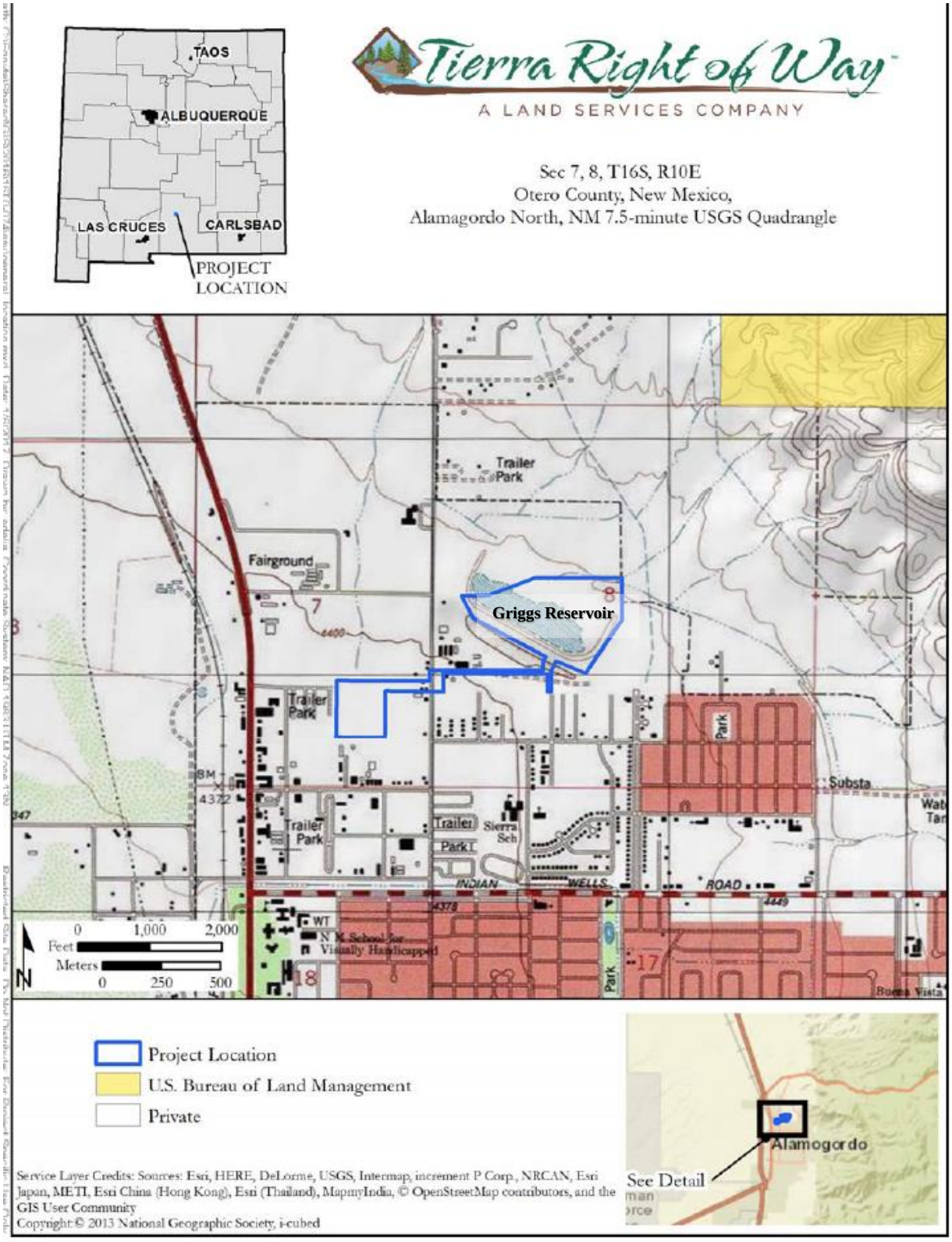

Figure 1: Vicinity Map of Flood Control Improvements, City of Alamogordo, Otero County, NM (Tierra, 2017).

1.3 Authority

This Draft EA has been prepared consistent with the following authorities as provided by Congress:

The improvement work is authorized under Section 595 of the Water Resources Act of 1999 (P.L. 106-53) (Act), as amended in the Energy and Water Appropriations Act of 2004 (P.L. 108-137, Section 117) to include New Mexico. The Act authorizes

> …*environmental assistance to non-Federal interests in New Mexico,* which *may be in the form of design and construction assistance for water-related environmental infrastructure and resource protection and development projects,* including projects for *wastewater treatment and related facilities; water supply and related facilities; environmental restoration; and surface water resource protection and development*.

Provisions under the Act require that the project be publicly owned to receive Federal assistance. As such, the non-Federal sponsor for the proposed project is the City of Alamogordo. The Act further requires that a cooperative agreement be established between the Federal and non-Federal interests. In general, the Federal share of project costs under each cooperative agreement is 75 percent of the total project cost.

1.4 Compliance with Applicable Laws, Policies, and Plans

This Draft EA was prepared by USACE in compliance with all federal and state requirements, and in accordance with the local project partner, and other stakeholders within the project area.

1.4.1 Federal Requirements

This Draft EA was prepared by USACE in compliance with all applicable Federal Statutes, regulations, and Executive Orders (EO), as amended, including, but not limited to, the following:

- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703 *et seq.*)
- Fish and Wildlife Coordination Act of 1934 (48 Stat. 401; 16 USC 661 *et. seq.*)
- Clean Water Act of 1948, 1966, 1972, Sec. 10 Rivers & Harbors Act of 1899
- Watershed Protection and Flood Prevention Act of 1954 (16 U.S.C. 1001 *et seq*.)
- Flood Control Act of 1958 (P.L. 85-500), 1962 (P.L. 87-874, Sec. 101)
- National Historic Preservation Act of 1966 (54 U.S.C. 300101 *et seq*.)
- National Environmental Policy Act of 1969 (NEPA) (42 U.S.C 4321 *et seq*.)
- EO 11593: Protection and Enhancement of the Cultural Environment, 1971
- Clean Air Act of 1972 (42 U.S.C. 7401 *et seq.*)
- Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.)
- Federal Noxious Weed Act of 1975 (7 U.S.C. 2814)
- EO 11988: Floodplain Management, 1977
- EO 11990: Protection of Wetlands, 1977
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Farmland Protection Policy Act of 1981 (7 U.S.C. 4201 *et seq.*)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq*.)
- EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 1994
- American Indian Religious Freedom Act (42 U.S.C. 1996)

- EO 13112, Invasive Species, 1999
- **Water Resource Development Act of 1999 (P.L. 106-53, Sec. 595)**
- **Energy and Water Resources Development Appropriations Act of 2004 (P.L. 108-137, Sec. 117)**
- EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance, 2009
- EO 13653, Preparing the United States for the Impacts of Climate Change, 2013
- Protection of Historic and Cultural Properties (36 CFR 800 *et seq*.)
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Part 1500 *et seq*.)
- USACE Procedures for Implementing NEPA (33 CFR Part 230; ER 200-2-2)
- Energy Independence and Security Act of 2007 (P.L. 110-140, Sec. 438, 121 Stat. 1492, 1620)

1.4.2 State Requirements

This Draft EA was prepared by USACE in compliance with all applicable state requirements.

1.4.3 Local Plans and Policies

The City of Alamogordo has affirmed its intent to participate in the project.

1.5 Existing Projects

Many studies and projects have been initiated in response to a series of Congressional actions associated with the need for flood control in Alamogordo, though the proposed Griggs Reservoir Outfall Structure Modification Project is the only current flood control project in the north side of the City moving towards implementation. The following are other completed and on-going USACE-associated flood control projects throughout Alamogordo.

1.5.1 South Diversion and McKinley channel: Phases I-VIII, Alamogordo, NM

The Flood Control Act of 1962, Section 101 (P.L, 87-874), in accordance with the Chief of Engineers recommendation contained in House Document, Number 473, dated July 12, 1962; and the Energy and Water Appropriations Act of 2004, Section 105 (P.L. 108-137), authorized the construction of flood control infrastructure to address the primary flood threats to Alamogordo resulting from flows through the City from Dry, Beeman and Marble canyons. The integrated USACE Final GRR/EA (USACE, 1998) recommended two diversion channels, the North Diversion Channel and the South/McKinley Diversion Channel, along with two flood debris basins structures that would intercept flood flows from canyons and arroyos. A Project Cooperation Agreement was executed on July 9, 1999, with construction in separate phases over several years (2000-2016) developed to accommodate the City's funding. Existing project Phases I through VIII have been focused on the South Diversion and McKinley channels along the south side of the City, with the construction of over 28,580 feet of concrete lined channel, 5,879 feet of levee, 19 concrete box culverts, rip rap and sediment basins.

2. ALTERNATIVES CONSIDERED

Two alternatives are considered for NEPA analysis including the No Action, which is used as the comparison basis, and the Improved Flood Protection Alternative which addresses the needs of Alamogordo. A separate buried storm drain route was proposed down the 26th Street alignment, however was not carried forward for further consideration as the current proposed route through the City's Public Works Yard was more cost effective with less impact on area traffic patterns.

2.1 No Action Alternative

A No Action Alternative is required pursuant to NEPA. The No Action Alternative considers the likely future conditions in the project area in the absence of the Federally-cost-shared and locally supported project. The No Action Alternative does nothing to alleviate risks to public health and safety. Under this alternative, there are neither changes to the existing breached, non-engineered Griggs Reservoir, nor to the environment in and around the existing breached reservoir. Impactful failures and continued overland flow from future flood events are possible with the continued build-up of the area, commercially and residentially.

2.2 Improved Flood Protection Alternative (Preferred)

The proposed improvements and modifications to the City of Alamogordo drainage system include reconstruction of the Griggs Reservoir dam, embankment and emergency spillway, with a connecting buried storm drain system, and potential future construction flood control pond, with total proposed project disturbance of approximately 18.5 acres.

Modification work on the Griggs Reservoir would include dredging and enlarging the detention basin by reconstructing the existing dam, embankment, and emergency spillway (Figure 2) to allow 49 acre feet of water impoundment with less than six feet of embankment height, allowing for compliance with existing non-jurisdictional height requirements and detainment of the two-year storm event (NMOSE, 2018).

The project would require 38,200 cubic yards of excavation at the Griggs Reservoir and channel outlet to the existing arroyo, and 4,200 cubic yards of engineered fill would be placed along the reservoir embankment. Material for the engineered fill would be obtained on site from the western edge of the adjacent water reservoir, and 500 feet of existing chain link fence removed from the reservoir to accommodate the grading in the reservoir and placement of engineered fill along the embankment (Wilson & Co., 2018).

The emergency spillway for the Griggs reservoir would be designed to allow for the 100-year 24-hour peak storm overflow with one-foot of freeboard, and the top, side and downstream slopes scour-protected with five-inch thick reinforced concrete. Storm water from the emergency spillway would surface flow south along Cuba Avenue, then west through the Public Works Yard and 26th Street to storm drain inlets located in N. Florida Avenue.

In addition, 2,876 feet of metal storm drain pipe would be installed from the Griggs Reservoir south and west through the City's Public Works Yard to the existing Dry Canyon channel. Pavement in N. Florida Avenue would be removed and replaced for the storm drain construction, along with removal and replacement of fifty feet of existing waterline under N. Florida Avenue to accommodate the new storm drain. The storm drain would then outlet to a constructed earthen channel located at the future detention pond site prior to discharging to the existing Dry Canyon channel (Wilson & Co., 2018) (Figure 2).

Federal costs would be $1,975,000 (USACE and EDA), and the City would be responsible for the non-Federal cost-share of $325,000. The proposed drainage system modifications and improvements may be constructed in various phases based on priority needs. The duration of the proposed construction would be less than two years, and is planned to start July 2018.

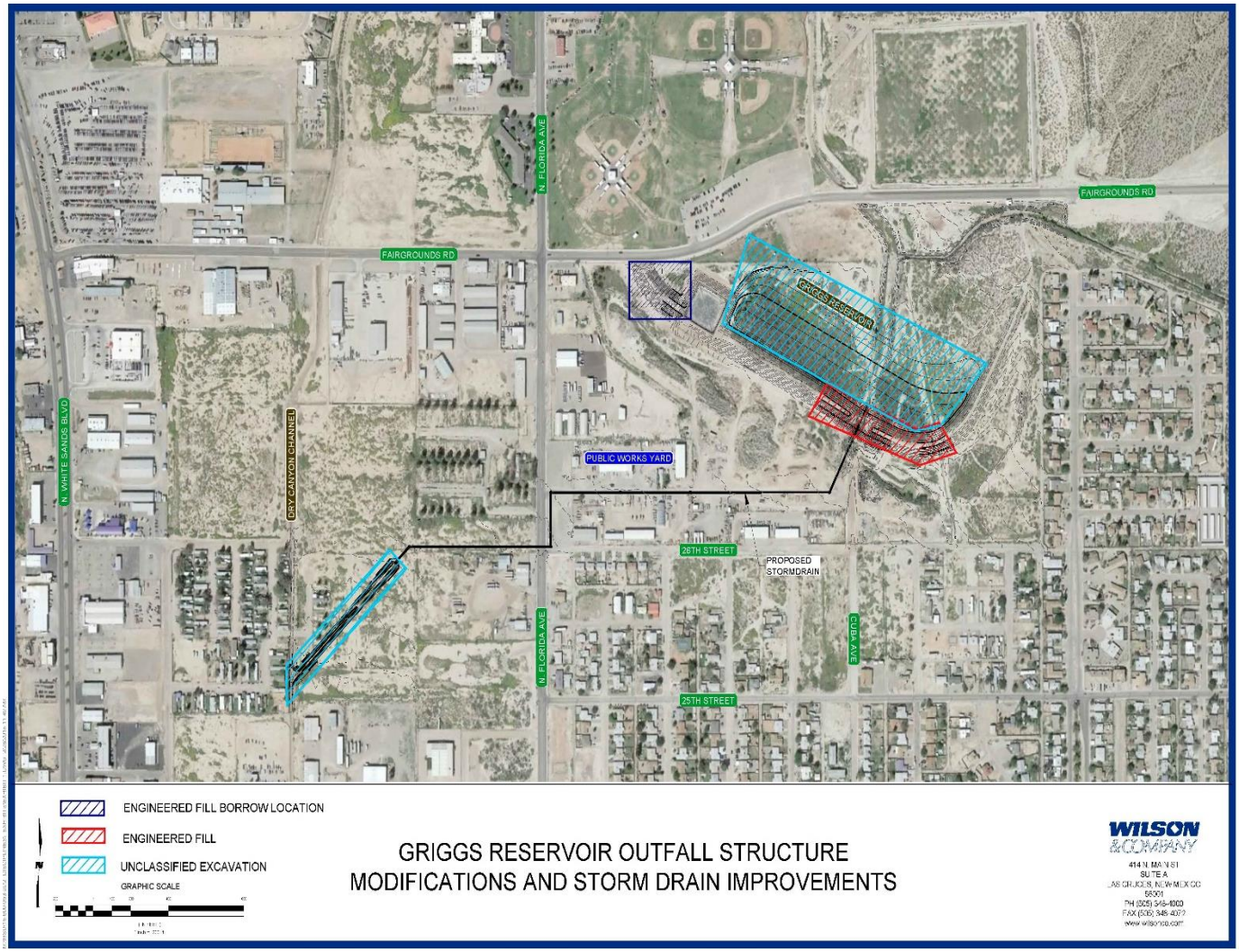

Figure 2: Overview of Griggs Reservoir Outfall Structure Modifications and Storm Drain Improvements.

2.3 Environmental Considerations and Mitigation

The construction footprint of the proposed project would remain within the current Griggs Reservoir footprint and the Public Works Yard, and would extend out into vacant land, all previously disturbed ground, within the City along existing roads.

2.3.1 Staging Areas

Construction staging and access for equipment and materials would take place within the City's Public Works Yard. The actual size, quantity and location of these temporary sites will be dependent upon the extent of the construction project phase.

2.3.2 Dam Borrow Material Requirements

Based on the survey, geotech data, and grading plans, no borrow material is planned. Access to the Griggs Reservoir portion of the project will either be through the main drive gate from N. Florida Avenue, or a secondary drive gate (just south of the site) also part of the Public Works Yard, but accessed from 26th Street.

2.3.3 Real Estate

Property within the footprint of this project is owned by and managed by the City of Alamogordo, including a 50 foot by 630.75 foot strip of right-of-way (0.724 acres) to be developed with an underground storm drain connecting from N. Florida Avenue on the east to the Dry Canyon channel on the west side (Figure 3).

At present, the right-of-way property is an unused, vacant lot. It is an interior tract on the west side of N. Florida Avenue at its three-way intersection with 26th Street which terminates in front of the property. The land is mostly level and at street grade. It appears to have been graded and cleared of vegetation in the past; though some areas have grown back. The property has approximately 140 feet of street frontage and a depth of ±630.75 feet. The land is zoned for C-3 Business use which is a broad classification that allows for a variety of development possibilities. The proposed project is not considered to have any significant impact or effect on the remaining property.

The only above ground improvement will be the necessary manholes to access the underground culvert. The proposed project is not expected to have a positive or negative impact on the marketability of the right-of-way property or the surrounding properties, including the remainder parcel.

2.3.4 Division of Responsibilities

Federal Responsibilities

A project partnership agreement was executed between USACE and the City, as the non-Federal sponsor, on October 5, 2017. After the sponsor provides the cash contribution, and the lands, easements, rights-of-way, relocations, and disposal areas (LERRDs), as well as assurances, the City may begin contract management for the construction of the proposed project. USACE will reimburse the City the amount necessary.

Non-Federal Responsibilities

It is the responsibility of the City to let and administer all of the contracts associated with the proposed project, in addition to obtaining all permits and licenses necessary for project design, construction, operation, and maintenance, and, in the exercise of its rights and obligations under the agreement, shall comply with all applicable Federal, State, and local laws, regulations, ordinances, and policies including the laws and regulations specified in Article XI of the agreement.

Views of Non-Federal Sponsor

The non-Federal sponsor, City, supports the Preferred Alternative. Throughout the development of the Draft EA, there has been significant coordination with the City.

