Supplemental Environmental Assessment

UPDATED CONVEYANCE TREATMENTS PHASE IV FOR LA JOYA ACEQUIA

La Joya, Socorro County, New Mexico

Section 1113 Water Resources Development Act

Prepared By:

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US Army Corps of Engineers ®
Albuquerque District

November 2019

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U.S. ARMY CORPS OF ENGINEERS

ALBUQUERQUE DISTRICT

FINDING OF NO SIGNIFICANT IMPACT

UPDATED CONVEYANCE TREATMENTS FOR LA JOYA ACEQUIA PHASE IV
SECTION 1113 WATER RESOURCES DEVELOPMENT ACT
LA JOYA, SOCORRO COUNTY, NEW MEXICO

The U.S. Army Corps of Engineers, Albuquerque District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Final Supplemental Environmental Assessment (FSEA) dated **12 November 2019**, for the **La Joya Acequia Phase IV and Supplement Project** addresses **continued acequia rehabilitation** of the **La Joya Acequia, La Joya, Socorro County, New Mexico**. The final recommendation is contained in Section 4 of the FSEA.

The FSEA, incorporated herein by reference, evaluated alternatives that would provide a reliable, efficient, low-cost, and low-maintenance system for the continued conveyance and distribution of water for use by the members of the La Joya Ditch Association in the project area. The recommended Acequia Rehabilitation action includes:

Phase IV Reach

- Rehabilitation of approximately 802 linear feet of earthen channel with a concrete-lined channel.
- Rehabilitation of approximately 263 linear feet of earthen channel with a combination structure, which includes a shallow earthen channel overlying a 48-inch pipe.
- Construction of a concrete headwall meant to serve the upstream end of the proposed 48-inch pipe.
- Construction of an interim grade control structure located at the southern end of this reach.
- Construction of various riprap erosion protection measures meant to address existing scour threatening the Acequia.
- Construction of approximately 975 linear feet of a new maintenance road and drainage diversion berm, which parallel the existing northern reach.

Supplemental Village Reach

- Rehabilitation of approximately 1,158 linear feet of earthen channel with a concrete-lined channel.
- Construction of a new concrete headwall for the culvert crossing at Camino del Rio.
- Construction of an 11-foot wide maintenance road that parallels the Acequia on the west side of the channel located within the Acequia right-of-way.
- Replacement of 8 head gates with new concrete headwalls, gates & frames, and culverts.
- Remove and reinstall existing fencing at selected locations within the project limits. Reinstallation would include new fence posts.
- Installation of bollards for the protection of exiting power poles within the Acequia right-of-way.
- Construction of a new concrete headwall for the culvert crossing located at an existing dirt road, which marks the southern boundary of the project.

- Construction of various riprap erosion protective measures meant to address scour concerns threatening the existing and proposed maintenance road.
- Re-construct points of connection for two private access drives impacted by the project improvements.
- Establishment of temporary contractor staging area near the intersection of the Acequia and Camino del Rio located west of the Acequia.
- Establish a site for the stockpiling of excess soil generated as part of the project earthwork operations.
- Post-construction reclamation of access, staging, and stockpile locations using approved seed mixes (native for the upland and pasture grasses for the horse pasture) after construction has been concluded to improve the likelihood of success, as well as providing improved wildlife habitat. Care would be taken to avoid the spread of exotic weed species to and from the proposed project site.

In addition to the recommended acequia rehabilitation alternative, a "no action" alternative was evaluated. For both alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☐	☐	☒
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☐	☐	☒
Wildlife and migratory birds	☐	☐	☒
Vegetation	☒	☐	☐
Threatened/Endangered species/critical habitat	☐	☐	☒
Historic properties	☐	☒	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☐	☐	☒
Land use	☐	☐	☒
Navigation	☐	☐	☒
Noise levels	☒	☐	☐
Public infrastructure	☒	☐	☐
Socio-economics	☐	☐	☒
Environmental justice	☐	☐	☒
Soils	☐	☐	☒
Tribal trust resources	☐	☐	☒
Water quality	☐	☐	☒
Climate change	☐	☐	☒
Prime and unique farmland	☐	☐	☒
Recreational resources	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) would be implemented, if appropriate, to minimize impacts and are listed below:

- Project activity would occur between September and March, outside the migratory bird nesting season, to avoid direct and indirect effects to any birds that may nest, migrate through, or forage in the general vicinity of the project.
- Sediment and erosion controls would be in place during the construction period. Following construction, the soil would be stabilized and all disturbed areas would be revegetated with appropriate native species.
- All construction equipment would be cleaned before entering and upon leaving the study area to prevent introduction or spread of invasive species. Equipment that was previously used in a waterway or wetland would be disinfected to prevent spread of aquatic disease organisms.
- Access roads and disturbed soil will be wetted. Stockpiles of debris, soil, sand, or other materials that could produce dust will be wetted or covered. All fill material, rubble, and spoil will be covered while being transported to or from the project site.
- All servicing and fueling of equipment would be conducted in a designated area hydrologically isolated from surface waters. Emergency spill kits will be placed in the designated fueling area.
- A Spill Control Plan will be required for this project. All heavy equipment will carry a spill kit and the operator shall be knowledgeable in the use of spill containment equipment.

Public review of the Draft Supplemental EA and FONSI were completed on **4 October 2019**. All comments submitted during the public review period have been responded to in the FSEA and FONSI.

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the Corps has determined that the recommended plan will have no effect on federally listed species or their designated critical habitat.

Pursuant to Section 106 of the National Historic Preservation Act and 36 CFR Part 800, the Corps has evaluated the National Register of Historic Places (NRHP) eligibility of archaeological and historic sites in or near the area of Potential Effect (APE) for the proposed acequia rehabilitation alternative, which include LA 31768, LA 31769, LA 31770, LA 88333 (the Village of La Joya de Sevilleta), and LA 109835 (the La Joya Acequia itself), and all of these sites have been previously determined eligible to the NRHP. LA 31768, LA 31769, and LA 31770 are sufficiently outside the APE that they will not be affected by project activities.

Since more than 50 percent of the La Joya Acequia will now be lined with concrete or piped, and because a section of these alterations affects the section of the Acequia within the site boundaries of the historic Village of La Joya, it is the Corps' determination that the proposed work on the Acequia constitutes an adverse effect to the historic Village of La Joya (LA 88333) and the La Joya Acequia itself (LA 109835). The New Mexico State Historic Preservation Officer (SHPO) concurred with Corps' findings on March 18, 2018. Therefore, the Corps and the SHPO have entered into a Memorandum of Agreement (MOA), which details a series of agreed-upon mitigation steps to resolve adverse effects to historic properties for the current project and future undertakings.

Two staging and spoil areas were surveyed for the proposed project. No historic properties or archaeological sites were discovered during the course of that survey. The Corps determined that the proposed project will have no effect on historic properties in the newly surveyed areas. Consultation with the SHPO regarding the staging and spoil pile area survey will be completed prior to project implementation.

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 and Historic Preservation Division's 2007 Native American Consultations List, American Indian Tribes that have indicated they have concerns in this portion of Socorro County have been contacted regarding the proposed project. Currently, there are no known cultural resources or traditional cultural properties concerns.

Pursuant to the Clean Water Act of 1972, as amended (CWA), the discharge of dredged or fill material associated with the recommended plan has been found to meet the requirements of a Nationwide Permit. Certain discharges associated with the construction and maintenance of irrigation ditches are exempt from Section 404 permit requirements (33 CFR 323.4(a), Exemption No. 3). Therefore, a Department of the Army permit under section 404 of the CWA is not required.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. **No other issues were raised relative to other environmental laws and/or Executive Orders.**

All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State, and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

15 November 2019

Date

Larry D. Caswell, Jr.

LTC, U.S. Army Corps of Engineers

District Commander

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LIST OF ACRONYMS USED

APE	Area of Potential Effect
ARMS	New Mexico Archaeological Record Management Section
BDANWR	Bosque del Apache National Wildlife Refuge
BMPs	Best Management Practices
CAR	Coordination Act Report
Corps	U.S. Army Corps of Engineers
CPR CoP	Climate Preparedness and Reslience Community of Practice
CWA	Clean Water Act
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
HTRW	Hazardous, Toxic, and Radioactive Waste
ISC	New Mexico Interstate Stream Commission
MOA	Memorandum of Agreement
MRGCD	Middle Rio Grande Conservancy District
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMCRIS	New Mexico Cultural Resources Inventory System
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
LERRDs	Lands, Easements, Rights-of-way, Relocations, and Disposal Areas
OMRR&R Manual	Operation, Maintenance, Repair, Rehabilitiation, and Replacement Manual
Reclamation	U.S. Bureau of Reclamation
Service	U.S. Fish and Wildlife Service
SHPO	State Historic Preservation Office
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Office
USGS	U.S. Geological Survey

1 INTRODUCTION

The Water Resources Development Act of 1986 (Public Law 99-662) (Act) authorized the restoration and rehabilitation of irrigation ditch systems (acequias) in New Mexico. Under Section 1113 of the Act, Congress has found that New Mexico's acequias date from the eighteenth century and, due to their significance in the settlement and development of the western U.S., should be restored and preserved for their cultural and historic values to the region. The Secretary of the Army, therefore, has been authorized and directed to undertake, without regard to economic analysis, such measures as are necessary to protect and restore New Mexico's acequias, with a non-Federal work share of 25 percent. The U.S. Army Corps of Engineers, Albuquerque District (Corps), in cooperation with the New Mexico Interstate Stream Commission (ISC), and at the request of the La Joya Acequia Association (Ditch Association), a community ditch association in Socorro County, NM, proposes to continue the rehabilitation of the La Joya Acequia (Acequia, ditch) to stabilize the historic ditch and provide a more efficient flow of water to the system while also protecting adjacent property.

The Acequia is the only communal acequia system between Albuquerque and Elephant Butte Reservoir as all other irrigation canals are part of Middle Rio Grande Conservancy District (MRGCD). The 8.9 mile Acequia begins just south of Highway 60 along the inland edge of the floodplain on the east-side of the Rio Grande. The return flows from the Acequia empty into the river via the Bernardo Arroyo about two miles south of the Village of La Joya. The Ditch Association is authorized to divert up to 36 cubic feet per second for three acre-feet per acre per year and provides irrigation water to about 800 acres of farmland.

The Corps has been assisting the Ditch Association on the Acequia since 1991, and has been working on related rehabilitation projects under Section 1113 of the Act since 1996. To date, the Corps has completed three other rehabilitation projects on portions of the Acequia. In 1996, the Corps completed 4,620 feet of concrete-lining of the Acequia, and replacement of 1,993 feet of open ditch with buried 48-inch diameter pipe. In addition, culverts at two arroyo crossings were replaced with pipe plus 10-foot long concrete transition structures at each end of the arroyo crossing for the transitions between ditch and pipe.

In September 2001, the Corps' signed a Finding of No Significant Impact (01 FONSI) for the work described in the "Conveyance Treatment for La Joya Acequia, Socorro County, NM, in September of 2001" Environmental Assessment (USACE 2001, "01 EA"). For that project, 4,765 feet of additional ditch was replaced with 48-inch diameter pipe. In addition, 6,395 feet of ditch was reshaped, placed on proper grade and lined with concrete to produce a smooth, trapezoidal channel for efficient water conveyance. Four arroyo crossings were rebuilt with buried 48-inch diameter pipe, plus hardened transition/ protection structures. One 15-foot wide dirt service road was constructed on the east bank of the ditch to provide the acequia association with required maintenance.

A 2008 Supplemental EA and FONSI (USACE 2008, "08 Supplemental EA/FONSI") analyzed the further rehabilitation of 965 feet of earthen channel with concrete lining, replacement of 200 feet of existing buried pipe under the Salas Arroyo with new 48-inch pipe reinforced with two-inch wire rip-rap, and construction of a ten-foot maintenance road paralleling the Acequia on the west-side of the channel located approximately 30 feet from the center of the ditch. The project also included installation of a new 48-inch check gate, and a new 12-inch diameter turn-out gate.

In 2018, the Ditch Association again approached the Corps with Phase IV, a request for continued maintenance on the downstream Acequia segments, including a supplemental section in the middle of the

Village of La Joya to address safety concerns, and is addressed in this La Joya Acequia Phase IV Supplemental EA.

Project Description and Purpose and Need

The La Joya Acequia system experiences significant conveyance losses, evapotranspiration, weak embankments, high sedimentation, and damages by high flows from arroyos. In addition, the mature and decadent cottonwood trees which line the embankment along the in-town segment are susceptible to wind damage that could result in major ditch failure. These challenges result in water loss and high maintenance costs to dredge the conveyance channel and repair damages. This instability has also shown to be a major issue during flooding, and has the potential to damage property and housing that parallel the Acequia.

The proposed project work as described below in this Supplemental EA is designed to address these challenges, thereby providing a reliable, efficient, low-cost, and low-maintenance system for the continued conveyance and distribution of water for use by the members of the Ditch Association.

Two separate reaches of the Acequia are identified for rehabilitation: the Phase IV Reach, and the Supplemental Village Reach:

Phase IV Reach

- Rehabilitation of approximately 802 linear feet of earthen channel with a concrete-lined channel.
- Rehabilitation of approximately 263 linear feet of earthen channel with a combination structure, which includes a shallow earthen channel overlying a 48-inch pipe.
- Construction of a concrete headwall meant to serve the upstream end of the proposed 48-inch pipe.
- Construction of an interim grade control structure located at the southern end of this reach.
- Construction of various riprap erosion protection measures meant to address existing scour threatening the Acequia.
- Construction of approximately 975 linear feet of a new maintenance road and drainage diversion berm, which parallel the existing northern reach.

Supplemental Village Reach

- Rehabilitation of approximately 1,158 linear feet of earthen channel with a concrete-lined channel.
- Construction of a new concrete headwall for the culvert crossing at Camino del Rio.
- Construction of an 11-foot wide maintenance road that parallels the Acequia on the west side of the channel located within the Acequia right-of-way.
- Replacement of 8 head gates with new concrete headwalls, gates & frames, and culverts.
- Remove and reinstall existing fencing at selected locations within the project limits. Reinstallation would include new fence posts.
- Installation of bollards for the protection of exiting power poles within the Acequia right-of-way.
- Construction of a new concrete headwall for the culvert crossing located at an existing dirt road, which marks the southern boundary of the project.
- Construction of various riprap erosion protective measures meant to address scour concerns threatening the existing and proposed maintenance road.
- Re-construct points of connection for two private access drives impacted by the project improvements.
- Establishment of temporary contractor staging area near the intersection of the Acequia and Camino del Rio located west of the Acequia.

- Establish a site for the stockpiling of excess soil generated as part of the project earthwork operations.
- Post-construction reclamation of access, staging, and stockpile locations using approved seed mixes (native for the upland and pasture grasses for the horse pasture) after construction has been concluded to improve the likelihood of success, as well as providing improved wildlife habitat. Care would be taken to avoid the spread of exotic weed species to and from the proposed project site.

Project Location

The Acequia is located east of Bernardo, between Belen and Socorro, and runs through the Village of La Joya in Socorro County, in central New Mexico (Figure 1). The 8.9-mile Acequia begins just south of New Mexico Highway 60 just above the inland edge of the floodplain and generally parallels the Rio Grande along the east side. The proposed project area is a 0.20-mile reach of ditch beginning just south of the Salas Arroyo (La Joya Acequia Rehabilitation Phase III), as well as a 0.22-mile supplemental reach within the Village of La Joya. The Acequia falls within the La Joya and Abeytas, New Mexico, U.S. Geological Survey (USGS) 7.5- minute quadrangle maps.

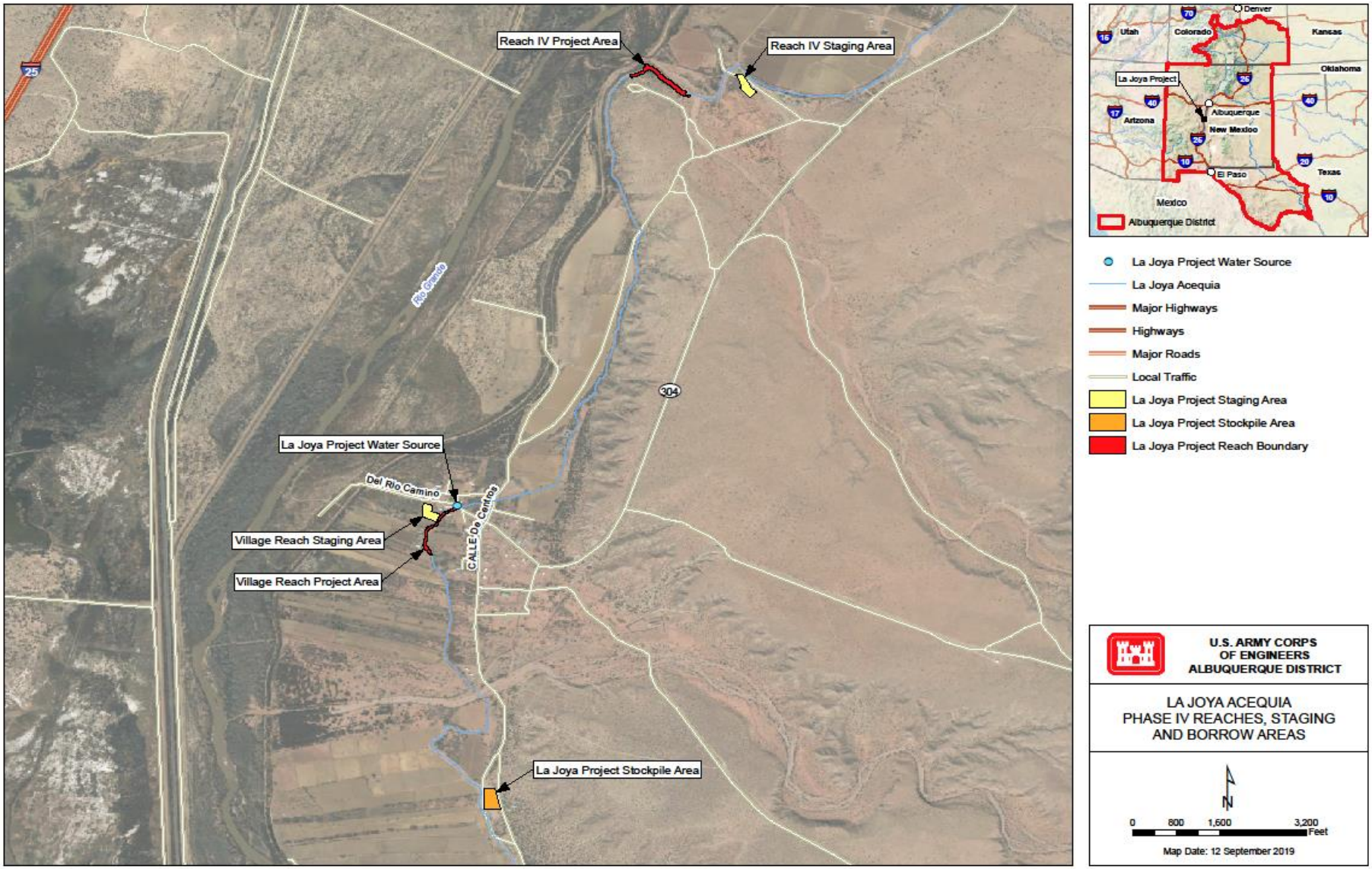

Figure 1: La Joya Acequia Proposed Rehabilitation Phase IV Project Area Location, Socorro County, New Mexico.

Alternative Description

In general, standard earthen acequia rehabilitation is accomplished either by installing pipe in the old conveyance channel, lining the channel with concrete, lining the channel with plastic, or a combination of these methods. This proposed project would include a combination of concrete-lined channel, as well as a structure of an earthen channel constructed over a pipe. For the latter structure, the pipe would convey irrigation waters of the Acequia while the channel is meant to convey storm water runoff. This new earthen channel would be subject to damaging flows and require maintenance to address scour, sedimentation, and vegetation control by the Ditch Association.

Factors that can determine the particular method of acequia rehabilitation include the elevation and slope of land adjacent to the conveyance channel, public safety, and cost. Seepage problems and bank stabilization are resolved with either piping or concrete lining. Maintenance of open, concrete-lined channels is the easiest as areas requiring repairs are readily identified and accessible. Open channels are aesthetically pleasing and in keeping with the cultural and historical nature of these structures. Buried pipe eliminates public safety concerns associated with open channels, eliminates sediment entry from adjacent soil erosion in sloped areas, and eliminates blockages from external debris. At the base of slopes, replacing the earthen ditch with pipe can restore natural subsurface hydrology. Pipe or concrete linings both provide for more efficient distribution of irrigation water to the users, and reduced maintenance of the system. In this case, the remaining section of the Acequia would be concrete-lined to maintain the cultural and historical integrity, aesthetics, increase bank stability, and decrease maintenance costs.

The No Action alternative would have the non-engineered earthen ditch remain as-is, including remaining susceptible to damaging flows, poor efficiency due to continued leakage and seepage, and require constant maintenance by the Ditch Association.

Authority

This Supplemental EA has been prepared consistent with the following authorities as provided by Congress.