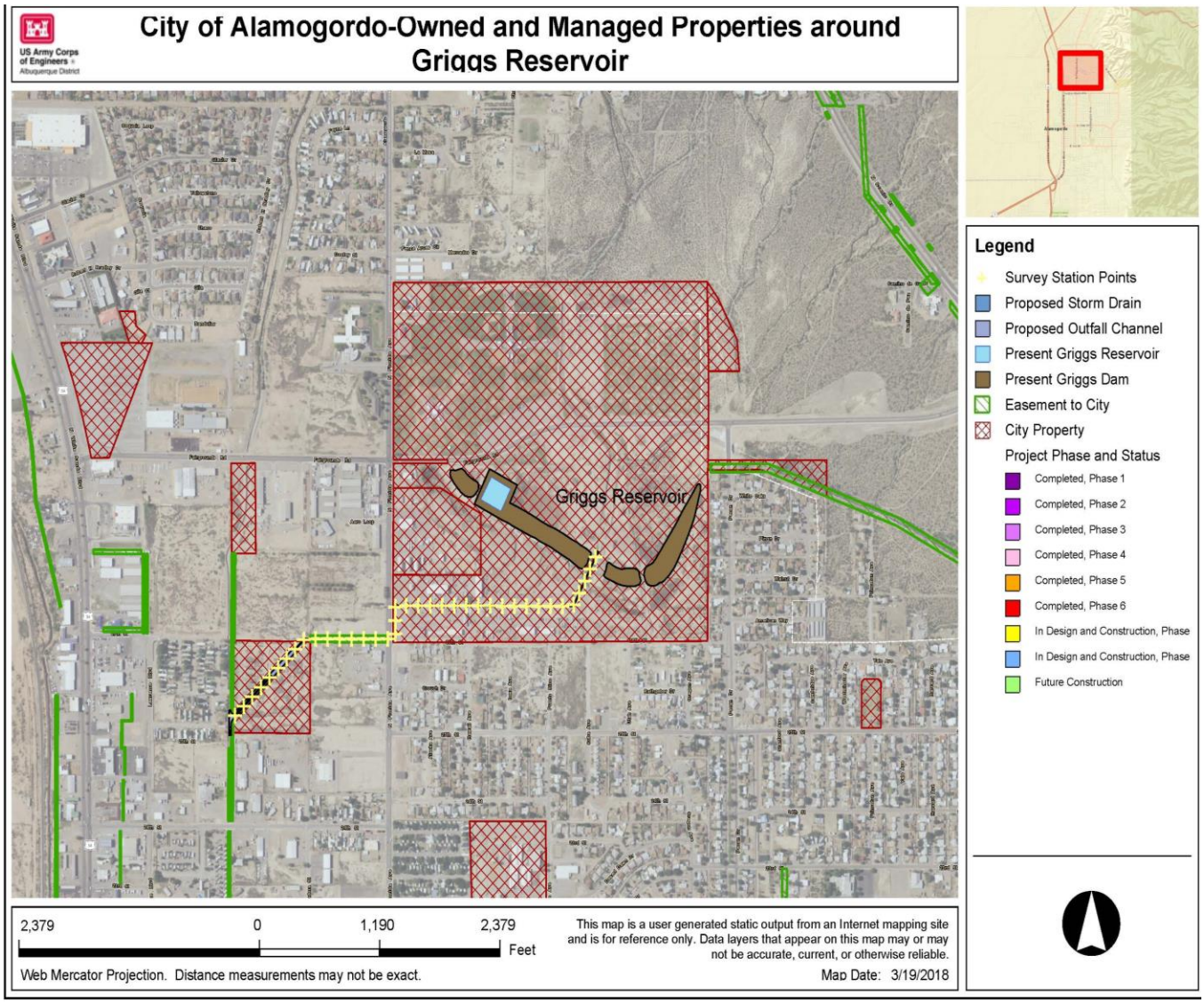

Figure 3: City of Alamogordo- Owned and Managed Properties around Griggs Reservoir (USACE-generated map, 2018).

3. AFFECTED ENVIRONMENT and FORESEEABLE EFFECTS

The alternatives that were evaluated were developed in response to the existing conditions within the project area. If the project is not constructed, some existing conditions may remain unchanged while others may deteriorate over time resulting in an increasing threat to public health, safety, and wellness. This chapter presents information on the existing physical and biological environment, along with socioeconomic and cultural conditions, and evaluates the foreseeable effects over time of both constructing and not constructing the improved and modified flood control system.

3.1 Physical Environment

3.1.1 Climate and Climate Change

Existing Conditions

Alamogordo is located in Otero County in south-central New Mexico at the eastern edge of the Tularosa (closed) Basin. The Basin is bounded on the north by Chupadera Mesa; on the east by the Jicarilla, sierra Blanca, and Sacramento mountains; on the west by the Organ, San Andres, and Oscura mountains; and on the south by a low divide which slopes into the Franklin, Hueco, and Jarilla mountains (Darton, 1928). The Basin floor elevation is from 4,000 to 4,400 feet above sea level, and the surrounding mountains rise abruptly to elevations of 7,000 to 12,000 feet. Alamogordo is situated 4,335 feet above sea level with the project area at approximately 4,400 feet. The topography in the project vicinity is flat with a slight southwestern aspect.

The area in the vicinity of Alamogordo can be classified as semi-arid, with average annual precipitation totaling 12.05 inches. Precipitation in the study area is strongly unimodal, peaking during the July-September months, with the highest average monthly precipitation in August at 2.39 inches. This pattern reflects the importance of summer and early fall monsoon precipitation and the general paucity of precipitation at other times of the year. Monsoon precipitation comes in the form of convective storms and is relatively localized.

At 32.54° N latitude and located on the western side of the Sacramento Mountains, Alamogordo lies south of the winter mid-latitude storm track, resulting in little or no snowfall in most years. Average snowfall peaks at approximately one inch each for December and January. Occasionally, however, significant snowfall does occur. The record snowfall for Alamogordo was ten inches of snow in January 1940.

Daily high temperatures in January average 56.3°F, with overnight minimums averaging close to freezing (31°F); January precipitation averages 0.69 inches. By contrast, daytime highs in July typically average 93.6°F with overnight minimums averaging 67.4°F; July precipitation averages 1.70 inches.

Monthly pan evaporation rates exceed precipitation by an order of magnitude. Annual pan evaporation at Alamogordo for the period 1939-1975 averaged 104.86 inches. Pan evaporation rates were averaged the least in December at 3.46 inches and the most in June at 14.43 inches, and averages above 11 inches from April through August.

There has been no detectable trend in precipitation for the Southwest. Analysis of flood trends was not conducted under ECB 2016-25 due to the lack of gauging stations on unregulated streams in the area. Additional details of this analysis can be found in Appendix A.

No Action Alternative

Climate change is anticipated to impact the study area primarily through temperature increases, which are projected to rise by as much as 3.5°F to as much as 8.5°F by 2100. Temperature increases are likely to drive

evaporation increases. There is strong model agreement in the direction and magnitude of projected temperature change.

Changes in precipitation are less certain, although winter precipitation is likely to decrease. Some models predict precipitation decreases of three to nine percent in all seasons. However, summer precipitation may increase in intensity, result in stronger, wetter storms interspersed with longer dry periods. Hurricanes are likely to increase in strength and moisture content. During late summer, larger, more-persistent hurricanes may provide additional moisture in the monsoon source regions. These changes may increase flood risk in the Rio Grande Closed Basins / Tularosa Basin. Models disagree on future precipitation trends due to:

- High inter-annual precipitation variability.
- Uncertainty over how future precipitation drivers (i.e El Niño-Southern Oscillation, hurricanes, etc.) might evolve.
- Inability of models to resolve mesocale (local) climate phenomena, such as individual thunderstorms, which makes it difficult to estimate how precipitation variables might change on a scale relative to flooding at Griggs Reservoir.

The USACE Climate Preparedness and Resilience Community of Practice (CPR CoP) Climate Hydrology Assessment Tool (https://maps.crrel.usace.army.mil/projects/rcc/portal.html) indicates a small but statistically significant increase in annual maximum monthly flows over the 21st Century relative to current conditions in the Rio Grande Closed Basins as a whole. Flood flow variability may increase, with increases in the magnitude of rare events. Similarly the CPR CoP Vulnerability Tool suggests a potential increase in monthly flood flow magnitudes for HUC 1305, Rio Grande Closed Basins but provides no quantitative increase in that magnitude. How either of these findings might translate into projected changes in instantaneous peak flood flows in the project area is unclear and cannot be quantified at this time.

Improved Flood Protection Alternative

The dry reservoir proposed by this project should result in no significant increases in greenhouse gas emissions in the region other than construction-related releases. This project has no significant impact with respect to climate change.

3.1.2 Geology and Soils

Existing Environment

The Tularosa Basin is in the Basin and Range geologic province (Miller, 1946, and Shimer, 1972) and is bounded on the east and west by mountains that are mostly tilted fault blocks. Faulting has produced steep scarps on the west side of the Sacramento Mountains and the east side of the San Andres Mountains. During thunderstorm activity, the runoff rushes out of the mountain canyons and arroyos depositing a heavy load of sediment on the basin floor and forming coalescing alluvial fans. Alamogordo is located on such fans at the foot of the Sacramento Mountains.

There are no well-defined watercourses in the Tularosa Basin, but many small canyons and arroyos descend from the surrounding mountains toward the valley floor. Four major and several small watersheds occur in the Alamogordo study area. The major drainage areas from north to south are Dry, Beeman, Marble, and Alamo canyons (Figure 4). The City is located on the alluvial fans of Beeman and Marble canyons.

Soils within the project area are of the Tome very fine sandy loam (TcA) and silt loam (TeB); Torrifluvents, hummocky (TvA); and gravel pit (GP) map units. Tome soils are well-drained soils formed from mixed, fine-silty alluvium and they are found on fan piedmonts. Slopes range from one to three percent for the TcA map unit and one to three percent for the TeB. The surface layer of TcA consists of very fine sandy loam and TeB has a silt loam surface layer. Torrifluvents are well-drained soils from mixed alluvium found on alluvial fans. Slopes range from zero to one percent, and the surface layer consists of gravelly fine sand (NRCS, 2017).

No Action Alternative

The physical and geologic condition in this alternative would continue unchanged from existing conditions. There would be continued unmanaged flooding in the project area allowing for continued associated soil, silt and debris movement.

Improved Flood Protection Alternative

The proposed project would have no significant effect on the area's overall physical and geologic condition. With the proposed improvements, there would be a focused reduction in soil movement associated with overland flood flow, in the project area. Sediment would be more confined to the Griggs Reservoir detention facility and transferred out of the project area via the underground drainage pipes.

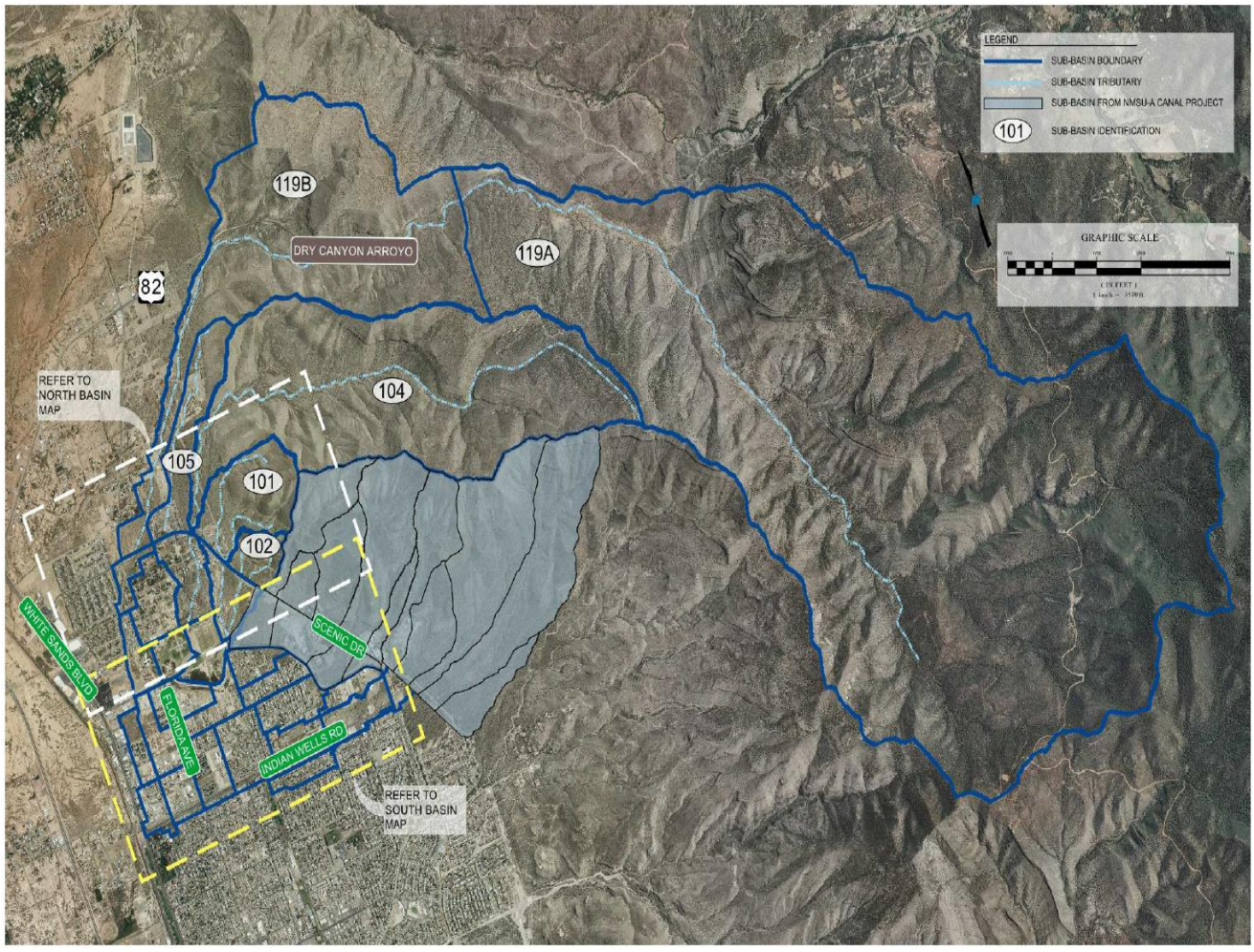

Figure 4: Overall Basin Map of Griggs Reservoir Project Area (Drainage Management Plan, Wilson & Co., 2013).

3.1.3 Hydrology, Hydraulics and Sedimentation

Existing Environment

This evaluation of hydrology and hydraulics provides an estimate of the magnitude and potential for flooding in the project area. These analyses provided flood peaks, volume and expected duration, along with the corresponding storm facility capacities.

Overview of Hydrologic Analysis in the Project Area

Hydrologic modeling was developed using the USACE Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), Version 3.4. The model was used for computing peak discharge and volumes associated with the design storm event. The Federal Emergency Management Agency (FEMA) recognizes HEC-HMS as a nationally-accepted model for continuous simulation. Unit hydrographs were computed by the model using the Soil Conservation Service Unit Hydrograph Method. Precipitation loss is based on soil characteristics, land cover, and land use. A time interval of three minutes was chosen for the computation time step. Routing the hydrographs was computed by the model using the Muskingum-Cunge Method. For a detailed discussion of the methods, inputs and results of the hydrology analysis refer to the Drainage Management Plan (Wilson & Co., 2013).

Hydraulic calculations have been performed to obtain capacities for existing culverts and open channels (Table 1). CulvertMaster by Bentley was used to calculate culvert capacities. Computations are based on U.S. Federal Highway Administration's Hydraulic Design of Culverts (HDS-5) methodologies. CulvertMaster can solve many hydraulic variables including culvert size, flow, and headwater. Entrance capacity is determined by taking into account the culvert's geometry, entrance condition, and headwater. A roughness number n=0.013 was used for concrete culvert structures and n=0.024 for corrugated culverts. An entrance loss coefficient Ke = 0.20 is used to model beveled ring entrances, and Ke=0.70 is used for mitered slope entrances. Refer to the Drainage Management Plan (Wilson & Co., 2013) for model outputs which show the culverts' inlet or outlet control. FlowMaster by Bentley was used to calculate channel capacities based on normal depth calculations. Energy losses in FlowMaster are evaluated based on friction losses. Manning's formula was selected as the friction method.

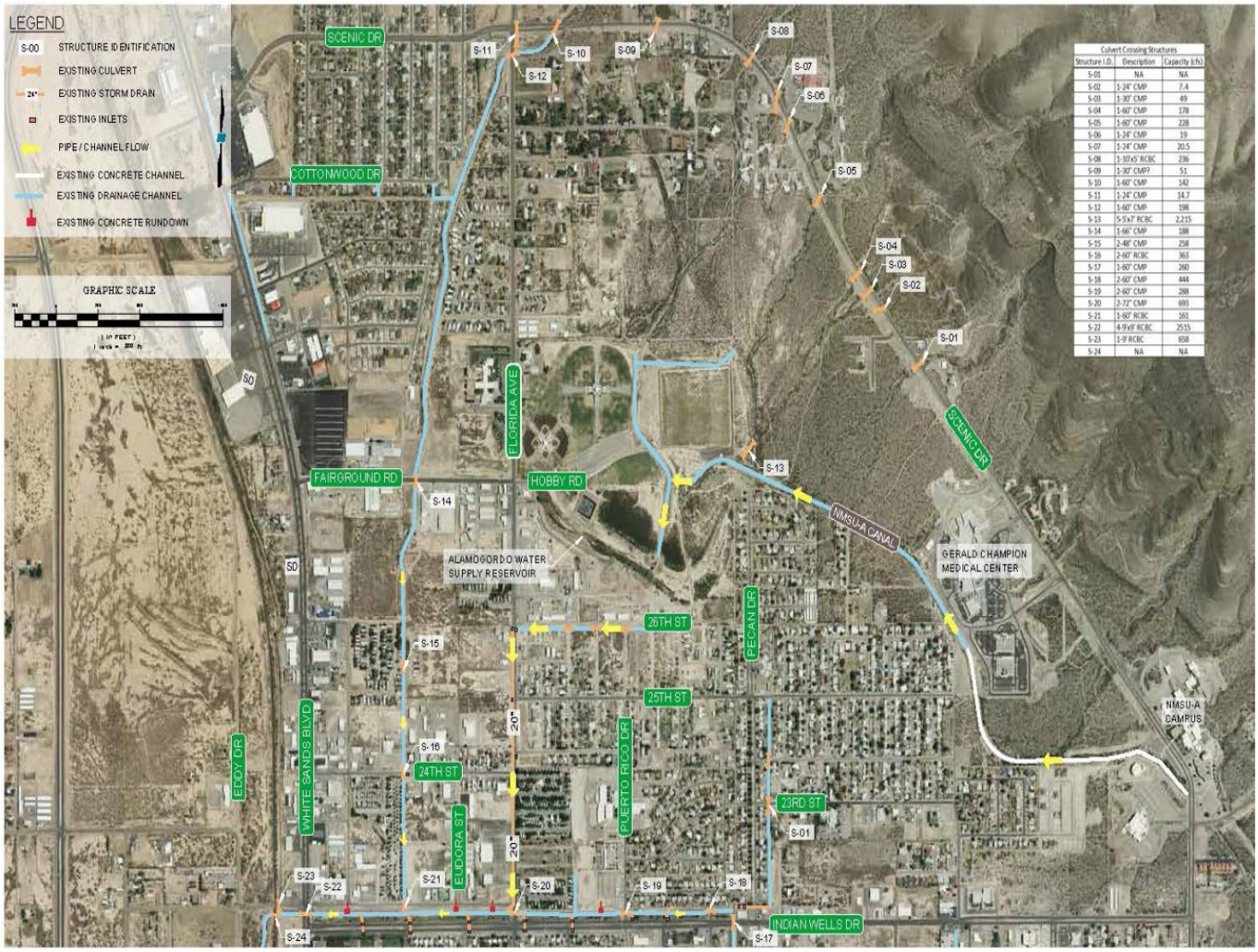

Figure 5: Infrastructure Inventory of Griggs Reservoir Project Area (Drainage Management Plan, Wilson & Co., 2013).

Table 1: Existing Culvert Capacities of Griggs Reservoir Project Area (Drainage Management Plan, Wilson & Co., 2013).

Structure	Approximate Location	Capacity (cfs)
S-01	1-36" CMP, .25 miles NW of Gerald Champion Medical Center beneath North Scenic Drive	55
S-02	1-24" CMP, .40 miles NW of Gerald Champion Medical Center beneath North Scenic Drive	7.4
S-03	1-30" CMP, .43 miles NW of Gerald Champion Medical Center beneath North Scenic Drive	49
S-04	1-60" CMP, .47 miles NW of Gerald Champion Medical Center beneath North Scenic Drive	178

Structure	Approximate Location	Capacity (cfs)
S-05	1-60" CMP, 400 feet SE of Mission Court beneath North Scenic Drive	228
S-06	1-24" CMP, 435 feet NW of Mission Court beneath North Scenic Drive	19
S-07	1-24" CMP, 640 feet NW of Mission Court beneath North Scenic Drive	20.5
S-08	1-10'x5' RCBC, Beeman Canyon Crossing beneath North Scenic Drive	236
S-09	1-30" CMP, 220 feet east of Pueblo Trail beneath North Scenic Drive	51
S-10	1-60" CMP, 980 feet east of Pueblo Trail beneath North Scenic Drive	142
S-11	1-24" CMP, just east of North Florida Avenue beneath North Scenic Drive	14.7
S-12	1-60" CMP, 256 feet south of North Scenic Drive beneath North Florida Avenue	198
S-13	5-5'x7' RCBC, Fairgrounds Road Extension	2,215
S-14	1-66" CMP, .23 miles west of North Florida Road beneath Fairground Road	188
S-15	2-48" CMP, .23 miles west of North Florida Road in between Fairground Road and 24th Street	258
S-16	2-60" RCBC, .23 miles west of North Florida Road beneath 24th Street	363
S-17	1-60" CMP, just east of Washington Avenue beneath Indian Wells Road	260
S-18	2-60" CMP, 325 feet west of Washington Avenue just north of Indian Wells Road	444
S-19	2-60" CMP, just north of Indian Wells Road beneath Puerto Rico Drive	288
S-20	2-72" CMP, just north of Indian Wells Road beneath North Florida Avenue	693
S-21	1-60" RCBC, 200 feet north of Indian Wells Road and .25 miles west of North Florida Avenue	161
S-22	4-9'x9' RCBC, just north of Indian Wells Road beneath White Sands Boulevard.	2,515
S-23	1-9' RCBC, 350 feet west of White Sands Boulevard and Indian Wells Road Intersection	658
S-24	NA	NA

Flood Hazards

The most recent FIS became effective on December 17, 2010. The study has developed flood risk data that is located within the Public Works Yard and will be used to establish flood insurance rates. Flood insurance is required on loans for infrastructure located within the FEMA's delineated Special Flood Hazard Areas which is the one percent chance event, known as the base flood or 100-year flood (Figure 5). Two Flood Insurance Rate Maps encompass the Public Works Yard (Figure 6). The map numbers are 35035C0937D, which covers most of the focus area, and 35035C0941D, which encompasses the remainder of the area to the east. Four different Flood Zones are identified in the FIRMs.

Zone A (Figure 6) corresponds to the one percent annual chance floodplain and has no Base Flood Elevations (BFE) determined because the floodplain is established by approximate methods. Zone AE also corresponds to the one percent annual chance floodplain but is determined through detailed analysis, therefore BFEs are labeled. Zone AH corresponds to the areas of one percent annual chance floodplain with shallow flooding, where depths could average between one and three feet. The BFEs are shown at selected intervals within this

zone. Zone X (shaded) are areas of 0.2 percent annual chance flood; areas of one percent annual chance flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from one percent annual chance flood. Zone X (unshaded) are areas determined to be outside the 0.2 percent annual chance floodplain. Figure 6 depicts the different flood zones along with the perimeter of the Public Works Yard.

A "Regulatory Floodway" is a portion of the watercourse and adjacent land areas that must be kept free of encroachment in order to convey the base flood without increasing the BFE more than one foot. Floodways were not computed in the 2010 FIS because of the lack of uniform channels through the study area, steep slopes resulting in high velocities, and several divided flow patterns. For the 2010 FIS report the one percent annual chance floodplain is to be considered the floodway. Future drainage improvements will be proposed to reduce the footprint of the one percent chance event within the study area (Wilson & Co., 2013). This would result in a reduction of physical loss by such a storm event and reduce flood insurance requirements

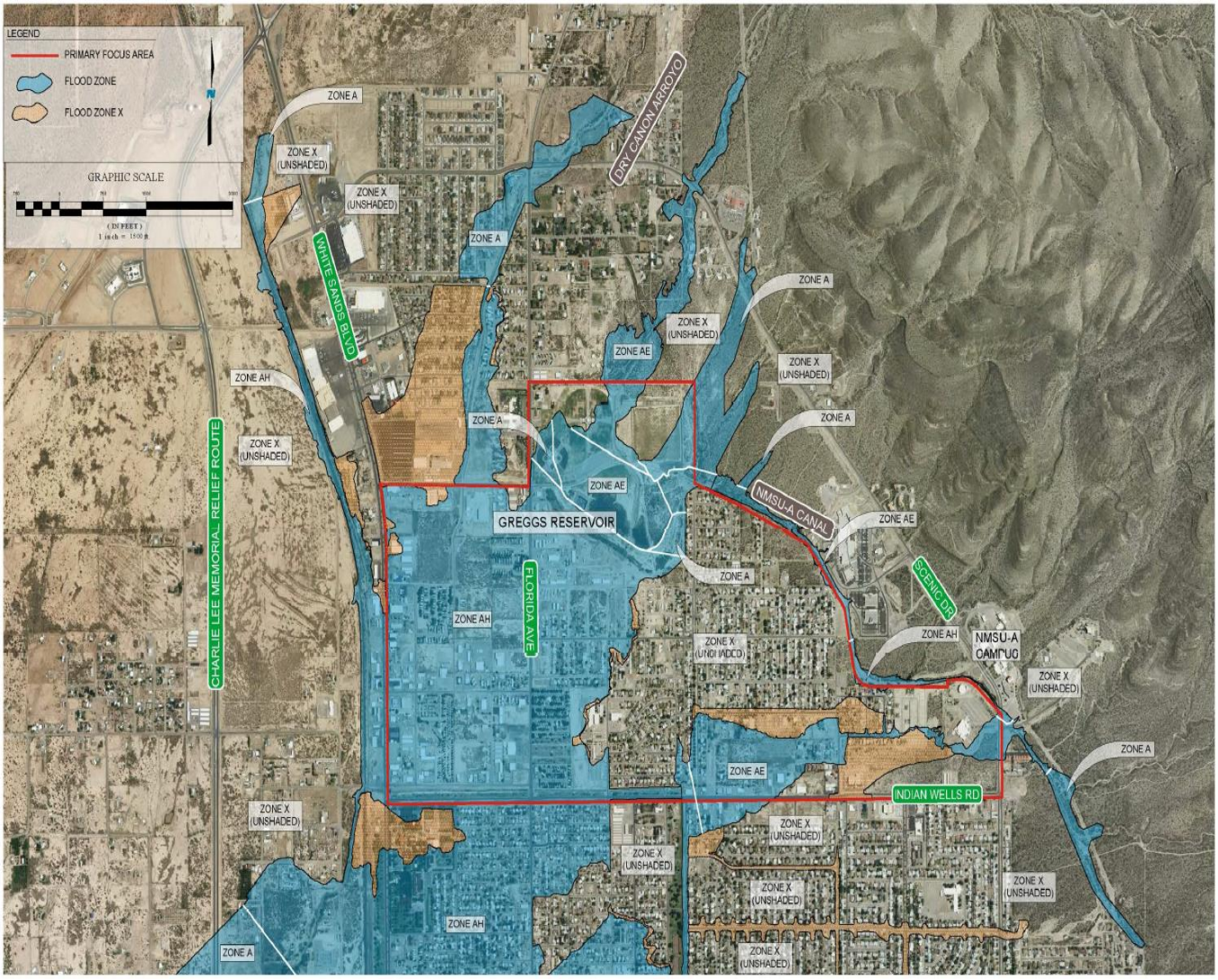

Figure 6: FEMA Flood Insurance Rate Maps (FIRMs) for Griggs Reservoir area (Drainage Management Plan, Wilson & Co., 2013).

Summary of Hydraulic Analysis

No Action Alternative

Under this alternative, there will be continued localized effects from flooding during frequent (2-year, 24-hour storm) storm events.

Improved Flood Protection Alternative

The existing Griggs Reservoir facility may be improved to provide limited upstream peak discharge attenuation, while adhering to the non-jurisdictional NMOSE regulations. The existing dam embankment may be reconstructed to allow for 46.9 acre-feet of water impoundment and less than six-foot embankment height. Improvements would require geotechnical borings to ensure adequate foundation and dam embankment stability, lowering of the dam embankment to comply with non-jurisdictional dam height (i.e. 6-foot) requirements, and reconstruction of the dam emergency spillway to allow for the 100-year, 24-hour design storm overflow. The advantages of this interim recommendation are added downstream protection of 26th Street/Cuba Avenue, and improved water quality in accordance with NPDES Phase II MS4 (Table 2). This interim facility has been modeled, assuming the Dry Canyon arroyo facility is in place, using a two-year, 24-hour storm event (Table 2). Nuisance flooding during frequent (i.e.: 2-year, 24-hour) storm events would be mitigated by the Proposed Action.

Table 2: Griggs Reservoir, 2-year 24-hour Storm Event (Drainage Management Plan, Wilson & Co., 2013).

Data/Result Description	Unit	Dam/Reservoir
Dam/Reservoir HEC-HMS		Griggs Reservoir
Return Period/Duration	Yr/Hr	2/24, no area reduction
Total Drainage Area	Mi^2	6.73
Inflow Time to Peak	Hrs	6.3
Peak Inflow	Ft^3/s	385
Inflow Total Runoff Volume	Ac-ft	122
Outflow Time to Peak	HRs	16.7
Outflow Peak Discharge	Ft^3/s	46
Outflow Maximum Storage Volume at Peak	Ac-ft	46.9
Total Reservoir Storage Time	Hrs	> 48
Reservoir Invert Elevation	Ft	4420
Emergency Spillway Elevation	Ft	4424
Storage Volume at Emergency Spillway	Ac-ft	46.8
Top of Embankment Elevation	Ft	4427
Maximum Water Depth	Ft	4

3.1.4 Water Resources

Section 402 of the Clean Water Act (33 U.S.C. 1251 *et seq.*), as amended, regulates point-source discharges of pollutants into waters of the United States and specifies that storm-water discharges associated with

construction activities shall be conducted under the National Pollution Discharge Elimination System (NPDES) guidance. Construction activities associated with storm-water discharges are characterized by such things as clearing, grading, and excavation, subjecting the underlying soils to erosion by storm-water, which results in a disturbance to one or more acres of land.

404 of the Clean Water Act provides for the protection of waters of the United States from impacts associated with irresponsible or unregulated discharges of dredged or fill material in aquatic habitats, including wetlands as defined under Section 404(b)(1).

Section 401 of the Clean Water Act requires that a Water Quality Certification Permit be obtained for anticipated discharges associated with construction activities or other disturbance within waterways in the project area. Regulatory authority for the issuance of water quality certification resides with the New Mexico Environment Department (NMED), Surface Water Quality Bureau.

Existing Environment

Water quality – There are no permanent flowing surface waters in the Alamogordo project area. Flood waters that are created by natural storm events and flow out of Marble, Beeman, and Dry canyons are exempt from the general water quality standards. The general standards that would affect precipitation runoff from the Sacramento Mountains are stream bottom deposits and turbidity. Neither of these standards is subject to regulation when attributable to natural causes (NM Water Quality Control Commission, 2000).

No Action Alternative

Without construction of the proposed project, there would be no significant impact to water quality in Alamogordo, nor to any waters of the U.S.

Improved Flood Control Alternative

The proposed project construction would not affect the quality of water in Alamogordo, nor any waters of the U.S, as the project lies within a closed basin and there are no permanent flowing surface waters, though may allow for short bursts of increased turbidity *if* a storm even occurs during construction. Standard Best Management Practices to prevent on-and off-site erosion would be incorporated in contract specifications, therefore, no significant effects are expected. The NPDES general permit guidance would apply to this project because the total area is greater than one acre. Therefore, a Storm-Water Pollution Prevention Plan (SWPPP) is required.

3.1.5 Floodplains and Wetlands

Executive Order 11988 (Floodplain Management) provides Federal guidance for activities within the floodplains of inland and coastal waters. The order requires Federal agencies to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Executive Order 11990 (Protection of Wetlands) requires the avoidance, to the greatest extent possible, of both long and short-term impacts associated with the destruction, modification, or other disturbance of wetland habitats.

Existing Environment

The principal waterway in the project area is Beeman Arroyo, a channelized ephemeral drainage that flows north-south through the Griggs basin portion of the project area. A single ephemeral tributary, the Tays-Holcomb Arroyo, flows from the east into Beeman Arroyo in the northeast portion of Griggs basin. Dry

Canyon Arroyo, the only other waterway in the project area, flows north-south along the western boundary of the proposed new detention pond location and is also channelized and ephemeral. While the National Wetlands Inventory mapper shows the current breached reservoir area as manmade freshwater pond, it does not meet all three of the wetland classification attributes and is, therefore, a non-jurisdictional wetland. A review of FEMA FIRM panel 35035C0937D indicated that the Griggs basin portion of the project area is located in a Zone AE floodplain, and the remainder is mapped as Zone AH (Figure 6).

No Action Alternative

No action would not fully comply with Executive Order 11988 (Floodplain Management) as it would not reduce the risk of flood, nor would it minimize the impact of floods on human safety, health, and welfare. No significant impacts to wetlands in the area would occur as there are no jurisdictional wetlands within the project area.

Improved Flood Protection Alternative

The purpose of the proposed action is to reduce the risk of flood and to minimize the impact of floods on human safety, health, and welfare, and, thereby, fully complies with Executive Order 11988 (Floodplain Management). No jurisdictional wetlands occur within the proposed project area, therefore, the proposed project would not have significant effect and would comply with Executive Order 11990 (Protection of Wetlands).

3.1.6 Air Quality, Noise and Aesthetics

Existing Environment

Air Quality

The recommended plan area is located in the U.S. Environmental Protection Agency's (USEPA) designated Air Quality Control Region 8, which is an attainment area for criteria pollutants. The USEPA, through the Clean Air Act, regulates and sets standards for pollutant levels in the air. Primary National Ambient Air Quality Standards (NAAQS) are established for the sole purpose of protecting public health. NAAQS have been established for total suspended particulates smaller than 10 microns (PM_{10}), sulfur dioxides (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3), and lead (Pb). The good air quality in the region is attributed to the low population and correspondingly low number of motor vehicles, and the absence of heavy industry discharging particulate matter into the atmosphere. Infrequently, high levels of total suspended particulates and CO occur in the proposed project area as a result of wind-blown dust and winter atmospheric inversions, which trap wood smoke and auto emissions in the lower layers of the atmosphere.

Regulations of the New Mexico Environmental Improvement Division's Prevention of Significant Deterioration Program (PSDP) allow air quality to deteriorate in small incremental amounts above existing levels of pollution in attainment areas throughout the state, which includes the majority of New Mexico. The PSDP divides state lands into three classes: Class I areas contain clean air and, therefore, only very small increases in air contaminant levels are permitted; Class II areas contain moderately clean air and, therefore, only moderate increases of air contaminant levels are permitted; and Class III areas are areas of extensive growth with concomitant increases in air contaminant levels. New Mexico does not contain any Class III areas: the majority of areas in New Mexico, and those in the majority of the proposed project area, are designated Class II.

Noise

The ear has the remarkable ability to handle an enormous range of sound levels. In order to express levels of sound meaningfully in numbers that are more manageable, a logarithmic scale is used, rather than a linear one. This scale is the decibel scale. Most noise levels are given in dBA, which are decibels adjusted to reflect the ear's response to different frequencies of sound. Sudden, brief impulse sounds, like many of those shown at 120 dB or greater, are often given in dB. Table 3 offers a comparison of common noises and their dBA levels (NoiseHelp, 2011).

According to the Noise Center for the League for the Hard of Hearing (2007), a typical, quiet residential area, has a noise level of 40 dBA; a residential area near heavy traffic has a noise level of 85 dBA, and heavy machinery has a noise level of 120 dBA. Major sources of intermittent noise in the area are attributed to automobile traffic, the nearby and associated City facilities, and Holloman Air Force Base and White Sands Missile Range activities. The Noise Center advises that noise levels above 85 dBA will harm hearing over time and noise levels above 140 dBA can cause damage to hearing after just one exposure.