The Acequia Rehabilitation Program of Section 1113 of the Water Resources Development Act of 1986 (P.L. 99-662) authorizes and directs the Secretary of the Army:

> *…to undertake, without regard to economic analysis, such measures as are necessary to protect and restore the river diversion structures and associated canals attendant to the operations of the community ditch and Acequia systems in New Mexico that are declared to be a political subdivision of the State of New Mexico. The non-Federal share of any work undertaken under this section shall be 25 percent.*
>
> And *…to consider the historic Acequia systems (community ditches) of the southwestern United States as public entities, if these systems are chartered by the respective State laws as political subdivisions of that State. This public entity status will allow the officials of these Acequia systems to enter into agreements and serve as local sponsors of water-related projects of the Secretary.*

Compliance with Applicable Laws, Policies, and Plans

This Supplemental EA was prepared by the Corps, in compliance with all Federal, State, and local requirements, and in accordance with the local project Sponsor, and other stakeholders within the project area.

1.1.1 Federal Requirements

This Supplemental EA was prepared by the Corps 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 (16 U.S.C. §470 *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 1986 (P.L. 99-662, Sec. 1113)
- Plant Protection Act of 2000 (7 U.S.C §7701 et seq.)
- Energy and Water Resources Development Appropriations Act of 2004 (P.L. 108-137, Sec. 117)
- EO 13653: Preparing the United States for the Impacts of Climate Change, 2013
- Protection of Historic and Cultural Properties (36 CFR Part 800 *et seq.*)
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Part 1500 *et seq.*)
- U.S. Army Corps of Engineers' Procedures for Implementing NEPA (33 CFR Part 230; ER 200-2-2)
- EO 13751: Safeguarding the Nation from Impacts of Invasive Species, 2016
- EO 13834: Efficient Operations, 2018

2 ALTERNATIVES CONSIDERED

Two alternatives are considered for NEPA analysis, including the No Action Alternative, which is used as the comparison basis, and the Acequia Rehabilitation Alternative, which addresses the needs of the Ditch Association.

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 cost-shared and locally supported project. The No Action Alternative would not include any of the necessary continued ditch rehabilitation work, nor would it alleviate risks to public health and safety associated with the supplemental La Joya section within the Village. Under this alternative, there would neither be improvements nor modifications to the existing leaking, non-engineered sections of the Acequia.

Acequia Rehabilitation Alternative (Preferred)

A continuation of prior rehabilitation work completed on the Acequia, the proposed La Joya Acequia Phase IV improvements and modifications include work along two reaches to provide a reliable, efficient, low-cost, and low-maintenance system for the continued conveyance and distribution of water for use by the members of the Ditch Association.

The two separate reaches of the Acequia identified for rehabilitation beginning in fall 2019/ winter 2020 are the Phase IV Reach and the Supplemental Village Reach. Summaries of proposed work planned for each reach are listed below (see Figures 2 and 3 below).

Phase IV Reach

- Rehabilitation of approximately 802 linear feet of earthen channel with a concrete-lined channel.
- Rehabilitation of approximately 263 linear feet of earthen channel with a combination structure, which includes a shallow earthen channel overlying a 48-inch pipe.
- Construction of a concrete headwall meant to serve the upstream end of the proposed 48-inch pipe.
- Construction of an interim grade control structure located at the southern end of this reach.
- Construction of various riprap erosion protection measures meant to address existing scour threatening the Acequia.
- Construction of approximately 975 linear feet of a new maintenance road and drainage diversion berm, which parallel the existing northern reach.

Supplemental Village Reach

- Rehabilitation of approximately 1,158 linear feet of earthen channel with a concrete-lined channel.
- Construction of a new concrete headwall for the culvert crossing at Camino del Rio.
- Construction of an 11-foot wide maintenance road that parallels the Acequia on the west side of the channel located within the Acequia right-of-way.
- Replacement of 8 head gates with new concrete headwalls, gates & frames, and culverts.
- Remove and reinstall existing fencing at selected locations within the project limits. Reinstallation would include new fence posts.
- Installation of bollards for the protection of exiting power poles within the Acequia right-of-way.

- Construction of a new concrete headwall for the culvert crossing located at an existing dirt road, which marks the southern boundary of the project.
- Construction of various riprap erosion protective measures meant to address scour concerns threatening the existing and proposed maintenance road.
- Re-construct points of connection for two private access drives impacted by the project improvements.
- Establishment of temporary contractor staging area near the intersection of the Acequia and Camino del Rio located west of the Acequia.
- Establish a site for the stockpiling of excess soil generated as part of the project earthwork operations.
- Post-construction reclamation of access, staging, and stockpile locations using approved seed mixes (native for the upland and pasture grasses for the horse pasture) after construction has been concluded to improve the likelihood of success, as well as providing improved wildlife habitat. Care would be taken to avoid the spread of exotic weed species to and from the proposed project site.

Restoration of all disturbed areas, including grading and seeding (to include access, staging areas, and stockpile locations) would occur after construction. The vegetative seed mix would include native species for the upland sites, as well as pasture grasses for the horse pasture site. These seed mixes would improve the likelihood of successful reclamation, as well as providing improved wildlife habitat. Measures would be taken to avoid the spread of exotic weed species to and from the proposed project site.

The proposed Acequia modifications and improvements may be constructed in various phases based on priority needs. The duration of the proposed construction would be approximately three months, and is planned to start fall 2019.

Environmental Considerations and Mitigation

The construction footprint of the proposed project would remain within the current Acequia and associated easement.

2.1.1 Staging and Stockpile Areas

Construction staging and stockpiling would take place within designated areas shown in Figure 1.

2.1.2 Real Estate

Property within the footprint of the Acequia is owned by and managed by the Ditch Association, which includes a 90-foot wide ditch easement. Temporary staging and temporary access easements would be secured for the Supplemental Village Reach.

2.1.3 Division of Responsibilities

2.1.3.1 *Federal Responsibilities*

The Corps would 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 laws and regulations.

2.1.3.2 *Non-Federal Responsibilities*

The ISC would be responsible for the non-Federal cost-share of 25 percent.

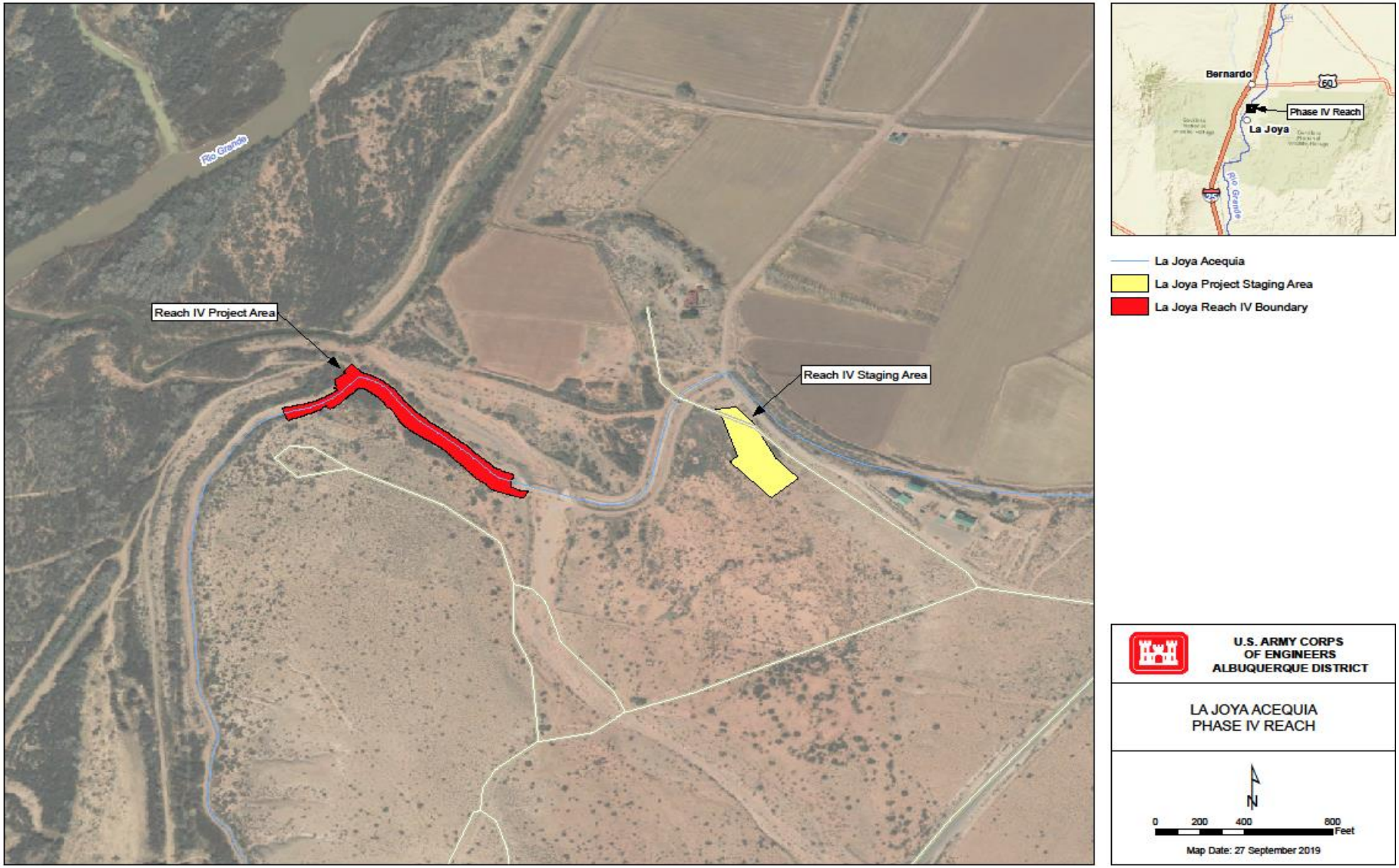

Figure 2: La Joya Acequia Proposed Phase IV Reach project and staging areas.