Table 3: Noise Level Chart: Examples of sounds with dB levels ranging from 0 to 180 decibels (NoiseHelp, 2011).

dBA	Example	Home & Yard Appliances	Workshop & Construction
0	healthy hearing threshold		
10	a pin dropping		
20	rustling leaves		
30	whisper		
40	babbling brook	computer	
50	light traffic	refrigerator	
60	conversational speech	air conditioner	
70	shower	dishwasher	
75	toilet flushing	vacuum cleaner	
80	alarm clock	garbage disposal	
85	passing diesel truck	snow blower	
90	squeeze toy	lawn mower	arc welder
95	inside subway car	food processor	belt sander
100	motorcycle (riding)		handheld drill
105	sporting event		table saw
110	rock band		jackhammer
115	emergency vehicle siren		riveter
120	thunderclap		oxygen torch
125	balloon popping		
130	peak stadium crowd noise		
135	air raid siren		
140	jet engine at takeoff		
145	firecracker		
150	fighter jet launch		
155	cap gun		
160	shotgun		
165	.357 magnum revolver		
170	safety airbag		
175	howitzer cannon		
180	rocket launch		
...			
194	sound waves become shock waves		

Aesthetics

The evaluation of visual qualities is a value judgment and is subjective, differing according to the perception of each individual. Aesthetically, the project area is comprised of residential and commercial area interspersed with vacant lots, with an overall eastern view of the Sacramento Mountains. A residential area is located east and south of the Griggs Reservoir, and a City park to the north across Fairgrounds Road (Figure 3). The Griggs Reservoir portion of the project area has been heavily disturbed by clearing and flood control work. Similarly, the western sediment control basin portion of the project area has been disturbed by past utility installations and clearing, and the proposed channel area between the basin and Florida Avenue has been bladed. The remaining portion of the proposed channel area east of Florida Avenue through the City's Public Works Yard is either paved or completely cleared (Google Earth Pro, 2018) (Project area photos in Appendix C).

No Action Alternative

Sound and air levels, and aesthetic condition under this alternative would continue unchanged from existing conditions.

Improved Flood Protection Alternative

Locally, air quality would decrease and noise levels would increase during actual project construction; this would be a direct result of equipment operation and dust. These effects would be temporary, relatively minor in nature, and would not have significant cumulative effects on air quality or sound levels.

The proposed project would result in a temporary but negligible increase in airborne dust, hydrocarbon emissions, and noise generated by construction machinery. These increases would, for the most part, occur during the daytime work period, would be minor and temporary, ending when construction is complete. In addition, the proposed action would take place on existing heavily disturbed sites and would not change the aesthetics of the project area.

Production of dust would be kept to an absolute minimum by contract requirements, and guidelines for the protection of air quality would be included in contract specifications. While there would be short periods of dust and noise generation, and hydrocarbon emissions, these should not significantly adversely affect public health or biological systems or lead to a significant deterioration of the existing noise, air, or aesthetic quality.

A Fugitive Dust Control Permit is needed when there will be surface disturbance to three-quarters of an acre or more. Because the proposed project would disturb 18.5 acres, the contractor would obtain an approved permit from the New Mexico Environmental Department.

3.2 Hazardous, Toxic, and Radioactive Waste Environment

3.2.1 Hazardous, Toxic, and Radioactive Waste

The USACE Regulation 1165-2-132, Hazardous, Toxic and Radioactive Waste (HTRW) Guidance for Civil Works Projects, provides guidance for the consideration of issues associated with HTRW which may be located within project boundaries or adjacent properties. This regulation outlines procedures to facilitate early identification and appropriate consideration of HTRW concerns in the reconnaissance, feasibility, preconstruction engineering and design, operations, maintenance, repair, replacement, and rehabilitation phases of a project. Specific goals include identification of level of detail for HTRW investigations and reporting for each phase of the project, promotion of early detection and response by the appropriate responsible parties, determination of viable options to avoid HTRW problems, and the establishment of a procedure for resolution of concerns, issues, or problems.

Existing Environment

A preliminary evaluation of existing conditions for HTRW was conducted by USACE to determine the presence and character of contamination, if any, on lands potentially associated with the project, and which may impact the area of potential effect. A site-visit of the project area was conducted on January 24, 2018, and a search of available environmental records was provided by Environmental Data Resources, Inc. (EDR) on January 3, 2018, identifying known HTRW issues in the area adjacent to the project site and areas within a half mile of the project. In an effort to evaluate the entire site, the subject area was expanded to a mile from the center of the project to allow for a more encompassing evaluation.

The EDR report was designed to assist parties seeking to meet the search requirements of USEPA Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14), or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

Recognizable Environmental Conditions (RECs) were identified by the EDR report within the local area and adjacent to the project site. The following four sites which will need to be avoided are:

- Otero County – Narcotics Incinerator NO2236 located at 1175 26th Street:
    - Site is designated as Treatment, Storage, & Disposal only, not requiring a permit
- Agra Earth & Environmental Inc. located at 700 Fairgrounds Road, Suite B:
    - Site is a Non-Generator
    - Following wastes found on-site:
        - Halogenated Solvents F001 and F002
- City of Alamogordo Central Receiving located at 2600 N. Florida Avenue:
    - Finding of contaminated soil below Service Pit #1
    - Two underground fuel storage tanks located on-site:
        - Gasoline (1) and Diesel (1)
- Body Masters Inc. located at 2769 N. Florida Avenue:
    - Site is a Non-Generator
    - Following wastes are found on-site:
        - Ignitable Waste
        - Cadmium
        - Lead
        - Non-Halogenated Solvents F003 and F005

Although these four sites are not near the main dam structure, they may influence the placement of the conduit. All actions must be taken to avoid this area, most notably the fueling locations and storage tank fill access areas, due to the probability of contaminated soil.

There are eight RECs within a half mile that are not adjacent to the project site. All of the additional sites are downstream of the project except one. These additional sites do not affect the project directly nor require alterations of the design. There are also multiple RECs that are at a lower elevation within the flood-prone zone with two located at a higher elevation than the proposed project site. The proposed project site is protected from these by elevation changes and other infrastructure features. Aside from the four listed above, the additional identified HTRW sites should have no impact on the proposed project. Note: an additional survey of the proposed construction area for presence of possible HTRW contamination would be conducted during preconstruction engineering and design, and prior to construction, as required.

No Action Alternative

The existing without-project conditions were identified for the project area in order to evaluate the potential for the presence or threatened release of HTRW within the limits and site vicinity of the planned civil works project. With unrestricted flows and the locations of the RECs, no HTRW releases are expected from the without project condition.

Improved Flood Protection Alternative

The future with-project condition were identified for the project area in order to evaluate the potential for the presence or threatened release of HTRW within the limits and site vicinity of the planned civil works project. With additional flood protection and the locations of the RECs, no HTRW releases are expected from the Improved Flood Protection Alternative, therefore no significant effects are expected.

3.3 Biological Environment

Twenty-five plant species and nine wildlife species and/or their sign were observed in the project area during the survey by contract biologists (Tierra, 2017). Other plants and wildlife may potentially occur in the project area and could only be detected during more extensive field observation.

3.3.1 Vegetation Communities

Existing Environment

The project area is located within the Chihuahuan Desertscrub biotic community which is the largest of the three Creosote-dominated deserts in North America (Brown, 1994). In New Mexico, this biotic community covers a large portion of the southern part of the State. There are more than one thousand endemic plant species found in this biotic community. Many of these species are local in distribution and restricted to one or more portions of the Chihuahuan Desertscrub, but the dominant vegetation is relatively homogenous from west to east and north to center. The landscape is composed of basins and ranges, including outwash plains, low hills, and bajadas. Drainages cut across the landscape and are rarely perennial. The principal external drainage of Chihuahuan Desertscrub is the Rio Grande and its major tributaries, but most drainages found in this biotic community have no outlets and end in closed basins (Brown, 1994).

Chihuahuan Desertscrub is dominated by three species of plants. The most characteristic species of this desert is Creosote bush (*Larrea tridentata*), which sometimes shares or temporarily gives up dominance to Tarbush *(Flourensia cernua)* or Whitethorn acacia *(Vachellia constricta)*. Other occasionally dominant species include Ocotillo *(Fouquieria splendens)*, Allthorn *(Canotia holacantha)*, and mesquite (*Prosopis* spp.) (Brown, 1994).

Common understory plants in this biotic community include zinnias (*Zinnia* spp.), dogweeds (*Dyssodia* spp.), agaves (*Agave* spp.), yuccas (*Yucca* spp.), and Beargrass *(Nolina microcarpa)*. The only prominent cacti in the southwestern part of the desert are local populations of cholla (*Cylindropuntia* spp.) and prickly pear (*Opuntia*

spp.); otherwise, the cacti are low growing and often clumped or prostrate. These latter cacti can include Turk's head *(Echinocactus horizonthalonius)*, hedgehogs (*Echinocereus* spp.), pincushions (*Mammillaria* spp.), fishhooks (*Ferocactus* spp.), and button cacti (*Epithelantha* spp.) (Brown, 1994).

While the project area is heavily disturbed and comprised mainly of bare ground and asphalt, vegetation observed during the survey was found to be somewhat characteristic of the biotic community discussed above (Project area photos in Appendix C). Tree species observed included Honey mesquite *(Prosopis glandulosa)*, and the invasive Saltcedar *(Tamarix pentandra)* and Siberian elm *(Ulmus pumila)*. Shrub and forb species observed included Four-wing saltbush *(Atriplex canescens)*, Creosote, Wolfberry *(Lycium berlandieri)*, Kochia *(Kochia scoparia)*, London rocket *(Sysimbrium irio)*, Chinese thornapple *(Datura quericifolia)*, Carelessweed *(Amaranthus palmeri)*, and Russian thistle *(Salsola kali)*. Cacti and succulent species observed included Prickly pear *(Opuntia phaecantha)*, Desert Christmas cactus *(Cylindropuntia leptocaulis)*, and Common cholla *(C. imbricata)*. Grass species observed included Feathergrass *(Chloris crinita)*, False buffalograss *(Munroa squarrosa)*, and Johnson grass *(Sorghum halapense)*. A complete list of plant species identified during the survey can be found in Appendix C.

No Action Alternative

Under this alternative, there would be no effect to vegetation communities as no vegetation would be removed, nor would there be any project-associated reseeding using native species or prioritized saltcedar removal.

Improved Flood Control Alternative

The proposed project would take place in pre-disturbed areas, and would eliminate some associated localized vegetation, including saltcedar removal just at the reservoir, therefore, no significant adverse effects are expected.

3.3.2 Invasive Plant Species and Noxious Weeds

Existing Environment

As per the New Mexico Department of Agriculture's *New Mexico Noxious Weed List* (updated October 2016; Appendix C), two Class C noxious weed species, Saltcedar and Siberian elm, were observed in the project area during the field survey. Class C weeds are considered to be widespread in New Mexico, and management decisions for these species should be determined at the local level based on feasibility of control and level of infestation.

No Action Alternative

Without the proposed project, saltcedar in the Griggs reservoir detention facility is unlikely to be prioritized for removal.

Improved Flood Control Alternative

As a result of the proposed project construction, saltcedar removal from just the Griggs reservoir detention facility would occur, with no resultant spread of species expected, therefore no significant adverse effects are expected.

3.3.3 Wildlife

Existing Environment

A variety of species are known to occur within the Chihuahuan Desertscrub biotic community as found within the project area.

Mammals found in Chihuahuan Desertscrub can include pocket gophers (*Thomomys* spp.), kangaroo rats (*Dipodomys* spp.), pocket mice (*Perognathus* spp.), Mule deer *(Odocoileus hemionus)*, Desert bighorn sheep *(Ovis canadensis)*, Black-tailed jackrabbit (*Lepus californicus*), and Desert cottontail *(Sylvilagus audubonii)*.

Common bird species found in this biotic community include Mourning dove *(Zenaida macroura)*, Roadrunner *(Geococcyx californianus)*, Lesser nighthawk *(Chordeiles acutipennis)*, Scaled quail *(Callipepla squamata)*, Chihuahuan raven *(Corvus cryptoleucus)*, Cactus wren *(Campylorhynchus brunneicapillus)*, and Curve-billed thrasher *(Toxostoma curvirostre)* (Brown 1994).

Reptiles commonly found in this biotic community include geckos (*Coleonyx* spp.), Greater earless lizard *(Cophosaurus texanus)*, horned lizards (*Phrynosoma* spp.), spiny lizards (*Sceloporus* spp.), whiptails (*Cnemidophorus* spp.), ratsnakes (*Bogertrophis* spp.), whipsnakes (*Masticophis* spp.), and rattlesnakes (*Crotalus* spp.) (Brown 1994).

Wildlife species observed in the project area at the time of the survey included Mourning dove, Roadrunner, Gambel's quail *(Callipepla gambelii)*, Horned lark *(Eremophila alpestris)*, Black-throated sparrow *(Amphispiza bilineata)*, Pigeon *(Columba livia)*, and Desert cottontail. Wildlife sign observed was limited to Botta's pocket gopher *(Thomomys bottae)* mounds and Black-tailed jackrabbit scat.

No Action Alternative

The absence of construction would have no significant impact to wildlife as a result of the no-action alternative.

Improved Flood Control Alternative

The proposed project construction would take place within the already disturbed Griggs Reservoir location, as well as along roadways and previously disturbed, sparsely vegetated vacant lots within Alamogordo. Minimum short-term, localized habitat disturbance is anticipated as a result of the proposed project. No significant effects should occur to wildlife as a result of the proposed project.

3.3.4 Special Status Species

Three agencies have primary responsibility for protecting and conserving plant and animal species within the proposed project area. The USFWS, under authority of the Endangered Species Act of 1973 (16 U.S.C. 1531) (ESA), as amended, has the responsibility for Federally-listed species. The New Mexico Department of Game and Fish (NMDGF) has the responsibility for state-listed wildlife species (Table 4). The New Mexico State Forestry Division (Energy, Minerals, and Natural Resources Department) (NM EMNRD) has the responsibility for state-listed plant species. Each agency maintains a continually updated list of species that are classified, or are candidates for classification, as protected based on their present status and potential threats to future survival and recruitment into viable breeding populations. These types of status rankings represent an expression of threat level to a given species survival as a whole and/or within local or discrete populations.

Existing Environment

No Federally listed Threatened, Endangered, or Proposed species were observed in the project area at the time of the field survey. It was further determined that the project area does not contain suitable habitat for any of the 11 special status species assessed in this report (Table 4). Consultation with USFWS (2018) for the proposed project resulted in USFWS response, "There are no critical habitats within your project area" (Appendix C).

No Action Alternative

Without project construction, no significant short- or long-term effects to special status species are anticipated.

Improved Flood Control Alternative

A "No Effect" determination would be appropriate for the project regarding its potential impacts to species listed under the ESA. Although these species (Table 4) are known to exist in Otero County, they are not likely to occur within the project area as there is no suitable habitat for any of the listed species, nor was there any presence of these species noted during the site visit to the project area. Therefore, the proposed project would have no significant effect on special status species.

Table 4: Special Status Species Listed for Otero County, NM, that have the Potential to Occur in the Vicinity of the Proposed Project Area.

Scientific Name	Common Name	Federal Status	State Status	Potential to Occur
Birds				
Coccyzus americanus	Yellow-billed cuckoo	T, PCH		0
Falco femoralis septentrionalis	Northern aplomado falcon	NEP		0
Sterna antillarum	Least tern	E		0
Strix occidentalis lucida	Mexican spotted owl	T, DCH		0
Plants				
Argemone pleiacantha ssp. pinnatisecta	Sacramento prickly poppy	E	E	0
Cirsium vinaceum	Sacramento Mountains thistle	T	E	0
Cirsium wrightii	Wright's marsh thistle	C	E	0
Echinocereus fendleri var. kuenzleri	Kuenzler hedgehog cactus	E	E	0
Hedeoma todsenii	Todsen's pennyroyal	E, DCH	E	0
Hexalectris nitida	Shining crested coralroot	SC	E	0
Hexalectris spicata	Crested coralroot	SC	E	0
Lepidospartum burgessii	Burgess' scale broom	SC	E	0
Lilium philadelphicum	Wood lily	SC	E	0
Mammals				
Tamias minimus atristriatus	Penasco least chipmunk	C		0
Zapus hudsonius luteus	New Mexico meadow jumping mouse	E, DCH		0

Status Key (as prepared by USFWS)**:** E= Endangered, T= Threatened, C= Candidate, SC**=** Species of Concern, P= Proposed for listing, S/A= Similarity of Appearance, NEP= Non-Essential Experimental Population. DCH=Designated Critical Habitat, PCH=Proposed Critical Habitat. Only Endangered and Threatened species are protected by the ESA.

3.4 Cultural Resources

Section 106 of the National Historic Preservation Act [54 U.S.C. § 300101 et seq.] (NHPA) and its implementing regulations, 36 CFR Part 800, require Federal agencies to take into account the effects of their undertakings (e.g., projects or permits) on historic properties. Historic properties are legally considered to be those properties (cultural resources) eligible for listing on the National Register of Historic Places (NRHP).

To be eligible for listing, a property must have "the quality of significance in American history, architecture, archeology, engineering, and culture" that can be "present in districts, sites, buildings, structures, and objects" and which must "possess integrity of location, design, setting, materials, workmanship, feeling, and association" and meet at least one of a set of four criteria relating to association with historical events, historically significant people, distinctive characteristics of a period or style, and/or are likely to yield information important to prehistory or history. There are many examples of historic properties, including archaeological sites, historic buildings, Traditional Cultural Properties (TCPs), and historic districts.

In order to comply with Section 106 of the NHPA, Federal agencies must consult on the effects of their undertakings on historic properties with the State Historic Preservation Officer (SHPO), or in the case of undertakings on tribal lands of Tribes that have assumes the role of the SHPO pursuant to Section 101 of the NHPA, with the Tribal Historic Preservation Officer (THPO) of that Tribe.

3.4.1 Summary of Cultural Resources Inventory

Existing Environment

The City of Alamogordo contracted with Tierra Right of Way (Tierra, 2017) to conduct a cultural resources survey of the Area of Potential Effect (APE) (Figure 7). Tierra archaeologists conducted a complete, systematic pedestrian survey of the entire APE on January 18 and 19, 2017. One historic property (HCPI #44367) and four isolated occurrences were documented during the course of survey. HCPI #44367 is the remnants of a historic earthen dam that created the Griggs Reservoir, and an associated water intake feature. The earthen dam is estimated to have been constructed sometime between 1898 and 1907 by the Alamogordo Improvement Company. A valve on the water intake structure dates to 1945. Tierra recommended HCPI #44367 not eligible to the NRHP due to the compromise of various aspects of its integrity, including the breaches in the earthworks, historic features that are no longer extant, and lack of integrity of setting due to recent land development. The four isolated occurrences all date to the last century, and consist of a shallow pond feature, a rusted license plate fragment, a crushed metal bucket, and three large rusted metal tanks. Tierra also recommended that all of the isolated occurrences be considered not eligible to the NRHP.

No Action Alternative

As there would be no ground disturbance associated with this alternative, there would, then, also be no associated significant short- or long-term effects on cultural resources.

Improved Flood Control Alternative

Upon review of Tierra's report (2017), USACE determined that the historic resources identified by Tierra during survey are not eligible to the NRHP. Further conversation by USACE with the City indicated that the curb, gutter, asphalt and underground utilities that would be disturbed in order to place the new storm drain, were replaced between 2011 and 2012, and the sidewalk was installed by City crews in 2013 or 2014. Based on Tierra's findings and the supplemental information from the City, USACE determined that the proposed project would result in **no properties affected.** USACE is currently consulting with the SHPO regarding these determinations; letter was sent out on February 15, 2018 (Appendix D).

Scoping consultation is being conducted with Tribes; letters were sent out on February 15, 2018. Consistent with the Department of Defense's American Indian and Alaska Native Policy, signed by Secretary of Defense William S. Cohen on October 28, 1998, and based on the State of New Mexico Indian Affairs Department's 2008 Native American Consultations List, American Indian tribes that have indicated they have concerns in Otero County were sent scoping letters regarding the proposed project. To date, USACE has received no indication of tribal concerns that would impact this project.

Should previously unknown artifacts or cultural resource manifestations be discovered during construction, work would be stopped in the immediate vicinity of the resource, a determination of significance made, and further consultation would be conducted to determine the best course of action.

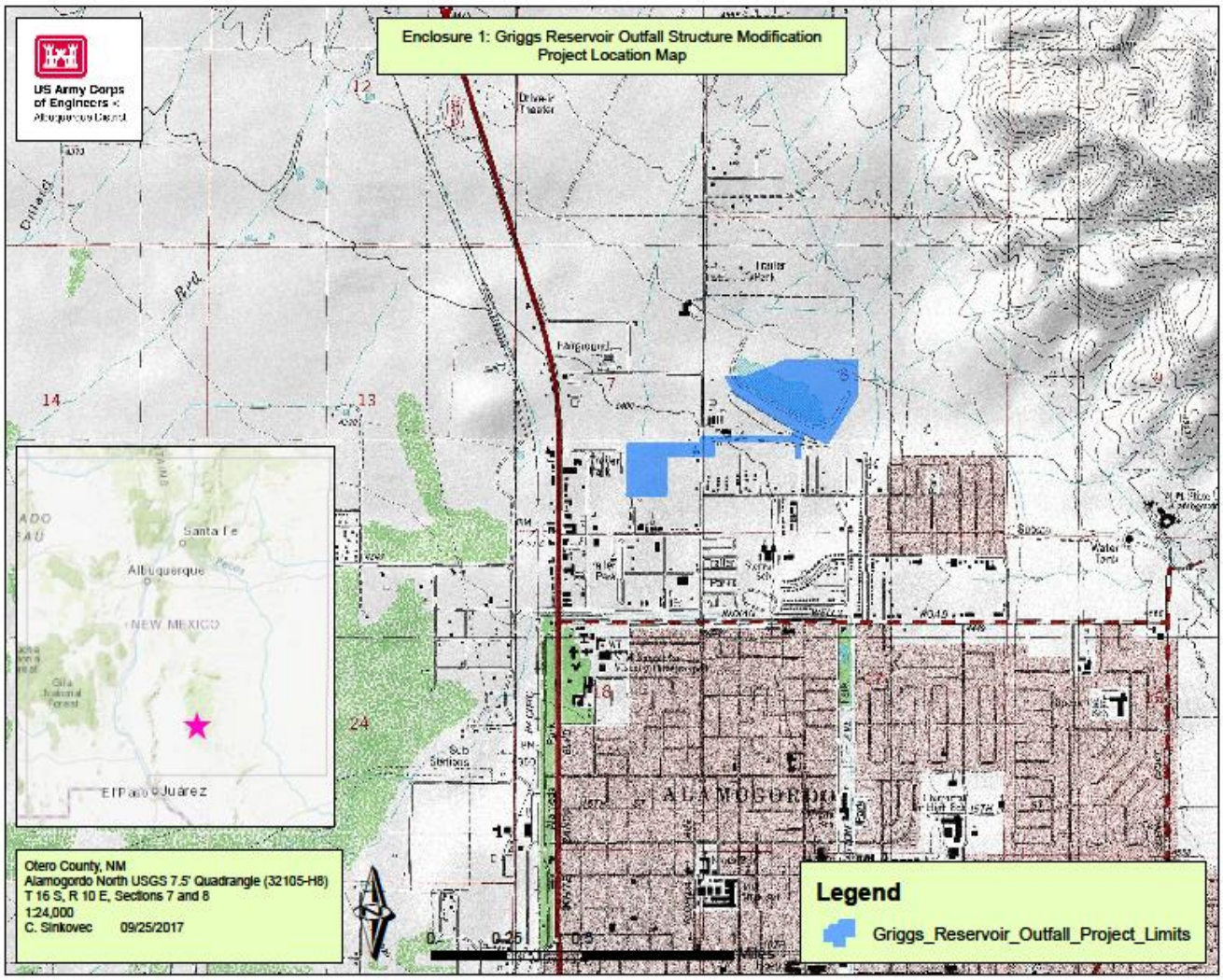

Figure 7: Griggs Reservoir Area of Potential Effect (USACE-generated map, 2018).

3.5 Land Use and Socioeconomic Environment

The proposed project would take place entirely within the already disturbed Griggs Reservoir area, along roadways, and vacant lots owned by the City. The City of Alamogordo would benefit from the proposed flood control system improvements. Adjacent property/features include streets, businesses, vacant lots, fairgrounds, and residential houses. Employment and population are the key components of project-related socioeconomic impacts. Changes in the level of employment can lead to an inflow or an outflow of population (workers and their dependents) to or from a region. This, in turn, affects the distribution and availability of income, housing, and public services in the region.

3.5.1 Socioeconomics

Existing Environment

Otero County is the 10th largest in New Mexico by population: 65,318, with the population of Alamogordo, the County seat, accounting for nearly half at 31,198 (Data USA, 2015). The County is an important air defense, rocket and missile-testing, and bombing range site for the U.S. Department of Defense. The area in and around Alamogordo is home to White Sands Missile Range and Holloman Air Force Base, the latter being the home to the F-22 Fighter Wing and of the German Air Force's American Training Center. White Sands Missile Range is the world's second largest overland testing facility. Other important area attractions include White Sands National Monument, the New Mexico Museum of Space History, the International Space Hall of Fame, Sunspot Astronomy and Visitor Center, New Mexico School for the Visually Handicapped and Blind, and New Mexico State University - Alamogordo.

Alamogordo, in 2015 (Data USA), had 20.5 percent of the population living below the poverty line, a number higher than the national average of 14.7 percent, with the median household income of $42,517, a -2.17 percent decline from the previous year, though there were 11,956 residents with jobs, a 2.27 percent growth over 2014. Alamogordo's median property value of $109,200 declined from the previous year's value of $112,100, with 58.3 percent of housing units occupied by their owners, consistent with the year prior.

Population changes for Alamogordo have been due to the diverse economy in the County, including government, education and research, health care, entertainment, and retail. Based on New Mexico Department of Workforce Solutions economic research and analysis of the Quarterly Census of Employment for Otero County (2017), total government employment has averaged 35 percent from 2011 through 2016 over all other industries, followed by health care and social assistance at 14 percent, retail trade at 12.5 percent, and construction at six percent. Continued urbanization of Alamogordo will contribute to increases in population as well. These projections are considered accurate for the future, with or without the implementation of a Federal project.

No Action Alternative

Without the proposed action, the employment is expected to remain on the current trajectory and the population is expected to continue growing in Otero County and Alamogordo.

Improved Flood Control Alternative

The proposed project is small in scale and would have no significant effect on employment or on the area population which is expected to continue growing in Otero County and Alamogordo. The City would benefit from the proposed flood control system improvements as the proposed project may reduce damage to local infrastructure from sediment and debris.

3.5.2 Land Use

Existing Environment

Important County and municipal infrastructure, including the Public Work Yard, parks and, and other facilities are located within the project area, and the growth of communities within this area is anticipated to continue (Figure 3). The existing City zoning in the immediate project area include: M-1 Light Industrial, R-1 Single Family Dwelling; C-3 Business; MH-1 Manufactured Housing Subdivision, MH-2 Manufactured Housing Park; and R-4 Multiple-Family Dwelling (NM Appraisal Co., 2017).

The buried storm drain will run under N. Florida Avenue at the corner of 26th Street, from the Public Works Yard, under the vacant lot the City holds a right-of-way through, to the Dry Canyon Drainage arroyo discharge point in the north-central section of the city. One of the primary north-south corridors in the city, N. Florida Avenue is a four-lane street with two driving lanes in each direction, curbs, gutters, streetlights, and sidewalks in front of the improved properties. It is mixed-use in nature with both residential and commercial development, and an abundance of vacant land along the street frontage; several of the lots have been on and off the market over the years. Development surrounding the project area includes a former feed store that is now used for U-Haul rentals, a vacated mobile home park, and the Otero County Public Works offices and maintenance yards which are located at the northwest corner of N. Florida Avenue and 26th Street (NM Appraisal Co., 2017).

To the north is the Alamogordo Public Schools Warehouse and Maintenance Yard, several older multitenant buildings, a car wash, an auto repair facility, the Betty Dare Good Samaritan facility, Champion Regency, a City Fire Station, and the Jim R. Griggs Sports Complex. To the south are a few auto repair facilities, multifamily residential properties, a mobile home and RV park, several service properties and a Family Dollar. On the east side of the street, just north of Indian Wells Road, a new park model community is being developed. This will be the first of its kind in the market (NM Appraisal Co., 2017).

To the south, the neighborhood is bound by Indian Wells Road. Indian Wells is one of the three primary east-west corridors in the city. It is a four-lane median divided street that is moderately developed. To the west, at the intersection of Indian Wells Road and White Sands Boulevard is the New Mexico School for the Visually Impaired. To the east, the corridor has experienced development in recent years. There are a number of new medical offices, a therapy center, fitness center and state offices to name a few (NM Appraisal Co., 2017).

Scenic Drive forms the north and east property boundaries. Scenic Drive is a four-lane street that generally runs along the eastern edge of the city. It is mixed-use in nature with both residential and commercial properties. In 1999, the Gerald Champion Regional Hospital relocated to Scenic Drive in the Subject neighborhood which resulted in other new construction in the area. The medical center consists of the hospital and several medical complexes at the southwest corner of Scenic Drive and Fairgrounds Road, the latter of which was recently extended to connect to Scenic Drive and provide better access to the hospital and neighborhood (NM Appraisal Co., 2017).

To the north, Scenic Drive connects to White Sands Boulevard. White Sands Boulevard (also known as U.S. Highway 54/70) is the primary north-south corridor through the City. As such, it is heavily developed and home to a variety of uses including White Sands Mall, Home Depot, Lowe's Home Improvement, a new Desert Sun Toyota Dealership, Tractor Supply Company, a variety of other retail stores, offices properties, and restaurants. The White Sands Mall recently sold and the new owner expects to revitalize the aging property, as well as construct a Hobby Lobby on the south end of the property (NM Appraisal Co., 2017).

Overall, the project neighborhood is centrally located in the city with good linkages to all necessary trades and services. The N. Florida Avenue area is mixed-use in nature with residential and commercial properties as well as vacant land. While new development has been limited over the years, there is currently a park model community under construction and the long-time vacant Coca-Cola distribution warehouse recently sold and was converted into an auto repair facility. The neighborhood is considered to be in a stable lifecycle with no significant changes to real estate values anticipated in the foreseeable future (NM Appraisal Co., 2017).

No Action Alternative

Without the project, future land use of the area is expected to remain similar to current trends, with the City's maintenance of the Griggs Reservoir infrastructure, Public Works Yard, and existing roads remaining unchanged. Water conservation and delivery would continue. Reclamation would continue maintenance of the floodway for water delivery. Transportation facilities would continue to function with regular maintenance.

Improved Flood Control Alternative

The proposed project would take place entirely within the already disturbed Griggs Reservoir area, along roadways, and vacant lots owned or maintained by the City, and is anticipated would remain in the future. Since the proposed project would include construction within the existing Griggs Reservoir footprint, Public Works Yard, and along existing roads; no substantial changes in land use are expected, therefore, no significant effects are expected.

3.5.3 Environmental Justice

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Low-Income Populations; February 11, 1994) was designed to focus the attention of federal agencies on the human health and environmental conditions of minority and low-income communities. It requires federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations and proposed actions. In an accompanying memorandum, President Clinton emphasized that existing laws, such as NEPA, should provide an opportunity for federal agencies to assess the environmental hazards and socioeconomic impacts associated with any given agency action upon minority and low-income communities. In April of 1995, the USEPA released a guidance document entitled Environmental Justice Strategy: Executive Order 12898. In short, this document defines the approaches by which the USEPA will ensure that disproportionately high environmental and/or socioeconomic effects on minority and low-income communities are identified and addressed. Further, it establishes agency wide goals for all Native Americans with regard to Environmental Justice issues and concerns.

Existing Environment

On February 11, 1994, then President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. This Executive Order requires Federal agencies to identify and address disproportionately high or adverse human health and environmental effects of Federal programs, policies, and activities on minority and low-income populations. An accompanying memorandum and guidance from the White House Council on Environmental Quality emphasized that Federal agencies would analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities as part of the NEPA analysis and provide opportunities for community input.

In April of 1995, the USEPA released a guidance document entitled Environmental Justice Strategy: Executive Order 12898. In short, this document defined the approaches by which the USEPA would ensure that disproportionately high environmental and/or socioeconomic effects on minority and low-income communities

are identified and addressed. Further, it established agency-wide goals for all Native Americans with regard to Environmental Justice issues and concerns.

Consideration of environmental justice concerns includes compilation of race and ethnicity data and the poverty status of populations. The 2015 (Data USA) estimated median household income in Otero County was $39,775 and $42,517 in Alamogordo. The percent of the residents were classified as living in poverty was 23 percent in Otero County and 20.5 percent in Alamogordo; both were higher than New Mexico as a whole (20.4%), and higher than the U.S. (13.5%) (U.S. Census Bureau, 2017).

Minority populations, as defined by the U.S. Census Bureau, are significant in both areas: Otero County is composed of Hispanics (36.1%), Native American (6.2%), and Blacks (3.5%), while Alamogordo has a lower percentage of Hispanics (33.9%), lower percentage of Native Americans (1.3%), and higher percentage of Blacks (5.4%). New Mexico is 48 percent Hispanic and 10.5 percent Native American, which is higher than the U.S. as a whole (U.S. Census Bureau, 2017).

No Action Alternative

In the future without-project condition, the flooding potential in the study area would remain the same, though would not have a disproportionate effect on minority and low-income communities. Under the No Action Alternative, there would be a higher potential for flooding and debris flows

Improved Flood Control Alternative

The City of Alamogordo Drainage Improvement Project would be conducted under Section 595 of the Water Resources Development Act of 1999 (Public Law 106-53; 33 U.S.C. 2201 *et seq*.) as amended. This program is largely intended to provide needed assistance (technical, financial, etc.) to communities in which water resources are degrading and in need of improvement. As such, this project would benefit an area within a minority and low-income community. The improvements and modification to the flood control system would benefit Alamogordo. The proposed project may reduce damage to local infrastructure from flooding, sediment and debris. A reduction in potential losses of property or agricultural production, or eliminating the need to maintain flood insurance could relieve a significant financial burden, especially to low income households. Under the definition of Executive Order 12898, therefore, environmental justice would not be adversely affected under the proposed action.

Table 5: Alternatives Comparison.

Alternative / Item Assessed	No Action		Proposed Action	
	Short-term	Long-term	Short-term	Long-term
Hydrology	No effect	Adverse	Beneficial	Beneficial effect
Water Resources	No effect	No effect	No effect	No effect
Wetlands	No effect	No effect	No effect	No effect
Air Quality	No effect	No effect	Minor, temporary effect	No effect
Noise	No effect	No effect	Minor, temporary effect	No effect
Aesthetics	No effect	No effect	Minor, temporary effect	No effect
Cultural resources	No effect	No effect	No properties affected	No properties affected
Socioeconomics and Demographics	No effect	No effect	No effect	No effect
Land Use	No effect	No effect	No effect	No effect
Vegetation	No effect	No effect	Minor, temporary adverse effect	No effect
Noxious weeds and invasive species	No effect	No effect	Beneficial effect	Beneficial effect
Wildlife	No effect	No effect	Minor, temporary effect	No effect
Special Status Species	No effect	No effect	No effect	No effect

3.6 Cumulative Effects

NEPA defines cumulative effects 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."

The footprint of the proposed project lies within an urban area. The proposed flood control and drainage system improvements would take place within the City of Alamogordo. The proposed drainage system improvements are located along and adjacent to the roadways within the City. The improvements to the flood control system would not significantly impact the current conditions of the local environment. Increased protection associated with flood control and management is anticipated to occur from the proposed project. For these reasons, the proposed project when combined with past, present, or future activities in the City would not significantly add to or raise local cumulative environmental impacts to a level of significance.

The environmental baseline excludes the effects of the existing reservoir, though breached, that has been in place since at least the 1950's. Cumulative impacts are those which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Accordingly, discussion of effects of the with-project condition only pertains to the incremental difference between the current reservoir, dam and spillway parameters, and the planned engineered infrastructure, including the connecting buried storm drains.

A direct effect of the recommended plan would be the enhanced level of safety and well-being provided to residents and business owners located below the Griggs Reservoir and along the associated floodways. The potential for loss of life, injury, emotional trauma, and economic losses that accompany major flooding would be reduced.

While the recommended plan would result in the irretrievable commitment of materials and fossil fuels during the construction phase of the project, operation and maintenance is not expected to increase the use of either construction materials or fossil fuels.

In addition, several long-term benefits for the environment would result from the project. Improving public safety due to enhanced flood risk management measures and reducing flood damage would increase productivity of the surrounding human community.

4. CONCLUSIONS

The proposed action evaluated in this Draft EA addresses the method and potential effects for the flood management infrastructure modifications and improvements. The proposed flood control modifications and improvements are located along previously disturbed areas and adjacent to the roadways within the City of Alamogordo. Impacts to the environment would be non-significant and short-term. The proposed project would not result in any moderate or significant short-term, long-term, or cumulative adverse effects. Therefore, the proposed project would not significantly affect the quality of the human environment and is recommended for implementation.