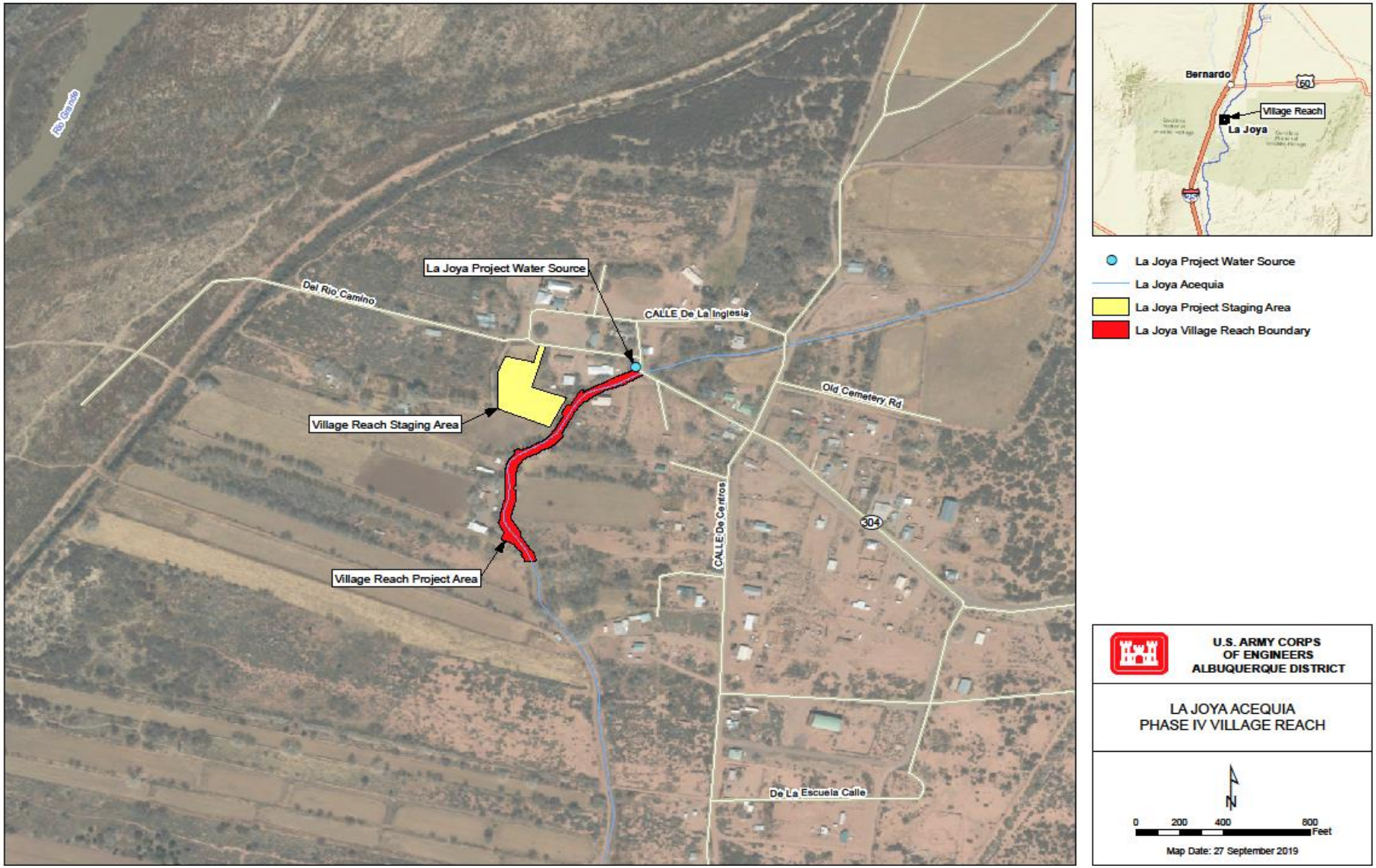

Figure 3: La Joya Acequia Proposed Supplemental Village Reach project and staging areas.

3 AFFECTED ENVIRONMENT and FORESEEABLE EFFECTS

Project alternatives were evaluated in the 01 EA and the rehabilitation work proposed in this Supplemental EA would be accomplished at designated locations within the boundaries as described in both the 01 EA and 08 Supplemental EA. All work would be initiated after the irrigation season in the late fall and winter and completed before the onset of irrigation in the spring. This chapter presents new information not previously presented on the existing physical and biological environment, including climate change, along with project specific cultural conditions, and evaluates the reasonably foreseeable effects.

Physical Environment

The 01 EA and 08 Supplemental EA determined that the previous conveyance treatment had no effect on the following physical resources of the area: physiography soils climate, floodplains and wetlands hydrology, land and water uses, air quality and noise, socioeconomic environment, and aesthetics. Since the proposed work would be within the construction limits of the 01 EA and 08 Supplemental EA, the ensuing paragraphs discuss only those resources that could have changed since the signing of the 01 and 08 FONSIs, or could be impacted by the proposed work.

3.1.1 Climate and Climate Change

Analysis of climate change impacts to all Corps' Civil Works projects is governed by the Corps' Climate Preparedness and Resilience Policy Statement (June 2014), and the Engineering and Construction Bulletin (ECB) 2018-14, Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects. Detailed information on climate change impacts may be found in Appendix A.

3.1.1.1 *Climate and Relevant Climate Variables*

La Joya is located along the Rio Grande between the Sevilleta National Wildlife Refuge and the City of Socorro, in that portion of the Rio Grande watershed commonly termed the Middle Rio Grande. The proposed project rehabilitation of the ditch would address the major problem of water loss by piping and lining of portions of the Acequia. Water for the Acequia originates in the Rio Grande and tributaries upstream of the diversion north of the Village, and this water originates primarily as snowmelt runoff during the winter and early spring.

3.1.1.1.1 Relevant Climate Variables

Conserving water in the face of diminishing water supply is the primary project sponsor concern. The water that flows through the Acequia originates in the Rio Grande, primarily from winter and spring precipitation in the higher elevation portions of the Rio Grande watershed north of Cochiti Dam (the Upper Rio Grande). Therefore, for this project, the primary concern with respect to climate change is the impact of climate change on Rio Grande surface water supply in the future.

The climate in the Rio Grande Basin in New Mexico is determined in large part by its location at the boundary between the arid subtropics and the humid mid-latitudes in the interior of the U.S. (continental, non-coastal location), and its position along the southern margin of the Rocky Mountains.

Spring runoff flows in the Rio Grande at the Acequia diversion point originate almost entirely in the mountains to the north, extending to the Rio Grande headwaters in the San Juan and Sangre de Cristo mountain ranges of Colorado and New Mexico, and the Tusas and Jemez mountains of northern New Mexico. The size of the annual snowpack and, therefore, the amount of available water, varies significantly from year-to-year

depending on the sea surface temperatures in the northeastern tropical Pacific. During El Niño years, the eastern tropical Pacific Ocean surface is warm, producing moister air over the ocean that feeds into winter storm systems, producing wet winters and higher spring and summer flows in the Southwestern U.S., including New Mexico. Dry winters occur when the eastern tropical Pacific Ocean surface is cool, which reduces evaporation and results in dry air over the ocean. Less moisture is available for storm formation and winter precipitation, and spring runoff flows in the southwestern U.S. are reduced (Sheppard et al. 2002). Spring conditions are also important as dust and rain may increase early, pre-agricultural season runoff, while warm, windy days may sublimate a significant share of the snowpack.

With the onset of spring/summer, the study area is dominated by dry air masses and windy conditions in the late spring and early summer. In the late summer (July, August, and September), the North American Monsoon brings moist subtropical air masses into the region, and precipitation is dominated by localized convection and is highly variable within and between years. Local precipitation may reduce agricultural water demand, and cloudy conditions in late summer may reduce evaporative demand.

While monsoon precipitation can impact the available water in the system, and how it is allocated, the dominant control on water availability is the volume and persistence of the snowpack in the Upper Rio Grande. The remainder of this Section focuses on projected impacts of climate change on Upper Rio Grande snowpack and runoff, and the implication of these changes for Middle Rio Grande water supply.

3.1.1.1.2 Recent Changes

3.1.1.1.2.1 Temperature

Temperature increases affect snowpack by reducing the length of the freeze season at all altitudes, increasing the share of winter precipitation that falls as rain, and increasing the amount of snowmelt runoff that occurs during winter and early spring at the expense of a snow pack that persists later in the year and favors more runoff in late spring and summer.

Temperatures in the West have shown a relatively steady rise beginning in the early 20th Century: the consensus view is that recent increases in temperature in the western U.S. exceed observations in the historic record beginning in the late 19th Century (USGCRP 2009). Particularly troubling for the region's snowpack and spring runoff have been increases in winter (January, February, March, or JFM) temperatures. The observational record of 1950 to 1999 shows an increase in maximum average JFM temperatures of 1.53°C (2.8°F) and an increase in minimum average JFM temperatures of 1.72°C (3°F) (Bonfils et al. 2008).

Rates of warming in high elevation areas may be considerably greater than across the Southwest as a whole. In an analysis of National Weather Service and SNOTEL site data in the San Juan Mountains, Rangwala and Miller (2010) detect a rate of warming of 1.8°F (1°C) per decade from 1990 to 2005.

3.1.1.1.3 Recent Precipitation Trends

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 (e.g., Pacific Decadal Oscillation (PDO) vs. El Nino-Southern Oscillation (ENSO)). Because of the high inter-annual, decadal, and longer-term variability in precipitation, detecting changes in precipitation has been more challenging than detecting changes in temperature.

To date, no trends have been observed in annual water year precipitation from 1895/96 through 2010/11 for the six-state Southwest (NOAA 2013b). Seasonal time series show no trends for winter, spring, and summer, and fall shows a slight upward, but not statistically-significant, trend. 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.

3.1.1.1.4 Rio Grande Hydrologic Trends

Consistent with ECB 2018-14, the Corps' Climate Hydrology Assessment Tool was used to investigate observed trends in Rio Grande flows. Long-term reductions in annual peak flows, indicative of reductions in snow melt runoff, are observed in the Rio Grande at the Embudo gage (8279500), which is the primary gage upstream of the river regulation and, therefore, provides a measure of changes in unregulated spring runoff flows in the Rio Grande (see Appendix A). Nonstationarities were detected in the peak flows at this gage, circa 1978 and 1995, consistent in timing with known changes in Pacific SST precipitation forcing due to the PDO.

3.1.1.2 *Existing Conditions Summary*

Analysis for this project was conducted in accordance with ECB 2018-14. La Joya is located in a semi-arid climate region characterized by warm winters and hot summers, and annual precipitation less than 10 inches. The Acequia draws water from the Rio Grande through an upstream diversion and delivers it to fields located on the Rio Grande flood plain. The primary climate–related concern of this study is future water quantity. This is primarily a function of the size and water volume of the headwaters snowpack in mountains of the Upper Rio Grande basin. In recent years, drought conditions have reduced snowpack volumes, and higher winter and spring temperatures have encouraged earlier snow melt. As a result, runoff volumes have been reduced and late summer flows lower than previously in the basin. Snowpack sublimation under warmer and windier spring weather conditions has also been observed.

3.1.1.3 *Projected Climate Futures*

Recent overviews of climate change in the southwestern U.S. have been provided in (Garfin et al. 2013), (Melillo et al. 2014), and NOAA (2013b). Important syntheses of climate change impacts to New Mexico and Colorado include New Mexico Office of the State Engineer (2006) and Ray et al. (2008). Refer to Appendix A – Climate Change of this Supplemental EA for more in-depth analyses and discussion.

3.1.1.3.1 Projected Changes in Temperature and Precipitation

Climate change in the Upper Rio Grande basin was modeled by the U.S. Bureau of Reclamation (2011a, b; Reclamation) using the Hybrid Delta-ensemble approach (Brekke et al. 2010) employing output from 16 models from the CMIP3 multi-model dataset. The basin-average mean-annual temperature is projected to increase by approximately 1.8-3.3°C (5-6°F) during the 21st Century (USBOR 2011a) relative to the 1990s. Temperature changes are anticipated to be uniform over the basin and to increase steadily through time.

Median precipitation declines by about 2.5 percent relative to the historic baseline, with 50 percent of the values ranging between -10 to +2.5 percent, and the limits of the full dataset ranging from about-22 to +15 percent relative to the baseline. The projected declines are in line with the 0-10% declines cited by Barnett and Pierce (2009).

3.1.1.3.2 Hydrologic Impacts

Hydrologic changes have been studied primarily at the regional and watershed levels, with most efforts focused on the Colorado and Upper Rio Grande basins.

Reductions in snowpack, declines in snow water equivalence, and advances in snowmelt are all projected to contribute to substantial declines in flows in the Southwest's rivers (Cayan et al. 2013). Studies of the Colorado River show that flow on the Colorado River is likely to be reduced by 10 to 30 percent (see discussion in Barnett and Pierce 2009), which may result in large reductions in New Mexico's share of the Colorado Upper Basin water (USBOR et al. 2013). However, due to earlier spring snowmelt and higher evaporation rates, it is projected that the total basin storage in regional reservoirs could decline by as much as 32 to 40 percent (Christensen et al. 2004, Leung et al. 2004). Since the headwaters of the Rio Grande are located farther south than those of the Colorado, it is probable that projected declines in flow in the Rio Grande will equal or exceed those for the Colorado River (Cayan et al. 2013). Changes in temperature and precipitation patterns are expected to drive reductions in snowpack (Elias et al. 2015). Higher temperatures are projected to delay the date at which precipitation falls as snow in the fall and cause a four to six week earlier shift in the date at which precipitation reverts to rain in the spring. The altitude at which a winter snowpack will develop is anticipated to rise. In 2005, the RMCO (2005) noted that 10 of the previous 16 years in the Rio Grande Basin had snowpack below the long-term average, a trend that has continued since.

Regional climate models driven by high emissions scenarios indicate that the snowpack may be non-existent south of 36°N (approximately the latitude of the City of Española, NM) by 2100 (Gutzler et al. 2006). The same study showed reductions in snow water equivalence of approximately one-third to one-half (approximately 50-200 mm of water) compared to the 1961 to 1985 average in the San Juan Mountains.

Lower overall snowpack volume and SWE, and earlier snowpack melting, are expected to drive down low summer flows (Gleick 2000). The net effect of these changes is projected to be reduction in available surface water. At the same time, increased temperatures are likely to increase potential evaporation across the region, and drought conditions are likely to become more frequent and more intense. Crop water demand is likely to rise as a result.

3.1.1.4 *No Action Alternative*

Models project substantial warming over the 21st Century of 5 to 7°F by year 2100 as compared to late 20th Century averages. Modeling using RCP scenarios suggests warming may reach as much as 8.5 to 10°F by year 2100 under plausible high emissions (large radiative forcing) scenarios, which is slightly higher than earlier estimates. Even with no net changes in precipitation, such warming will exert profound effects on regional hydrology by altering snowpack, spring runoff and evaporation rates. Hydrologic modeling by Reclamation indicates an up to 33 percent reduction in Rio Grande water supply in the 21st Century (USBOR et al. 2013). Snowpack changes are likely to cause these flows to peak earlier in the water year, and for late summer flows to be reduced relative to today as a result. Water supply is very likely to remain a critical issue for Acequia users.

3.1.1.5 *Acequia Rehabilitation Alternative*

The proposed Acequia rehabilitation project would have no significant impact on regional climate.

3.1.1.6 *Projected Impacts to Project Features (Resilience Risk)*

Resilience risk refers to risks to the project or its performance due to climate change that have not been mitigated by project design. Table 1 outlines the vulnerability of the proposed project to climate change, and summarizes climate change impacts and risks.

Table 1: Climate change impacts to project features.

Measure	Vulnerability	Projected Climate Change Impacts and Qualitative Risks
Acequia modification This structural solution is designed to reduce water loss to evaporation and seepage between the diversion dam at the Rio Grande and its use in La Joya.	Decreases in stream flow that might reduce water availability in the Acequia.	Impacts: • Smaller snowpacks, advances in spring runoff timing may lead to reductions in total runoff volumes, and decreases in late summer base flow, which may reduce available water supply. • Increased temperature and decreased soil moisture / precipitation could lead to increased crop water demand. Risks: • The Acequia may have less water to transmit during parts of the growing season.

3.1.2 Water Resources and Water Quality

3.1.2.1 *Existing Environment*

Surface water is diverted from the Rio Grande at the Isleta Diversion Dam into the Peralta Canal. Unconsumed water from Peralta is diverted back into the Rio Grande or into the San Juan Canal, the source of water to the Acequia system. A schematic of the conveyance system and associated streamflow gages, including the supply to the Acequia system, are available via the Reclamation website: https://www.usbr.gov/uc/albuq/water/ETtoolbox/rg/riog/schematic/SCHEMATICbelendiv.html.

Unconsumed water in the Acequia, although rare, eventually discharges into the Rio Grande via a drain upstream of the San Acacia Diversion Dam. However, the U.S. Environmental Protection Agency (EPA) and State of New Mexico do not require a permit under Section 402 (National Pollutant Discharge Elimination System (NPDES)) of the Clean Water Act (CWA) for discharges composed entirely of return flows from irrigated agriculture. As a result, the regulatory agencies do not require routine water quality monitoring and assessment. Furthermore, the Ditch Association has not identified any water quality impacts or concerns. In conclusion, the existing water quality for the system is not currently known, but not considered a concern by regulatory agencies or the local sponsor.

3.1.2.2 *No Action Alternative*

Without construction of the proposed project, there would be no significant impact to water quality in the Village of La Joya, nor to any waters of the U.S. Additionally, benefits associated with the proposed ditch rehabilitation, including providing a reliable, efficient, low-cost, and low-maintenance system for the continued conveyance and distribution of water for use by the members of the Ditch Association, would not be realized.

3.1.2.3 *Acequia Rehabilitation Alternative*

Under this proposed action, under a quarter-mile stretch of Acequia would be realigned within the Village of La Joya. The CWA provides for the protection of waters and wetlands of the U.S. from impacts associated

with irresponsible or unregulated discharges of dredged or fill material in aquatic habitats, including wetlands, as defined under 404(b)(l). However, the CWA also states that certain discharges associated with the construction and maintenance of irrigation ditches are exempt from Section 404 permit requirements (33 CFR 323.4 (a), Exemption No.3). Discharges associated with siphons, pumps, head gates, wing walls, weirs, diversion structures, and other facilities functionally related to irrigation ditches are also included in this exemption. Therefore, a Department of the Army Section 404 permit would not be required for the proposed action. Since the action is exempt from permitting under Section 404, it is also exempt from state certification under Section 401 of the CWA.

Section 402(p) of the CWA specifies that storm water discharges associated with construction activities disturbing one or more acres of total land area must be authorized by an NPDES permit. The proposed 2019/2020 construction will disturb greater than one acre. As a result, the contractor and landowner will apply for coverage under the EPA NPDES Construction General Permit (CGP) at least 14 calendar days before commencing construction activities. Prior to submission of the notice of intent (NOI), the Contractor will develop a Stormwater Pollution Prevention Plan (SWPPP) that meets the minimum requirements of the CGP. Prior to the commencement of earth disturbing activities, site-specific stormwater Best Management Practices (BMPs) will be installed by the Contractor to reduce impacts to the water quality of nearby waterways. The Contractor will be responsible for monitoring and maintaining stormwater BMPs until the construction project has concluded and a Notice of Termination (NOT) has been submitted to EPA. Upon completion of earth disturbing activities all disturbed areas will be stabilized per the CGP. Upon completion of the construction contract, all remaining areas that have not obtained final stabilization will be turned over to the local sponsor for continued adherence to the CGP.

3.1.3 Hazardous, Toxic, and Radioactive Waste

3.1.3.1 *Existing Environment*

To identify and document the recognized environmental conditions (i.e., hazardous, toxic, and radioactive waste (HTRW)) in connection with the proposed project, a Phase I Environmental Site Assessment (Phase 1 ESA) for forestland or rural property was conducted by the Corps (USACE 2019; Appendix D). The Phase 1 ESA was developed following American Society for Testing and Materials (ASTM) guidance (E2247-16). Environmental regulatory records, historic aerial photographs, site reconnaissance, and interviews were used to assess the historic and existing environmental conditions within the project area and buffer.

The Phase 1 ESA has revealed no evidence of recognized environmental concerns within or near the proposed construction project. The Phase 1 ESA did not identify the presence or likely presence of any hazardous substance, or petroleum products on or near the property that indicate an existing release, a past release, or threat of a release into the ground, groundwater, or surface water of the property.

3.1.3.2 *No Action Alternative*

The no action alternative will have no effect on known HTRW, as no recognized environmental concerns within or near the proposed construction project.

3.1.3.3 *Acequia Rehabilitation Alternative*

The future with-project condition will have no effect on known HTRW, as there are no recognized environmental concerns within or near the proposed construction project were identified. Based on the lines of evidence derived from the Phase 1 ESA, a Phase II investigation (ASTM E1903) is not warranted at this time. If areas of concern or contaminants are identified, construction shall be postponed and the Corps will

coordinate with the Ditch Association to determine the appropriate course of action. No HTRW releases are expected from the proposed action, therefore, no significant effects are expected.

Biological Environment

3.1.4 Vegetation

3.1.4.1 *Existing Environment*

Vegetation along the proposed Phase IV Reach is consistent with the prior up-ditch segments with patches of saltcedar (*Tamarix spp.*) established at the upper-end and sparser with more native upland shrubs (four-wing saltbush, rubber rabbitbrush) as the ditch winds along the base of the upland bench towards the Village of La Joya. In contrast, the Supplemental Village Reach runs through irrigated (ditch) and sub-irrigated (shallow groundwater), thereby feeding a variety of agricultural fields, orchards, and both native and non-native uncultivated trees throughout the general area, including native Rio Grande cottonwoods (*Populus fremontii var. wislizenii*).