5. PREPARATION, CONSULTATION and COORDINATION

5.1 Preparation

This Draft EA was prepared for the City of Alamogordo by USACE. Personnel primarily responsible for preparation include:

- Summer Schulz Biologist
- Christina Sinkovec Archaeologist
- Ariane Pinson Climate
- Chris Velasquez Civil Design
- Otis Dickey HTRW
- Rich Negri Geotech
- Eric Banks Structural
- Steve Boberg H&H
- Michael Martinez Project Manager

5.2 Quality Control

This Draft EA has been reviewed for quality control purposes. Reviewers include:

- Stephen Ryan Biologist
- Jonathan Van Hoose Archaeologist
- Michael Porter Biologist

5.3 Consultation and Coordination

Agencies and entities that were contacted formally or informally in preparation of this Draft EA include:

- City of Alamogordo, NM
- Comanche Nation of Oklahoma, OK
- Kiowa Tribe of Oklahoma. OK
- Mescalero Apache Tribe, NM
- Pueblo of Isleta, NM
- Ysleta del Sur Pueblo, TX
- New Mexico SHPO, Santa Fe, NM
- USFWS, NM Ecological Services Field Office, Albuquerque, NM

5.3.1 SHPO Consultation

On February 15, 2018, USACE provided a consultation letter to SHPO regarding the potential effects of the project on the historic reservoir and intake tower.

5.3.2 Endangered Species Act Coordination

Consultation with the USFWS was initiated by USACE via the IPAC system on March 6, 2018.

5.4 Public Involvement under NEPA

Coordination with the public and interested parties has taken place throughout the development of the project. In April of 2016, formal scoping included Notice of Floodplain and Wetland Explanation letters to associated entities (Table 6) as required by the EDA grant and performed by the Southeastern New Mexico Economic Development District on behalf of the City of Alamogordo.

The public will again be provided a 30-day review period of this Draft EA.

Table 6: Prior Project Coordination.

Scoping Notice Recipient	Date of Letter
New Mexico Children, Youth and Families Department	4/7/2016
New Mexico Department of Fish and Game	4/7/2016
New Mexico Department of Cultural Affairs, Historic Preservation Division	4/14/2016
City of Alamogordo	4/14/2016
Natural Resources Conservation Service	4/7/2016
New Mexico Workforce Connection	4/7/2016
National Park Service, Rivers and Trail Program	4/7/2016
Department of Cultural Affairs, Historic Preservation Division	4/7/2016
New Mexico State Parks	4/7/2016
US Fish and Wildlife Service	4/7/2016
New Mexico Department of Transportation, District 2	4/7/2016
New Mexico Environment Department, District 2	4/7/2016

5.5 Libraries and Public Locations for Draft EA to be Available

Alamogordo Public Library
920 Oregon Avenue
Alamogordo, NM 88310

USACE website: http://www.spa.usace.army.mil/Missions/Environmental/Environmental-Compliance-Documents/Environmental-Assessments-FONSI

5.6 Mailing List for Draft EA

Ms. Susan Milsap, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services
2105 Osuna Road NE
Albuquerque, NM 87113

U.S. Forest Service
Smokey Bear District
901 Mechem Dr. Ruidoso, NM 88345

Ms. Shelly Lemon
New Mexico Environment Dept.
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502

Ms. Daniela Roth, State Botanist
Forestry and Resources Conservation Div.
Energy, Minerals, and Natural Resources Dept.
P.O. Box 1948
Santa Fe, NM 87504-1948

Ms. Michelle Ensy
Department of Cultural Affairs
Historic Preservation Division
Bataan Memorial Building, Room 236
407 Galisteo Street
Santa Fe, NM 87501

Ms. Maggie Paluch
Assistant City Manager
City of Alamogordo
1376 Ninth Street
Alamogordo, NM 88310-5855

Ms. Marcy Leavitt
Regulatory Division
U.S. Army Corps of Engineers
Albuquerque District
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Mr. Matt Wunder
Conservation Services Division
New Mexico Dept. of Game and Fish
P.O. Box 25112
Santa Fe, NM 87504

Ms. Rhonda Smith
Office of Planning and Coordination
Region 6
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Mr. Tom Blaine
New Mexico State Engineer
Office of the State Engineer
P.O. Box 25102
Santa Fe, NM 87504-5102

New Mexico State Parks
P.O. Box 1147
Santa Fe, NM 87504

Mr. John Longworth, Director
New Mexico Interstate Stream Commission
P.O. Box 25102
Santa Fe, NM 87504-5102

New Mexico Children, Youth and Families Dept.
P.O. Box 5160
Santa Fe, NM 87502-51160

Mr. Donald Ashby
District Conservationist
Natural Resources Conservation Service
3501 Mesa Village Drive
Alamogordo, NM 88310

New Mexico Workforce Connection
901 Alaska Avenue
Alamogordo, NM 88310

Mr. Attila Bailey
National Park Service
Rivers and Trail Program
P.O. Box 728
Santa Fe, NM 87504

Mr. Timothy Parker, District Engineer
District 2
New Mexico Dept. of Transportation
P.O. Box 1457
Roswell, NM 88202-1457

Mr. David Roybal
District 2
New Mexico Environmental Dept.
P.O. Box 5469
Santa Fe, NM 87502

Ms. Dora Batista
Executive Director
Southeastern New Mexico Economic Development Office
1600 SE Main, Suite D
Roswell, NM 88203

Ms. Margaret Paluch
City Manager
City of Alamogordo
1376 Ninth Street
Alamogordo, NM 88310-5855

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APPENDIX A

Climate and Climate Change

Small Flood Risk Management Project, Griggs Reservoir, Alamogordo, NM

Climate and Climate Change

December 2017

DRAFT

US Army Corps of Engineers
Albuquerque District

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1.1 Introduction

This project seeks to provide flood risk reduction to the City of Alamogordo, located in the Otero County, New Mexico, in the Tularosa (closed) Basin. The community sits on the western-facing foot slopes of the Sacramento Mountains within the Chihuahuan Desert. Griggs Reservoir is located at the north end of the city, and captures the occasional high runoff from usually ephemeral streams originating along the flanks of the Sacramento Mountains.

1.2 USACE Climate Change Guidance

Under the *USACE Climate Change Adaptation Policy Statement*, signed by Assistant Secretary of the Army Ms. Jo-Ellen Darcy on 3 June 2011, USACE is required to mainstream climate change adaptation in all activities as a means of enhancing the resilience of USACE's built and natural water-resource infrastructure and reducing its potential vulnerabilities to the effects of climate change and variability. USACE is charged with adaptation planning using the best available and actionable science to consider the impacts of climate change when planning for the future.

This assessment follows the procedures outlined in USACE Engineering and Construction Bulletin (ECB) 2016-25, *Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs and Projects* for conducting the required qualitative evaluation of climate change impacts to projects, studies and designs.

1.3 Climate: Existing Conditions

Because climate change is likely to impact the project goals and designs, a qualitative assessment of these impacts was undertaken, supplemented by a quantitative assessment of current trends in precipitation and temperature across the region.

1.3.1 Background

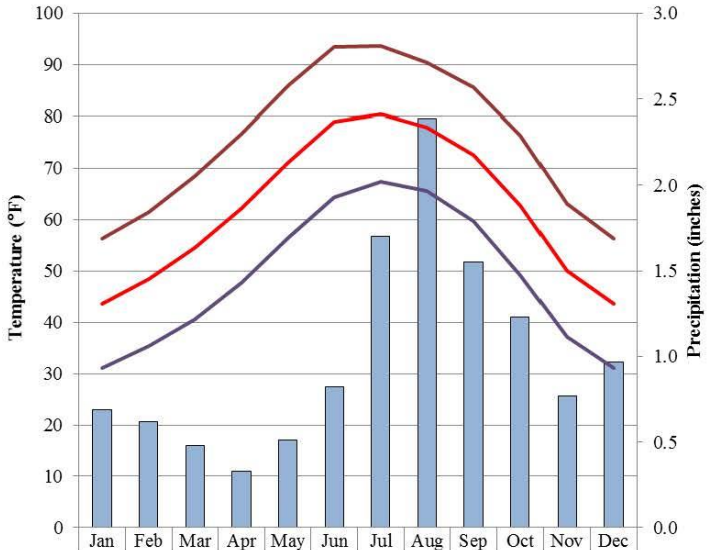
The City of Alamogordo is located in a hydrologically-closed basin located in south-central New Mexico. The Sacramento Mountains are an east-dipping fault block, with the majority of surface and groundwater flows moving towards the Pecos Basin to the east rather than the Tularosa Basin to the west. Most of the precipitation in the mountains falls during the summer monsoon (July-September) or from winter storms. Average annual precipitation in the highest portions of the Sacramento Mountains can reach 26 inches (Newton 2011). However, the channels responsible for flood flows at Griggs Reservoir drain the steep, west-facing mountain slopes, and snowmelt runoff is not a significant source of flows.

The North American Monsoon becomes an increasing share of annual precipitation moving south from the Colorado border, but typically brings only localized, intense precipitation in contrast to

slow, steady wide-area precipitation typical of winter storm systems. The high topographic relief of the Sacramento Mountains combined with its southerly location make it highly susceptible to precipitation originating from occasional remnant tropical storms and hurricanes that originate in the eastern Pacific Ocean and Gulf of Mexico (Newton 2011).

1.3.2 Current Climate of the Study Area

The closest National Weather Service Cooperative Observer (COOP) station with a continuous recent record is the station at Alamogordo, New Mexico (290199). The average monthly temperature and precipitation values for the most recent 30-year period (1981-2010) are given in Figure 1.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Precipitation (in.)	0.69	0.62	0.48	0.33	0.51	0.82	1.7	2.39	1.55	1.23	0.77	0.97
Mean Max. Temperature (F)	56.3	61.4	68.4	76.6	85.9	93.5	93.6	90.4	85.6	76.3	63	56.2
Mean Temperature (F)	43.65	48.4	54.5	62.15	71.15	78.95	80.5	78	72.6	62.7	50.1	43.6
Mean Min. Temperature (F)	31	35.4	40.6	47.7	56.4	64.4	67.4	65.6	59.6	49.1	37.2	31

Figure 1 Climate normal data (1981-2010) for the NWS COOP site at Alamogordo, New Mexico (290199).

The area in the vicinity of Alamogordo, NM can be classified as semi-arid, with average annual precipitation totaling 12.05 inches. Daily high temperatures in January average 56.3°F, with minimum overnight temperatures averaging close to freezing (31°F). Average January precipitation is 0.69 inches. By contrast, daytime highs in July typically average 93.6°F with

overnight minimums averaging 67.4°F. Average July precipitation is 1.70 in. Although July is the warmest month, August has the highest average monthly precipitation at 2.39 inches.

Precipitation in the study area is strongly unimodal, peaking during the July-September months. This pattern reflects the importance of summer and early fall monsoon precipitation and the general paucity of precipitation at other times of the year.

The largest one day precipitation total on record at Alamogordo, NM during the period of record (1909-2009) is 2.60 inches on 22 September 1941 (Western Regional Climate Center, 2017), approximately the 24-hour 25-year or the 0.04% chance event (NOAA/NWS, 2014).

At 32.54° N latitude and located on the western side of the Sacramento Mountains, Alamogordo lies south of the winter mid-latitude storm track, resulting in little or no snowfall in most years. Average snowfall peaks at approximately 1 inch each for December and January. Occasionally, however, significant snowfall does occur. The record snowfall for Alamogordo was 10 inches of snow in January 1940 (Western Regional Climate Center, 2017).

Monthly pan evaporation rates exceed precipitation by an order of magnitude. Annual pan evaporation at Alamogordo for the period 1939-1975 averaged 104.86 in (Western Regional Climate Center, n.d.). Pan evaporation rates averaged the least in December at 3.46 inches and the most in June at 14.43 inches, and averaged above 11 inches from April through August.

The observed rates of warming in the period 1981-2010 in the Alamogordo area are likely comparable to those observed by Nielsen-Gammon (2011) immediately to the south in Far West Texas. Nielson-Gammon observed a 4°F degree rise in winter temperatures since 1960. This is an approximate rate of temperature increase of 0.8°F per decade. Temperatures have gradually risen at a rate of approximately 0.6°F per decade since 1970 for New Mexico as a whole (Tebaldi et al., 2012).

As summarized by Gutzler (2013:4):

> *Temperature across the southwestern U.S. has increased so much and so steadily relative to interannual variability – especially in the warm season – that temperatures from the first half of the 30-year averaging period* [1981-2010] *are considerably colder than temperatures in more recent years, or expected temperatures in future years. Thus the seasonal outlooks almost always indicate enhanced probability of "above normal" temperature ….*

Despite recent drought years, no trends have been observed in annual water year precipitation from 1895/96 through 2010/11 for the six-state Southwest (NOAA, 2013) that includes Colorado and New Mexico. Seasonal time series show no trends for winter, spring and summer; fall shows a slight upward, but not statistically-significant, trend. In a study of climate change along the borderlands, Gutzler (2013) observed no trend in precipitation since 1900 in Texas Climate Division 05.

In addition, there has been no overall trend in the frequency of extreme precipitation events across the Southwest (NOAA, 2011): throughout the 20th century and into the early 21st century, the number of 1-day-duration and 5-year return interval precipitation events fluctuated, but remained within the range of early 20th century values.

The ephemeral arroyo responsible for flooding in the study area is ungauged. There are no nearby gages on perennial or ephemeral waterways. As a result, an analysis of current trends was not conducted using the USACE Nonstationarity Detection Tool or the Climate Hydrology Assessment Tool (https://maps.crrel.usace.army.mil/projects/rcc/portal.html).

1.4 Projected Changes in Climate

1.4.1 Projected Temperature Change

Model projections indicate that surface temperatures in the Southwest will warm substantially over the 21st Century (highly likely), and warming is likely to be higher in summer and fall than in winter and spring (Cayan et al., 2013). For the Southwest as a whole, compared to the period 1971-2000, models used in the most recent national climate assessment project (Cayan et al., 2013; USGCRP 2014) indicate a potential increase of 2-6°F under low future atmospheric greenhouse gas concentrations, and 5-9°F under higher future atmospheric greenhouse gas concentrations. Warming is likely to be higher inland and to increase from south to north.

Seasonal differences in warming are likely, although the high variation among models reduces confidence in specific results (Cayan et al., 2013). Increases in summer temperatures are likely to be greater than for other seasons, with mean increases across modeled scenarios around 3.5°F in 2021-2050, 5.5°F in 2041-2070, and 9°F 2070-2099. The least amount of warming is anticipated for the winter months, with an average increase of 2.5°F in 2021-2050 increasing to almost 7°F in 2070-2099.

(a) Alamogordo Area Temperature Projections

There have been no climate change studies specific to Southern New Mexico. However, several studies have focused on Far West Texas (El Paso area) and the Southwest Borderlands. Based on models from the National Center for Atmospheric Research, the average projection for Far West Texas is for a mean annual temperature increase of 6-8°F by 2100 (Norwine et al., 2007). Using a multi-model ensemble running under a moderate emissions (aka, A1B) scenario, an increase of about 1°F is projected for the period 2000-2019 compared to the 1980-1999 baseline period, 2°F for the period 2020-2039, and close to 4°F for the period 2040-2059 (Nielsen-Gammon, 2011). The range of model values for the 2040-2059 is from 2-5.5°F.

Under the A1B moderate future emissions scenario, Texas Climate Division 05 (Far West Texas) is anticipated to warm about 5.5°F in winter and close to 7°F in summer by 2100 (Gutzler et al.,

2013). In these models, "even anomalously cold summers late in the 21st Century are warmer than the warmest summer ever observed to date" and "annual average temperature…increases far beyond the historical range of variability before the end of the current century" (Gutzler et al., 2013:7).

1.4.2 Projected Changes in Precipitation

Warming-driven changes to global atmospheric circulation will affect when, where, and by how much precipitation will change. These changes will be superimposed on already highly-variable precipitation patterns resulting from the interplay of long- and short-term climate cycles. Long-term wet and dry cycles in the Southwest are controlled primarily by Pacific sea surface temperatures (SSTs), particularly the multi-decadal Pacific Decadal Oscillation (PDO). Atlantic Ocean SSTs are also important. The driest phases in the Southwest are associated with cool Pacific SSTs (negative PDO) and warm Atlantic SSTs (positive Atlantic Multidecadal Oscillation (AMO)) (Norwine et al., 2007). Interannual (time scales of 1 to less than 10 years) variation in winter precipitation is controlled by the ENSO cycle, with either El Niño or La Niña amplified depending on the state of the PDO. Because of the high variability in precipitation in the Southwest at multiple scales, detecting changes in precipitation has been more challenging than detecting changes in temperature.

Changes in PDO and AMO correspond to the major dry and wet periods (McCabe et al., 2004). From 1944 through 1963, combination of a negative PDO and positive AMO were major contributors to Southwestern drought. From 1964-1976, negative PDO and negative AMO contributed to average precipitation conditions, and from 1977 through 1994, the combination of positive PDO and negative AMO contributed to wetter-than-average precipitation. Since 2000, PDO has been primarily negative (Mantua, 2013) and AMO has been strongly positive (NCAR 2012), contributing to the reemergence of drought across the Southwest. The decade 2001-2010 has had the second-largest area affected by drought (after the period 1951-1960) and the most severe average drought conditions of any decade since 1901 (Hoerling et al., 2013).

In general, warming is anticipated to intensify existing precipitation patterns: wet areas, such as the northeastern U.S., may get wetter and dry areas, such as northern Mexico and southern Arizona, are likely to get drier (USGCRP 2009; Melillo et al., 2014). Most climate models project that the Southwest will become drier. Modelers are highly confident of this result (USGCRP 2009; Melillo et al., 2014). "Highly confident" means that most models agree that drying will occur, even though there is disagreement about the amount of change in precipitation.

Drying will be driven by increased evaporation due to warmer temperatures, and by changes in precipitation due to changes in global scale atmospheric circulation, such as poleward expansion of the subtropical dry zone (Lu et al., 2007). Because southern New Mexico is located at the boundary of the subtropics, and because many of the processes that affect precipitation along this boundary are not well-captured by models, there is greater uncertainty for precipitation change

than for temperature change. However, in almost all model scenarios, the rate of evaporation increases faster than any positive change in precipitation, driving the basin to an overall drier state.