The Acequia, specifically, is heavily disturbed, with removal/mowing of annual vegetative growth typically occurring at least seasonally to maintain ditch function. Growing in and along the Acequia itself are various annual weedy species, ash, Siberian elm *(Ulmus pumila*), and approximately 10 mature Rio Grande cottonwoods approximately 15 to 25 feet tall standing directly within the section of the ditch that runs through the Village (Figures 4 through 9).

The proposed Phase IV Reach staging area is heavily disturbed from previous construction activities, while the proposed Supplemental Village Reach staging area is located within an irrigated horse pasture adjacent to the ditch (Figures 10 through 12).

Figure 4: La Joya Acequia Proposed Phase IV Reach, upper-end, with water views.

Figure 5: La Joya Acequia Proposed Supplemental Village Reach with and without water views of cottonwood encroachment.

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Figure 6: La Joya Acequia Proposed Supplemental Village Reach without water looking south.

Figure 7: La Joya Acequia Proposed Supplemental Village Reach with water looking south.

Figure 8: La Joya Acequia Proposed Supplemental Village Reach without water looking north.

Figure 9: La Joya Acequia Proposed Supplemental Village Reach with water looking south with invasive trees.

Figure 10: La Joya Acequia Proposed Phase IV Reach staging area.

Figure 11: La Joya Acequia Proposed Supplemental Village Reach staging area.

Figure 12: La Joya Acequia Proposed Phase IV Reach stockpile area.

3.1.4.2 *No Action Alternative*

Under this alternative, there would be no effect to vegetation communities as no proposed project-associated vegetation would be removed, including invasive saltcedar in the Phase IV Reach or Siberian elm in the Supplemental Village Reach.

3.1.4.3 *Acequia Rehabilitation Alternative*

The proposed project would take place in previously disturbed areas, and would eliminate some associated localized vegetation during realignment of the ditch (concrete-lined) and improvement of the 10-foot maintenance road to protect the ditch integrity and adjacent homes from seepage and potential bank failure, all within the current Acequia easement. Saltcedar and sparse shrubs located along the arroyo would be removed in the Phase IV Reach. Vegetation growing in and along the ditch bank within the Supplemental Village Reach would also be removed, including Siberian elm and approximately six mature cottonwood.

All ditch work would be conducted outside the irrigation season (late fall/winter) when water is not present in the Acequia. While the in-Village staging area would be reclaimed back to horse pasture, the upland staging area would be reclaimed using a seed mixture to include a variety of native grasses, forbs, and shrubs; a diverse mixture of flora will improve the likelihood of successful reclamation, as well as providing improved wildlife habitat within the project boundaries. BMPs would be incorporated to ensure exotic weeds are not spread during construction. No significant adverse effects are expected.

3.1.5 Special Status Species

Per project coordination with the U.S. Fish and Wildlife Service (Service) (Consultation #22-2-00-I-174), in October 2001, a *Final Supplemental Fish and Wildlife Coordination Act Report for the Conveyance Treatment for the La Joya Acequia, Socorro County, New Mexico* (USFWS 2001), was received by the Corps, as was Service concurrence with the associated biological assessment in a letter to the Corps dated February 11, 2002. Those special status species not considered by the 01 EA or 08 Supplemental EA's are addressed below.

3.1.5.1 *Existing Environment*

Under Section 7 of the Endangered Species Act, federal project proponents are required to consult with the Service if one or more listed species may be affected by an action. In accordance with Section 7 of the ESA, informal consultation for the proposed La Joya Acequia Phase IV project was initiated with the Service on April 12, 2018, and updated August 20, 2019, *Consultation Code 02ENNM00-2018-SLI-0664*.

Based on previous field assessments conducted along the Acequia, there are no specific species of interest or concern within the project limits, nor were any Federally-listed Threatened, Endangered, or Proposed species observed during the January 26, 2018, April 23, 2018, or July 12, 2019 (breeding season), site visits. During the site visits, very few birds were detected in the project area. Review of the following three Federally- and State-listed special status species with the potential to occur in the area not previously analyzed in the prior EAs, the Service's iPaC assessment tool determined habitat of two species overlap designated critical habitat, while the third was outside designated critical habitat (Table 2, USFWS 2019, Appendix B).

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*, "flycatcher") is known to use the Rio Grande valley on its migratory pathway (Sogge et al 1997). While there is designated critical habitat at the upper end of the project action area, the 2008 Supplemental EA/FONSI, in coordination with the Service, determined that the area does not have suitable habitat for the flycatcher. Therefore, the flycatcher will not be addressed further in this Supplemental EA.

The Western Yellow-billed Cuckoo (*Coccyzus americanus*, "cuckoo") was listed as Federally-threatened in 2014, and, therefore, was not previously addressed. However, though there is designated critical habitat identified at the upper end of the project action area, the Corps has determined that it is not suitable habitat. Therefore, the cuckoo will not be addressed further in this Supplemental EA.

Also in 2014, the New Mexico meadow jumping mouse (*Zapus hudsonius luteu*s, "mouse") was listed as Federally-endangered and populations were identified in the nearby Bosque Del Apache National Wildlife Refuge. However, the mouse has not yet been identified outside of that area, nor is there any critical habitat identified in the project action area. Additionally, the ephemeral Acequia does not have suitable dense riparian/wetland habitat. Therefore, the mouse will not be addressed further in this Supplemental EA.

Table 2: Summary of determined effects to listed species and proposed or designated critical habitat.

Name		Effects Analysis	
Common (Species)	Habitat Type	Species	Critical Habitat
Southwestern Willow Flycatcher *(Empidonax traillii extimus)*	Dense Riparian	Present in Project action area as migrant only	Designated, but not suitable in Project action area
		No effect	No effect
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis)*	Riparian	Present in Project action area as migrant only	Designated, but not suitable in Project action area
		No effect	No effect
New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus)*	Dense Riparian / Wetland	Not considered present in Project action area	Not in Project action area
		No effect	No effect

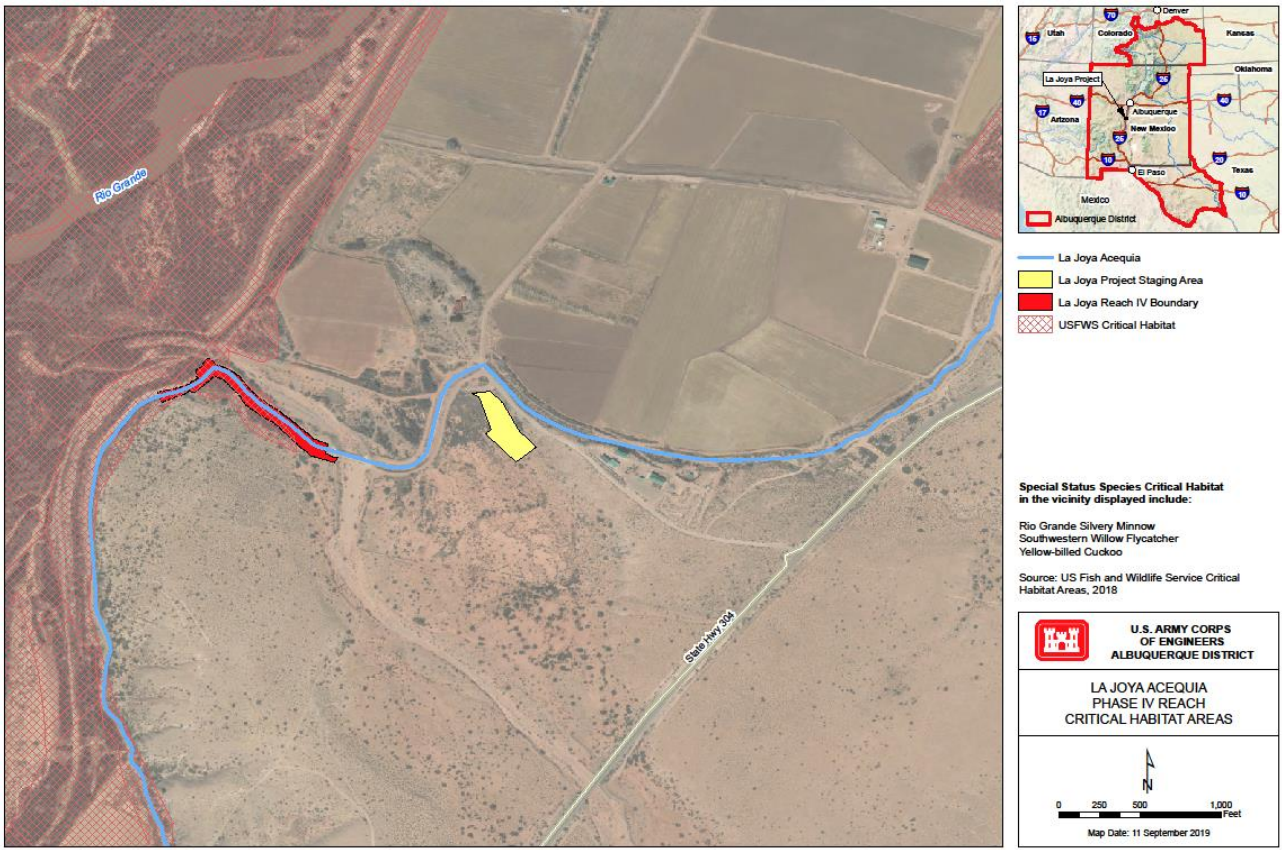

Figure 13: La Joya Acequia Proposed Phase IV Reach staging area-associated critical habitat.

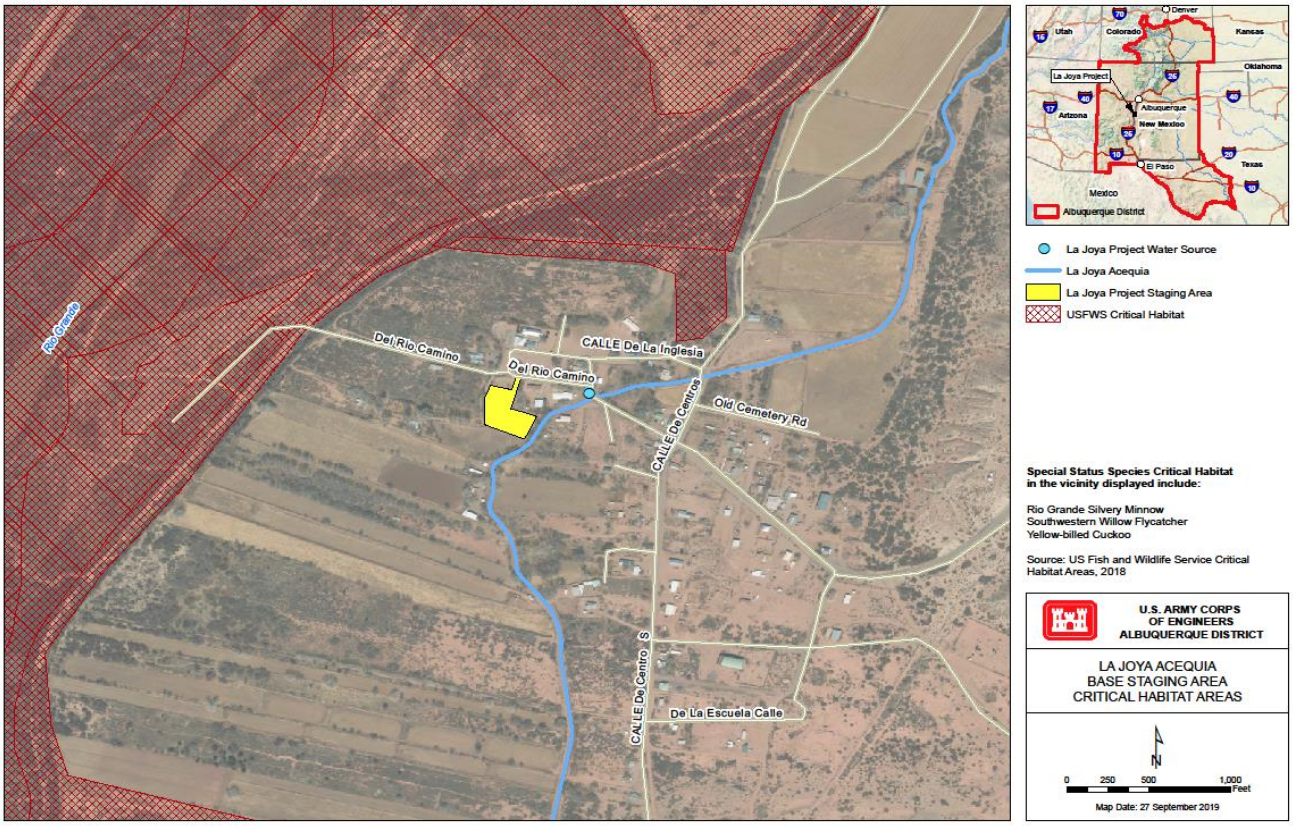

Figure 14: La Joya Acequia Proposed Supplemental Village Reach staging area-associated critical habitat.

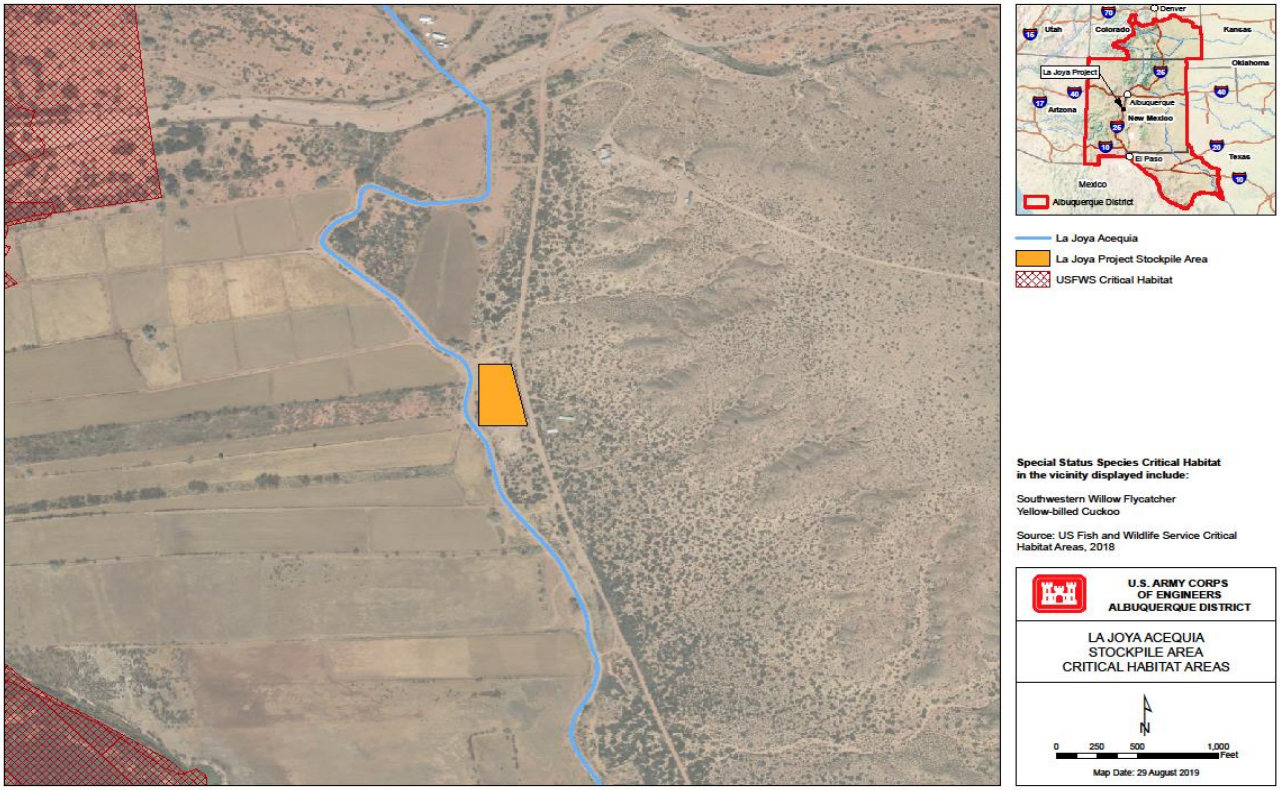

Figure 15: La Joya Acequia Proposed Supplemental Village Reach stockpile area-associated critical habitat.

3.1.5.2 *No Action Alternative*

The No-Action Alternative would result in no proposed project-associated effects on Federally- or State-listed special status species.

3.1.5.3 *Acequia Rehabilitation 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 2) are known to exist in the La Joya area of Socorro County, they are not likely to occur within the proposed 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 during breeding season (July 12, 2019) to the project area. Therefore, the proposed project would have no significant effect on special status species.

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 National Register of Historic Places (NRHP) listing. 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 Office (SHPO), or in the case of undertakings on tribal lands of Tribes that have assumed the role of the SHPO pursuant to Section 302702 of the NHPA, with the Tribal Historic Preservation Officer (THPO) of that Tribe.

3.1.6 Summary of Cultural Resources Inventory

3.1.6.1 *Existing Environment*

There have been three surveys in or near the proposed project area. In 1991-1992, Marshall and Marshall (1992) surveyed approximately the northern one-half of the Acequia system, from the La Joya diversion structure at NM Highway 60 downstream to the Village of La Joya, for Reclamation. The project area for the rehabilitation of the La Joya diversion structure and Project Areas 3 and 5 were re-surveyed for cultural resources and the results reported by Kneebone (1995). Since the Corps was assisting the Ditch Association with the proposed Project Areas 1 and 2, and due to the time since the 1992 and 1995 surveys, the Corps re-surveyed the ditch alignment from the diversion structure downstream to north side of the La Joya community and for the first time surveyed from the southern end of La Joya downstream to the Acequia's desagua or end of the ditch (Everhart 2001). The Corps' 2001 survey did not survey the portion of the ditch within the La Joya community. The two staging areas and stockpile area were surveyed for the proposed project (Figures 1, 2, and 3). No historic properties or archaeological sites were discovered during the course of that survey. The Corps determined that the proposed project will have no effect on historic properties in the newly surveyed areas.

The current project area, therefore, has been previously surveyed for cultural resources by Marshall and Marshall (1992), by Everhart (2001), and by Sinkovec (2019). In anticipation of the selection of the Acequia rehabilitation alternative, a Memorandum of Agreement (MOA) was prepared with the Corps and the SHPO as signatories, and with the Ditch Association and the ISC as concurring parties (see Appendix C). If the Acequia Rehabilitation Alternative is chosen, the Acequia alignment in its entirety will be documented by a cultural resources contractor per the MOA.

There are five known sites within or near the Area of Potential Effect (APE) for the proposed project: LA 31768, LA 31769, LA 31770, LA 88333 (the Village of La Joya de Sevilleta), and LA 109835 (the La Joya Acequia itself). The Corps has evaluated the National Register of Historic Places (NRHP) eligibility of these archaeological and historic sites, and all of these sites have been previously determined eligible to the NRHP.

3.1.6.2 *No Action Alternative*

Without the implementation of a Federal project, the historic properties within the proposed project's APE would be expected to remain in approximately their current condition. The historic sites of the Acequia (LA109835) and the Village of La Joya (LA 88333) would not be subjected to the adverse effects to certain aspects of site integrity anticipated from construction of the Acequia Rehabilitation Alternative. However, the physical integrity of the portion of the Acequia within the Village limits is currently being adversely affected by seepage, and the earthen walls of the Acequia are in danger of compromise if the large cottonwoods making up a portion of the acequia wall were to fall or burn due to high winds or lightning strikes. The Acequia Rehabilitation Alternative would help to alleviate those concerns and preserve the alignment of the ditch.

3.1.6.3 *Acequia Rehabilitation Alternative*

A review of Corps records and an online records check of the New Mexico Office of Cultural Affairs' Historic Preservation Division New Mexico Cultural Resources Information System (NMCRIS) database was conducted on February 28, 2018. Five sites are located within or near the Area of Potential Effect (APE) for the proposed project: LA 31768, LA 31769, LA 31770, LA 88333 (the Village of La Joya de Sevilleta), and LA 109835 (the Acequia itself). The Corps has evaluated the NRHP eligibility of these archaeological and historic sites, and all of these sites have been previously determined eligible to the NRHP. LA 31768, LA 31769, and LA 31770 are located sufficiently outside the APE that they will not be affected by project activities. However, the Acequia (LA 109835) and the Village of La Joya (LA 88333) are both within the APE for the proposed project, and will be affected by project construction activities.

Thirty-nine percent (18,314 feet) of the 8.9-mile Acequia's open earthen ditch has been affected during past projects by the installation of concrete ditch lining or irrigation pipeline, or both. The proposed project would affect an additional 12,600 linear feet, or about 27 percent of the earthen Acequia, including approximately 1,165 feet within the site boundaries of the historic Village of La Joya. Since more than 50 percent of the Acequia would now be lined with concrete or piped, and because a section of these alterations affects the section of the Acequia within the site boundaries of the historic Village of La Joya, it is the Corps' determination that the proposed work would have a significant effect on the integrity of the historic Village and Acequia sites. While the historic alignment (location) of the Acequia (LA 109835) would not be significantly affected, lining sections of the earthen Acequia with concrete or pipe would adversely affect the Acequia's integrity of setting, feeling, design, workmanship, and materials. The Acequia is also considered a qualifying characteristic of the eligibility of the site of the Village of La Joya (LA 88333), and concrete lining of the earthen Acequia within the Village limits constitutes an adverse effect to the integrity of feeling, setting, design, workmanship, and materials of the historic Village. For these reasons, the Corps has determined that the proposed additional work on the Acequia would constitute an adverse effect to the historic Village of La Joya (LA 88333) and the Acequia (LA 109835). The SHPO concurred with Corps' findings on March 18,

2018. Therefore, the Corps and the SHPO have entered into an MOA, which details a series of agreed-upon mitigation steps to resolve adverse effects to the Acequia for the proposed current project and future undertakings.