Model projections range from essentially no change in precipitation to reductions of about 10% (Barnett and Pierce, 2009). Researchers at the U.S. Global Change Research Program project a 10 to 20% decline in precipitation by 2080-2090 primarily in the winter and spring, resulting from the northward (poleward) shift of midlatitude winter storm tracks bringing the Southwest into the subtropics year-round (Melillo et al., 2014). Land and ocean warming may bring more moisture into the Southwest during the summer months, providing stronger monsoons, but this is only projected by some models. The timing of monsoon precipitation may shift later in the year (Cook and Seager, 2013). Modeling by Dominguez et al. (2010) suggests that the distribution of drying may be uneven across the Southwest: the southern part of the Southwest may become drier, and the northern part slightly wetter, but the modeled trends were not significant. Model projections show that precipitation will continue to be characterized by wet and dry cycles (Cayan et al., 2013). Overall, model simulations used in the most recent National Climate Assessment show changes in precipitation that range from -13% to +10% across all model runs (Cayan et al., 2013). Confidence in model projections is medium-low, reflecting the variation in the magnitude and direction of projected changes.

A key change projected by models is that precipitation may become concentrated in a smaller number of larger-magnitude precipitation events. This would continue the existing trend of increasing frequency and intensity of heavy downpours in the U.S.: in the Southwest from 1958 to 2011, there was a 12% increase in the amount of rainfall falling in very heavy precipitation events (Melillo et al., 2014). Climate models project that the share of precipitation falling in heavy rainfall events will continue to increase. Because precipitation may intensify – more, larger storms, fewer small ones – a trend towards drier conditions driven by temperature increases may result in more severe droughts coupled with the potential for more severe floods (Gutzler, 2013). Although the frequency of the largest precipitation events may increase, there is no quantitative information to support an assessment of an increase in size of the largest events: climate models are currently unable to resolve individual storm events and the likely magnitude of precipitation change during an individual storm, either as a change in total precipitation or change in rainfall intensity (volume/hour). Consequently, it is not currently possible to project changes in instantaneous peak flood flows in the project area. Because there is no data to support a projected increase in probable maximum flood (PMF) in the study area, and because there is no accepted methodology for quantitatively assessing climate change impacts to a project's PMF, ECB 2016-25 does not require further analysis.

The Alamogordo region receives periodic intense precipitation from moist subtropical air masses derived from land falling eastern north Pacific hurricanes. Although it is not clear whether the number of land falling hurricanes will increase, hurricane intensity is projected to increase (fewer category 1 and 2 storms, more category 5 storms) and the amount of precipitation falling from all hurricanes is likely to increase (Gutowski et al., 2008). During late summer, larger, more-persistent

hurricanes may provide additional moisture in the monsoon regions. These changes may increase flood risk in the region; however, the magnitudes and uncertainties associated with this qualitative assessment of future moisture availability are unknown.

Seasonal and annual drought are anticipated to be a persistent feature of future climate across the region. Temperature-driven increases in evaporation are projected to lead to sustained dryer climate conditions, particularly in winter such that the average climate of the Southwest by mid-21st Century will resemble that found during a multi-year drought today. The most severe future droughts will still occur during persistent La Niña events, because these events will perturb a base state that is drier than any state experienced recently (Seager et al., 2007). Furthermore, because of the overprinting of a gradual drying in the Southwest, not even the wettest future models predict a return to the two wet decades preceding the 1997-98 El Niño (Seager and Vecchi, 2010).

1.5 Projected Changes in Regional Hydrology

1.5.1 Climate Change Impacts to Flooding in the Alamogordo Area

In the study area, flooding occurs primarily in response to summer monsoon precipitation (which can be locally very heavy) and monsoon precipitation augmented by moisture from hurricanes that make landfall in south Texas or northern Mexico. Flood risk may increase in the Alamogordo area due to increased precipitation intensity, and due to increased hurricane moisture resulting from warmer sea surface temperatures in the eastern Pacific Ocean or Gulf of Mexico. These changes may increase flood risk in the study area; however, the magnitudes and uncertainties associated with this qualitative assessment of future moisture availability are unknown.

Precipitation extremes are expected to become more frequent and intense even if net precipitation stays the same or decreases (Gershunov et al., 2013). This may occur because the amount of water the atmosphere can hold scales with temperature: a warmer atmosphere is able to hold more water, and, therefore, greater heat and moisture are available to fuel larger storms.

Precipitation under the North American Monsoon is not well modeled by global circulation models (GCMs), and there is little model consensus on its evolution (Gershunov et al., 2013). A recent study by Cavazos and Arriaga-Ramírez (2012) suggests that precipitation in the North American Monsoon region will be reduced by 20% in winter, spring, and summer by the last 20 years of this century under a high (aka, A2) emissions scenario. Other studies suggest that precipitation during the late summer/early fall monsoon season will remain the same, but much of this rainfall may shift to September and October (Cook and Seager, 2013). Low confidence also surrounds model projections of extreme precipitation events during the monsoon season (Gershunov et al., 2013). Changes to flood risk during the monsoon cannot be evaluated at this time. In addition, New Mexico is located outside the core monsoon region in northwest Mexico, and projected monsoon changes in peripheral areas are not well understood. Consequently, there is no data on how changes in the core region monsoon are likely to impact southern New Mexico and the project area.

Hurricane intensity and development are driven by sea surface and subsurface temperatures, and are enhanced when wind shear (the difference in wind strength with altitude) is reduced (Emanuel, 2005). A large share of atmospheric warming (past and future) is anticipated to be absorbed by the oceans, leading to increasing ocean temperatures through the depth of mixing. Although it is not clear whether the number of land falling hurricanes will increase, two outcomes are likely: hurricane intensity is projected to increase (fewer category 1 and 2 storms, more category 5 storms) and the amount of precipitation falling from all hurricanes is likely to increase (Gutowski et al., 2008). During late summer, larger, more-persistent hurricanes may provide additional moisture in the monsoon source regions. Such changes may increase flood risk in the project area. However, no studies have been conducted that examine the transport into New Mexico of potential additional moisture in the eastern Pacific, and there is no quantitative data on whether or how this might impact precipitation intensity or frequency in southern New Mexico, including the project area.

The projected future annual maximum monthly flows for the Rio Grande Closed Basins (HUC 1305) in which Alamogordo is located were obtained from the USACE Climate Preparedness and Resilience Community of Practice (CPR CoP) Climate Hydrology Assessment Tool (Figure 2) (https://maps.crrel.usace.army.mil/projects/rcc/portal.html). A slight, but statistically significant increase in projected mean annual maximum monthly streamflow is shown in the model ensemble average (annual maximum flow trend = 1.87292*year - 895.321, p-value 0.0025864), but the trend explains only a small portion of the variation in the model data (R^2= 0.088904) with the average change amounting to approximately 150 cfs. This result represents an estimate for perennial stream flows in the region. Changes in monthly maximum runoff averages do not necessarily equate to changes in precipitation intensity, and therefore have an uncertain relationship to changing flood risk in the project area. The models project a significant increase in the range of flows in some years, which may indicate an increased risk of large flood events under warmer future conditions in the Rio Grande Closed Basins.

The CPR CoP Vulnerability Assessment Tool was used to examine sources of vulnerability to future changes in flood risk for the Rio Grande Closed Basins (HUC 1305) as a whole (Figure 3). The region is not among the 20% at greatest risk across the conterminous U.S. The tool identifies flood magnification (the ratio of the average monthly flow exceeded 10% of the time in the future compared to the present) as the largest risk for this HUC.

While the CPR CoP tools provide information on projected future conditions throughout the basin, it is not clear at this time how well they may reflect the conditions within the tiny Griggs Reservoir project watershed. Furthermore, small increases in the annual maximum monthly flows provide no guidance on how the largest flood flows might change in the future, and should not be used to infer changes in the project design flood.

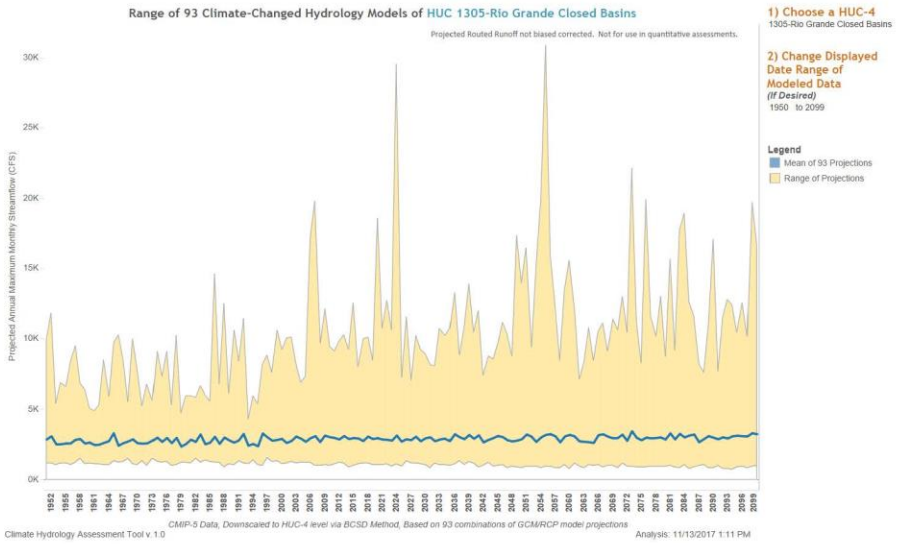


Figure 2 Projected Annual Maximum Monthly Flows, HUC 1305 Rio Grande Closed Basins (annual maximum flow trend = 1.87292*year - 895.321, p-value 0.0025864).

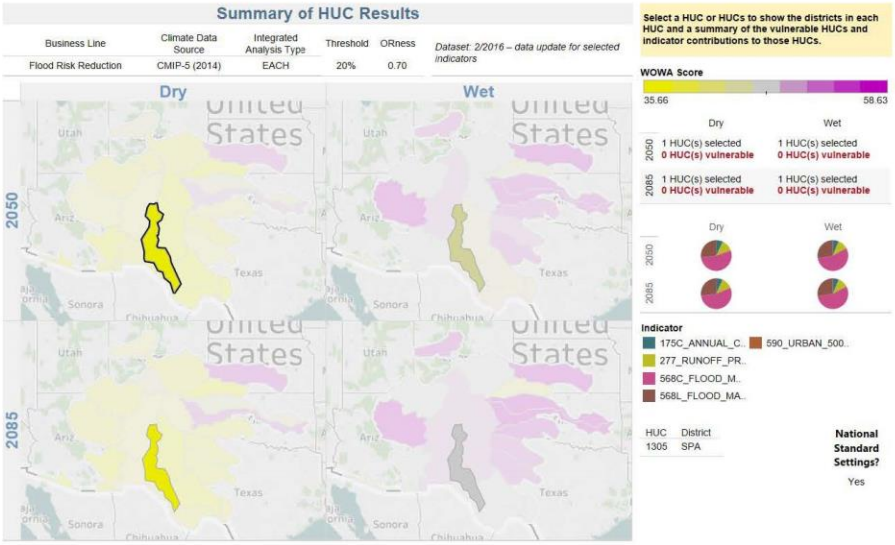


Figure 3 Watershed Vulnerability Assessment with Respect to Flood Risk for HUC 1305 Rio Grande Closed Basins.

1.6 Summary

1.6.1 Existing Conditions

The area in the vicinity of Alamogordo, NM can be classified as semi-arid, with average annual precipitation totaling 12.05 inches. Daily high temperatures in January average 56.3°F, with minimum overnight temperatures averaging close to freezing (31°F). Average January precipitation is 0.69 inches. By contrast, daytime highs in July typically average 93.6°F with overnight minimums averaging 67.4°F. Average July precipitation is 1.70 in. Although July is the warmest month, August has the highest average monthly precipitation at 2.39 inches.

Precipitation in the study area is strongly unimodal, peaking during the July-September months. This pattern reflects the importance of summer and early fall monsoon precipitation and the general paucity of precipitation at other times of the year. Monsoon precipitation comes in the form of convective storms and is relatively localized.

At 32.54° N latitude and located on the western side of the Sacramento Mountains, Alamogordo lies south of the winter mid-latitude storm track, resulting in little or no snowfall in most years. Average snowfall peaks at approximately 1 inch each for December and January. Occasionally, however, significant snowfall does occur. The record snowfall for Alamogordo was 10 inches of snow in January 1940.

Monthly pan evaporation rates exceed precipitation by an order of magnitude. Annual pan evaporation at Alamogordo for the period 1939-1975 averaged 104.86 in. Pan evaporation rates were averaged the least in December at 3.46 inches and the most in June at 14.43 inches, and averages above 11 inches from April through August.

There has been no detectable trend in precipitation for the Southwest. Analysis of flood trends was not conducted under ECB 2016-25 due to the lack of gauging stations on unregulated streams in the area.

1.6.2 Future Without-Project Condition

Climate change is anticipated to impact the study area primarily through temperature increases, which are projected to rise by as much as 3.5°F to as much as 8.5°F by 2100. Temperature increases are likely to drive evaporation increases. There is strong model agreement in the direction and magnitude of projected temperature change.

Changes in precipitation are less certain, although winter precipitation is likely to decrease. Some models predict precipitation decreases of 3-9% in all seasons. Summer precipitation may increase in intensity, result in stronger, wetter storms interspersed with longer dry periods. Hurricanes are likely to increase in strength and moisture content. During late summer, larger, more-persistent hurricanes may provide additional moisture in the monsoon source regions. These changes may

increase flood risk in the Rio Grande Closed Basins / Tularosa Basin. Models disagree on future precipitation trends due to:

- High inter-annual precipitation variability.
- Uncertainty over how future precipitation drivers, such as El Niño-Southern Oscillation and hurricanes, might evolve.
- Inability of models to resolve mesocale (local) climate phenomena, such as individual thunderstorms, which makes it difficult to estimate how precipitation variables might change on a scale relative to flooding at Griggs Reservoir.

The USACE Climate Preparedness and Resilience Community of Practice (CPR CoP) Climate Hydrology Assessment Tool (https://maps.crrel.usace.army.mil/projects/rcc/portal.html) indicates a small but statistically significant increase in annual maximum monthly flows over the 21st Century relative to current conditions in the Rio Grande Closed Basins as a whole. Flood flow variability may increase, with increases in the magnitude of rare events. Similarly the CPR CoP Vulnerability Tool suggests a potential increase in monthly flood flow magnitudes for HUC 1305, Rio Grande Closed Basins but provides no quantitative increase in that magnitude. How either of these findings might translate into projected changes in instantaneous peak flood flows in the project area is unclear and cannot be quantified at this time.

1.6.3 Future With-Project Condition

The dry reservoir proposed by this project should result in no significant increases in greenhouse gas emissions in the region other than construction-related releases. This project has no significant impacts with respect to climate change.

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APPENDIX B

Hydrology and Hydraulics

TOM BLAINE, P.E.
STATE ENGINEER

DAM SAFETY BUREAU
CONCHA ORTIZ Y PINO BLDG
P.O. BOX 25102
SANTA FE, NEW MEXICO 87504
(505) 827-6122
(505) 476-0220 FAX
NM.DamSafety@state.nm.us

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
Santa Fe

January 31, 2018

Bob Johnson, Engineering Manager
City of Alamogordo
1376 East Ninth St.
Alamogordo, NM 88310

RE: Jurisdictional Determination for Griggs Field Detention Basin, OSE File No. MISC

Dear Mr. Johnson;

The Office of the State Engineer Dam Safety Bureau (OSE-DSB) has completed the jurisdictional determinations for the Griggs Field Detention Basin to be constructed as part of the Griggs Reservoir Outfall Structure Modifications and Storm Drain Improvements Project requested by Daniel Aguirre, P.E., with Wilson and Company in a letter dated January 11, 2018. A review of the provided information indicates that the detention structure will be a non-jurisdictional structure, assuming it is con structed as designed. Please see the attached review memorandum. We encourage you to design and construct this facility with the use of criteria found in 19.25.12 NMAC and to develop an Emergency Action Plan for the dam if appropriate to its hazard classification. If the final design for the structure deviates from the proposed design, a re-evaluation will be necessary.

If you have any questions, please feel free to contact Bud Brock at 505-383-4137 or me at 505-383-4134.

Sincerely,

Charles N Thompson

Charles N. Thompson, P.E.
Chief, Dam Safety Bureau

CNT:bb

email: Daniel Aguirre, PE, Wilson and Company (daniel.aguirre@wilsonco.com)
Brigitte Fuller, PE, Wilson and Company (brigitte.fuller@wilsonco.com)

Enclosure

APPENDIX C

Environmental Resources

Project Area Photos

Griggs Reservoir: Looking northeast towards proposed outfall structure location.

Griggs Reservoir: Looking north into the proposed project area.

Griggs Reservoir: Looking east along existing dam wall.

Griggs Reservoir: Looking southeast from existing dam wall towards flood-prone area.

View of N. Florida Ave. proposed underground storm water pipe crossing.

East to west view of proposed storm water pipe route through ROW adjacent to N. Florida Ave.

West to east view of proposed underground storm water pipe route.

View of the Dry Canyon channel looking east towards project area.

Looking south down the Dry Canyon channel.

View of the Dry Canyon channel towards south from top of bank.

PLANTS IDENTIFIED IN THE PROJECT AREA

Amaranthus palmeri	Carelessweed
Atriplex canescens	Four-wing Saltbush
Chloris crinita	Feathergrass
Cucurbita foetidissima	Coyote Gourd
Cylindropuntia imbricata	Common Cholla
Cylindropuntia leptocaulis	Desert Christmas Cactus
Cynodon dactylon	Bermuda Grass
Datura quericifolia	Chinese Thornapple
Grindelia squarrosa	Curlycup Gumweed
Gutierrezia sarothrae	Broom Snakeweed
Kochia scoparia	Kochia
Larrea tridentata	Creosote
Lepidium sp.	pepperweed
Lycium berlandieri	Wolfberry
Munroa squarrosa	False Buffalograss
Opuntia phaeacantha	Prickly Pear
Prosopis glandulosa	Honey Mesquite
Salsola kali	Russian Thistle
Sisymbrium irio	London Rocket
Solanum elaeagnifolium	Silverleaf Nightshade
Sorghum halapense	Johnson Grass
Sporobolus airoides	Alkali Sacaton
Tamarix pentandra	Salt Cedar
Ulmus pumila	Siberian Elm
Xanthium strumarium	Common Cocklebur
Yucca treculeana	Torrey Yucca

NM STATE UNIVERSITY

New Mexico Department of Agriculture
Office of the Director/Secretary
MSC 3189
New Mexico State University
P.O. Box 30005
Las Cruces, NM 88003-8005
575-646-3007

October 19, 2016

MEMORANDUM

TO: General Public

FROM: Director/Secretary Jeff Witte

SUBJECT: New Mexico Noxious Weed List Update

The Director of the New Mexico Department of Agriculture has selected the following plant species *(see attached New Mexico Noxious Weed List)* to be targeted as noxious weeds for control or eradication pursuant to the Noxious Weed Management Act of 1998.

Petitions to add new plant species to the state noxious weed list were solicited and received by the New Mexico Department of Agriculture (NMDA) from Cooperative Weed Management Areas, individuals, agencies, and organizations. The petitions were reviewed by the New Mexico Weed List Advisory Committee using ecological, distribution, impact, and legal status criteria within the State of New Mexico and adjoining states and countries. Based on their extensive knowledge and experience, experts from the New Mexico State University Plant Sciences Department added several species as well.

This list does not include every plant species with the potential to negatively impact the state's environment or economy. Landowners and land managers are encouraged to recognize plant species listed on the federal noxious weed list and other western states' noxious weed lists as potentially having negative impacts and to manage them accordingly.

New Mexico Noxious Weed List

Updated September 2016

Class A Species

Class A species are currently not present in New Mexico, or have limited distribution. Preventing new infestations of these species and eradicating existing infestations is the highest priority.

Common Name	Scientific Name
Alfombrilla	*Drymaria arenariodes*
Black henbane	*Hyoscyamus niger*
Brazillian egeria	*Egeria densa*
Camelthorn	*Alhagi psuedalhagi*
Canada thistle	*Cirsium arvense*
Dalmation toadflax	*Linaria dalmatica*
Diffuse knapweed	*Centaurea diffusa*
Dyer's woad	*Isatis tinctoria*
Giant salvinia	*Salvinia molesta*
Hoary cress	*Cardaria spp.*
Leafy spurge	*Euphorbia esula*
Oxeye daisy	*Leucanthemum vulgare*
Purple loosestrife	*Lythrum salicaria*
Purple starthistle	*Centaurea calcitrapa*
Ravenna grass	*Saccharum ravennae*
Scentless chamomile	*Matricaria perforata*
Scotch thistle	*Onopordum acanthium*
Spotted knapweed	*Centaurea biebersteinii*
Yellow starthistle	*Centaurea solstitialis*
Yellow toadflax	*Linaria vulgaris*

Class B Species

Class B Species are limited to portions of the state. In areas with severe infestations, management should be designed to contain the infestation and stop any further spread.

Common Name	Scientific Name
African rue	*Peganum harmala*
Bull thistle	*Cirsium vulgare*
Chicory	*Cichorium intybus*
Halogeton	*Halogeton glomeratus*
Malta starthistle	*Centaurea melitensis*
Perennial pepperweed	*Lepidium latifolium*
Poison hemlock	*Conium maculatum*

Quackgrass	*Elytrigia repens*
Russian knapweed	*Acroptilon repens*
Spiny cocklebur	*Xanthium spinosum*
Teasel	*Dipsacus fullonum*

Class C Species

Class C species are wide-spread in the state. Management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation.

Common Name	Scientific Name
Cheatgrass	*Bromus tectorum*
Curlyleaf pondweed	*Potamogeton crispus*
Eurasian watermilfoil	*Myriophyllum spicatum*
Giant cane	*Arundo donax*
Hydrilla	*Hydrilla verticllata*
Jointed goatgrass	*Aegilops cylindrica*
Musk thistle	*Carduus nutans*
Parrotfeather	*Myriophyllum aquaticum*
Russian olive	*Elaeagnus angustifolia*
Saltcedar	*Tamarix spp.*
Siberian elm	*Ulmus pumila*
Tree of heaven	Ailanthus altissima

Watch List Species

Watch List species are species of concern in the state. These species have the potential to become problematic. More data is needed to determine if these species should be listed. When these species are encountered please document their location and contact appropriate authorities.

Common Name	Scientific Name
Crimson fountaingrass	*Pennisetum setaceum*
Meadow knapweed	*Centaurea pratensis*
Myrtle spurge	*Euphorbia myrsinites*
Pampas grass	*Cortaderia sellonana*
Sahara mustard	*Brassica tournefortii*
Syrian beancaper	*Zygophyllum fabago L.*
Wall rocket	*Diplotaxis tenuifolia*

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: March 06, 2018
Consultation Code: 02ENNM00-2018-SLI-0043
Event Code: 02ENNM00-2018-E-01100
Project Name: Griggs Reservoir Outfall Structure Modification Project

Subject: Updated 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-0043

Event Code: 02ENNM00-2018-E-01100

Project Name: Griggs Reservoir Outfall Structure Modification Project

Project Type: DREDGE / EXCAVATION

Project Description: The project is located within Alamogordo, to the west of White Sands Boulevard and south of Fairgrounds Road, and is a total of approximately 61 acres in size. The eastern portion of the project is located at the Griggs Field Detention Reservoir north of 26th Street and east of Florida Avenue; it's approximately 42.7 acres in size. From the Griggs Reservoir, a corridor approximately 5.8 acres in size extends west approximately 0.4 miles through the City's Public Works Yard and across Florida Avenue to the potential future 12.4-acre regional outflow detention pond downstream and west from the dam. Specifically, the project area is within portions of Sections 7 and 8, Township 16 South, Range 10 East, New Mexico Principal Baseline and Meridian, as indicated on the Alamogordo North, NM, 7.5-minute U.S. Geological Survey Quadrangle Map.

Fully within the city limits of Alamogordo, NM, the proposed modification work on the Griggs Reservoir includes dredging and enlarging the detention basin by reconstructing the existing dam, embankment and emergency spillway to allow 49 acre feet of water impoundment with less than 6 feet of embankment height. In addition, there would be a connected buried storm drain with outflow to an existing arroyo, with the possible future construction of a regional outflow detention pond downstream and west from the dam, completely located within City limits and nearly all on City property, including an acquired 50' right-of-way along Florida Avenue. The ultimate build-out of the flood control improvements and modifications will provide adequate detention and conveyance of the 100-year, 24-hour storm runoff to north central Alamogordo while addressing immediate flooding concerns and protecting the Public Works Yard and surrounding areas, including minimizing the risk of property damage to existing residences, businesses and future development.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/32.92397834838263N105.94813130231472W

03/06/2018 Event Code: 02ENNM00-2018-E-01100 3

Counties: Otero, NM

Endangered Species Act Species

There is a total of 11 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. 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.

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
Penasco Least Chipmunk *Tamias minimus atristriatus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5126	Candidate

Birds

NAME	STATUS
Least Tern *Sterna antillarum* Population: interior pop. No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8505	Endangered
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
Northern Aplomado Falcon *Falco femoralis septentrionalis* Population: U.S.A (AZ, NM) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1923	Experimental Population, Non-Essential
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

Flowering Plants

NAME	STATUS
Kuenzler Hedgehog Cactus *Echinocereus fendleri var. kuenzleri* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2859	Endangered
Sacramento Mountains Thistle *Cirsium vinaceum* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/7486	Threatened
Sacramento Prickly Poppy *Argemone pleiacantha ssp. pinnatisecta* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3332	Endangered
Todsen's Pennyroyal *Hedeoma todsenii* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1081	Endangered
Wright's Marsh Thistle *Cirsium wrightii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8963	Candidate

Critical habitats

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

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Report County TES Table for

Otero

NEW MEXICO WILDLIFE OF CONCERN

For complete up-dated information on federal-listed species, including plants, see the US Fish & Wildlife Service website at http://ecos.fws.gov/ipac/wizard/chooseLocation!prepare.action. For information on state-listed plants, contact the NM Energy, Minerals and Natural Resources Department, Division of Forestry, or go to http://nmrareplants.unm.edu/. If your project is on Bureau of Land Management, contact the local BLM Field Office for information on species of particular concern. If your project is on a National Forest, contact the Forest Supervisor's office for species information. E = Endangered; T = Threatened; s = sensitive; SOC = Species of Concern; C = Candidate; Exp = Experimental non-essential population; P = Proposed

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Common Name	Scientific Name	NMGF	US FWS	Critical Habitat
Spotted Bat	Euderma maculatum	T		
Penasco Least Chipmunk	Neotamias minimus atristriatus	E	C	
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	E	
Peregrine Falcon	Falco peregrinus	T		
Arctic Peregrine Falcon	Falco peregrinus tundrius	T		
Least Tern	Sternula antillarum	E	E	
Neotropic Cormorant	Phalacrocorax brasilianus	T		
Common Ground-dove	Columbina passerina	E		
Mexican Spotted Owl	Strix occidentalis lucida		T	Y
Broad-billed Hummingbird	Cynanthus latirostris	T		
White-eared Hummingbird	Hylocharis leucotis	T		
Elegant Trogon	Trogon elegans	E		
Southwestern Willow Flycatcher	Empidonax traillii extimus	E	E	Y
Bell's Vireo	Vireo bellii	T		
Gray Vireo	Vireo vicinior	T		
Yellow-eyed Junco	Junco phaeonotus	T		
Baird's Sparrow	Ammodramus bairdii	T		
Varied Bunting	Passerina versicolor	T		
Gray-banded Kingsnake	Lampropeltis alterna	E		
Mottled Rock Rattlesnake	Crotalus lepidus lepidus	T		
Sacramento Mountain Salamander	Aneides hardii	T		
White Sands Pupfish	Cyprinodon tularosa	T		

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Otero

1. *Argemone pleiacantha subsp. pinnatisecta*
2. *Cirsium vinaceum*
3. *Cirsium wrightii*
4. *Echinocereus fendleri var. kuenzleri*
5. *Escobaria villardii*
6. *Hedeoma todsenii*
7. *Hexalectris nitida*
8. *Hexalectris spicata* *
9. *Lepidospartum burgessii*
10. *Lilium philadelphicum* *

APPENDIX D

Cultural Resources

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

February 15, 2018

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

Dr. Jeff Pappas
State Historic Preservation Officer
Historic Preservation Division
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

Dear Dr. Pappas:

Pursuant to 36 CFR 800, the U.S. Army Corps of Engineers (Corps), Albuquerque District, at the request of and in cooperation with the City of Alamogordo (City), the project sponsor, is seeking your concurrence in our determination of **no historic properties affected** for the proposed Griggs Reservoir Outfall Structure Modification Project in Otero County, New Mexico (Enclosure 1). The purpose of the project is to perform structural modifications and storm drain improvements on the existing Griggs Reservoir. The Griggs reservoir embankment is currently breached. The breach occurred approximately 30 years ago in response to a directive from the New Mexico Office of the State Engineer Dam Safety Bureau. The proposed modifications and improvements will bring the reservoir into conformance and provide storm drain protection to the City's Public Works Yard and residential and commercial properties west and south of the reservoir, which are currently subject to damage from flood waters.

The Griggs Reservoir Outfall Structure Modification Project is authorized under Section 595 of the Water Resources Development Act of 1996 (Public Law 99-662; 33 U.S.C. 2201 *et seq*.), as amended. The Act authorizes the Corps to provide assistance in the form of design and construction for water-related environmental infrastructure and resource protection and development projects in New Mexico. The project area is located within the Alamogordo city limits, on the Alamogordo North USGS 7.5' Quadrangle, T. 16 S., R. 10 E., sections 7 and 8. (Enclosure 1). The Area of Potential Effect (APE) for this project consists of 61.0 acres, including the reservoir area and its associated buried storm drain and outflow retention pond (Enclosure 2). Within the existing reservoir area, the project entails the removal of concrete curbs, fences and other structures at the outflow location and the construction of a new outfall structure at the southeast end of the reservoir. From the new Griggs Reservoir outfall structure, a new storm drain will be excavated to the south and west, across Florida Avenue, to a

constructed channel that will direct water to the existing channel that runs north south at the end of 25th street.

The City of Alamogordo contracted with Tierra Right of Way (Tierra) to conduct a cultural resources survey of the APE. Tierra archaeologists conducted a complete, systematic pedestrian survey of the entire APE on January 18 and 19, 2017. Their report, titled ***Cultural Resources Inventory for Construction of Public Works Yard Flood Control Project, City of Alamogordo, Otero County, New Mexico***, is enclosed for your review (Enclosure 3). One historic property (HCPI #44367) and four isolated occurrences were documented during the course of survey. HCPI #44367 is the remnants of a historic earthen dam that created the Griggs Reservoir, and an associated water intake feature. The earthen dam is estimated to have been constructed sometime between 1898 and 1907 by the Alamogordo Improvement Company. A valve on the water intake structure dates to 1945. Tierra recommended HCPI #44367 not eligible to the National Register of Historic Places (NRHP) due to the compromise of various aspects of its integrity, including the breaches in the earthworks, historic features that are no longer extant, and lack of integrity of setting due to recent land development. The four isolated occurrences all date to the last century, and consist of a shallow pond feature, a rusted license plate fragment, a crushed metal bucket, and three large rusted metal tanks. Tierra also recommended that all of the isolated occurrences be considered not eligible to the NRHP.

Upon reviewing Tierra's report, the Corps agrees that the historic resources discovered by Tierra during survey are **not eligible** to the NRHP. Further conversation by USACE with City of Alamogordo engineer Bob Johnson indicated that the curb, gutter, asphalt and underground utilities that will be disturbed in order to place the new storm drain were replaced between 2011 and 2012, and the sidewalk was installed by city crews in 2013 or 2014. Tierra recommended that the proposed project will have no adverse effect to historic properties, but based on Tierra's findings and the supplemental information from the City of Alamogordo, the Corps determines that the proposed Griggs Reservoir Outfall Structure Modification Project will result in **no historic properties affected.** The Corps seeks your concurrence with these determinations.

Pursuant to 36 CFR 800.2, consulting parties in the Section 106 process identified for the proposed project include the Corps and your office. Native American tribes and local governments that have cultural resource concerns within Otero County, New Mexico, were sent scoping letters for this project, and include the Mescalero Apache Tribe, the Pueblo of Isleta, the Comanche Nation of Oklahoma, the Kiowa Tribe of Oklahoma, the Pueblo of Ysleta del Sur, the Alamo Navajo Chapter, and the Ramah Navajo Chapter. No Traditional Cultural Properties and no Indian Trust Assets are known to occur within or adjacent to the project's APE.

Pursuant to 36 CFR 800.13, should previously unknown artifacts or historic properties be encountered during construction, work would cease in the immediate vicinity of the resource. A determination of significance would be made, and further consultation would be conducted to determine the best course of action.

If you have any questions or require additional information concerning the Griggs Reservoir Outfall Structure Modification Project, please contact Christina Sinkovec, archaeologist, at (505) 342-3168 (christina.b.sinkovec@usace.army.mil), or myself at (505) 342-3281 (george.h.macdonell@usace.army.mil). You may also provide comments to the above address.

Sincerely,

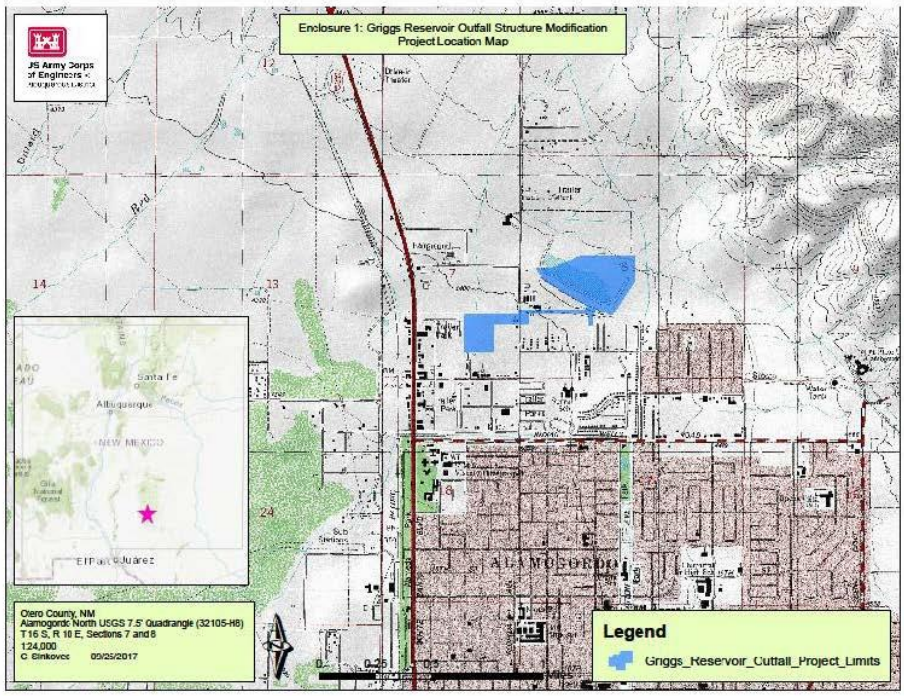
George H. MacDonell
Chief, Environmental Resources Section

_____ I CONCUR_____
Date JEFF PAPPAS
NEW MEXICO STATE HISTORIC
PRESERVATION OFFICER

Enclosures

REFERENCES:

Cullen, Sara L.
2017 Cultural Resources Inventory for Construction of Public Works Yard Flood Control Project, City of Alamogordo, Otero County, New Mexico. Report prepared by Tierra Right of Way for the City of Alamogordo Municipal Government. Tierra Archaeological Report No. 2017-026.


Enclosure 1: Griggs Reservoir Outfall Structure Modification
Project Location Map
JS Army Corps
of Engineers
Santa Fe
Albuquerque
NEW MEXICO
El Paso/Juarez
ALAMOGORDO
Otero County, NM
Alamogordo North USGS 7.5' Quadrangle (32105-H8)
T 16 S, R 10 E, Sections 7 and 8
1:24,000
C Sinkovec 05/25/2017
Legend
Griggs_Reservoir_Outfall_Project_Limits

APPENDIX E

Notice of Availability

NOTICE OF AVAILABILITY

Draft Environmental Assessment (DEA)
and
Finding of No Significant Impact (FONSI)
for the
Griggs Outfall Structure Modification Project
City of Alamogordo, Otero County, New Mexico

The U.S. Army Corps of Engineers (USACE), Albuquerque District, has released the "Draft Environmental Assessment (DEA) and Finding of No Significant Impact (FONSI) for the Griggs Outfall Structure Modification Project, City of Alamogordo, Otero County, New Mexico".

Public review of the DEA will begin on March 24, 2018 and will run for 30 days until April 22, 2018. The document will also be available on the USACE web site at http://www.spa.usace.army.mil/Missions/Environmental/Environmental-Compliance-Documents/Environmental-Assessments-FONSI. A hard copy will be sent upon written request.

Comments on the DEA / FONSI should be sent to:

U.S. Army Corps of Engineers
Albuquerque District
Environmental Resources Section
Attn: CESPA-PM-LE (Summer Schulz)
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Paper copies of this document are also available for review at:

Alamogordo Public Library
920 Oregon Avenue
Alamogordo, New Mexico 88310

For more information contact Summer Schulz at Summer.P.Schulz@usace.army.mil or (505) 342-3372.

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