A copy of the MOA is attached as Appendix C. The stipulations of the MOA include recordation of the existing Acequia alignment according to certain standards of recording, and documentation of the Acequia on SHPO Historic Cultural Property Inventory (HCPI) and Acequia forms. The MOA also stipulates the collection of oral histories from members of the Ditch Association and members of the Village of La Joya community regarding the uses and historic significance of the Acequia. Due to the urgent need for repair of the segment of the Acequia within the limits of the Village of La Joya (Supplemental Village Reach, Figures 1 and 3), the SHPO agreed that the stipulations of the MOA could be carried out concurrently with the construction on this portion of the Acequia. Per the MOA, all contracted cultural resource field work for Acequia documentation must be completed before construction begins on the segment of the Acequia north of the Village (Phase IV Reach) (Figures 1 and 2).

The proposed two staging areas and stockpile area were surveyed for the Acequia Rehabilitation project (Figure 1). No historic properties or archaeological sites were discovered during the course of that survey. The Corps determined that the proposed project would have no effect on historic properties in the newly surveyed areas. Consultation with the SHPO regarding the staging and stockpile area survey will be conducted concurrently with review of the Supplemental EA.

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."

There are no other foreseeable Federal, State, or local actions anticipated in the vicinity of the project area. Ideally, construction would be completed by the commencement of the 2020 irrigation season. The proposed construction would not raise cumulative effects to any environmental or cultural resource to a significant level. The new structures would reduce yearly ditch maintenance, lower water loss, and lessen the potential of flooding of adjacent properties.

4 CONCLUSIONS

The proposed Acequia Rehabilitation action would provide beneficial long-term, reliable and efficient irrigation of agricultural lands owned by members of the Ditch Association, and only minor and or temporary impacts of physical and biological resource in the area during construction, including no effect on historic properties in the newly surveyed areas. While the proposed additional work on the Acequia would constitute an adverse effect to the historic Village of La Joya and the Acequia, the MOA the Corps and the SHPO have entered in to details a series of agreed-upon mitigation steps to resolve adverse effects to the Acequia for the proposed current project and future undertakings. The proposed construction would preserve the economic, cultural, and historic values of the Acequia system. Therefore, the proposed Acequia Rehabilitation Alternative would have no significant impacts over the No Action Alternative.

5 PREPARATION, CONSULTATION and COORDINATION

Preparation

This Supplemental EA was prepared for the Ditch Association by the Corps. Personnel primarily responsible for preparation include:

- Amanda Velasquez Project Manager
- Summer Schulz Biology
- Christina Sinkovec Archaeology
- Ariane Pinson Climate
- Jason Woodruff Civil Design
- Justin Reale Hazardous, Toxic, and Radioactive Waste
- Otis Dickey Geotech

Quality Control

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

- Stephen Ryan Biologist
- George MacDonell Archaeologist

Consultation and Coordination

Agencies and entities contacted formally or informally in preparation of this Supplemental EA include:

- La Joya Acequia Association, La Joya, NM
- Mayor of Village of La Joya, La Joya, NM
- NM State Historic Preservation Office, Santa Fe, NM
- U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, NM
- NM State Engineer, Santa Fe, NM
- NM Interstate Stream Commission, Santa Fe, NM

Public Involvement under NEPA

Coordination with the public and interested parties has taken place throughout the current study. Table 3 summarizes public involvement to date. The public will be provided a review period of the Supplemental EA.

Table 3: Summary of previous coordination with the public and interested parties.

Location	Audience	Attendees	Date
Village of La Joya	La Joya Acequia Association	5	7/21/2018

Coordination with Other Federal, State, Regional, and Local Agencies

5.1.1 Tribal Consultation

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 and Historic Preservation Division's 2019 Native American Consultation List, American Indian Tribes that have indicated they have concerns in this portion of Socorro County have been contacted regarding

the proposed project. These tribes include Acoma Pueblo, Comanche Indian Tribe, Hopi Tribe, Isleta Pueblo, Kiowa Tribe, Mescalero Apache Tribe, Navajo Nation, and the White Mountain Apache Tribe. Currently, there are no known cultural resources or traditional cultural properties concerns. Consultation with tribes was conducted concurrently with review of the Supplemental EA.

5.1.2 Endangered Species Act Coordination

In accordance with Section 7 of the ESA, informal consultation was initiated with the Service on April 12, 2018, and updated August 20, 2019, *Consultation Code 02ENNM00-2018-SLI-0664*.

Libraries and public locations for Draft Supplmental EA

A hardcopy of the Draft Supplemental EA was available for public review at the Rio Abajo Community Library in the Village of La Joya, NM.

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7 APPENDICES

APPENDIX A – Climate and Climate Change

Climate and Climate Change, La Joya Acequia Phase IV, Middle Rio Grande Basin, New Mexico

Ariane Pinson, USACE Albuquerque District

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1.1 Guidance

Analysis of climate change impacts to all USACE Civil Works projects is governed by the following policy and guidance:

- USACE Climate Preparedness and Resilience Policy Statement (June 2014).
- Engineering and Construction Bulletin (ECB) 2016-25, Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects.

1.2 Climate and Relevant Climate Variables

The La Joya Acequia is an irrigation ditch located in La Joya, New Mexico. La Joya is located along the Rio Grande between the Sevilleta National Wildlife Refuge and the City of Socorro in that portion of the Rio Grande watershed commonly termed the Middle Rio Grande. The major problem addressed by this project is upgrading the irrigation ditch to minimize water loss during use by piping and lining portions of the Acequia.

Water for the acequia originates in the Rio Grande and tributaries upstream of the diversion north of the town, and this water originates primarily as snowmelt runoff during the winter and early spring.

1.2.1 Current Climate in the Middle Rio Grande Basin, New Mexico

The NOAA National Weather Service Cooperative Observer (COOP) station with a relatively complete record is located at Albuquerque International Airport (Station 290234), approximately 60miles north of the study area within the Rio Grande Valley. The period of record for this station is 1897 through present.

The climate at Albuquerque is arid continental with large daily and seasonal temperature differences (Figure 1). Summers tend to be hot and dry; winters tend towards cool and humid. Peak precipitation occurs during the late summer/early fall during the peak of the North American Monsoon (monsoon), with a secondary peak in winter. Spring and fall tends towards warm and dry. At Albuquerque, precipitation averages 9.45" per year. In most months, precipitation is 0.75 in or less, but is higher during the monsoon season: July receives an average of 1.5 in, August 1.58 in, September 1.08 in, and October 1.02 in. Precipitation may fall as snow from October through April, with average monthly snowfall peaking in December.

Table 1: Monthly climate normal values for Albuquerque International Airport (1981-2010).Source: Western Regional Climate Center (http://www.wrcc.dri.edu/cgi-bin/cliNORMNCDC2010.pl?nm0234).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max. Temperature (F)	46.8	52.5	60.5	69	78.8	88.3	90.1	87.2	80.7	69	55.8	46.1	68.8
Mean Temperature (F)	36.4	41.4	48.1	56	65.6	74.9	78.3	76.2	69.3	57.5	44.9	36.3	57.2
Mean Min. Temperature (F)	26.1	30.3	35.7	43	52.5	61.6	66.4	65.1	57.9	46.1	34.1	26.5	45.5
Mean Precipitation (in.)	0.38	0.48	0.57	0.61	0.5	0.66	1.5	1.58	1.08	1.02	0.57	0.5	9.45
Heating Degree Days (F)	885	661	524	277	71	4	0	0	26	240	601	890	4180
Cooling Degree Days (F)	0	0	0	7	91	302	411	346	155	10	0	0	1322

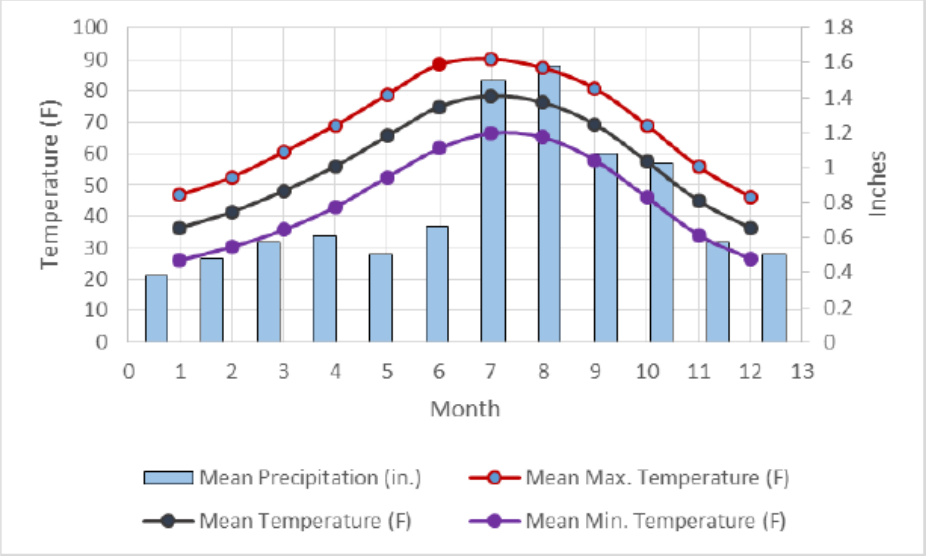

Figure 1: Figure 1 Albuquerque temperature and precipitation, based on monthly climate normal (1981-2010).

Source: Based on data from Table 1.

1.2.2 Relevant Climate Variables

Conserving water in the face of diminishing water supply is the primary sponsor concern. The water that flows through the acequia originates in the Rio Grande, primarily from winter and spring precipitation in the higher elevation portions of the Rio Grande watershed north of Cochiti Dam (the Upper Rio Grande). Therefore, for this study, the primary concern with respect to climate change is the impact of climate change on Rio Grande surface water supply in the future.

The climate in the Rio Grande Basin in New Mexico is determined in large part by its location at the boundary between the arid subtropics and the humid mid-latitudes in the interior of the United States (continental, non-coastal location), and its position along the southern margin of the Rocky Mountains.

The Middle Rio Grande Basin, New Mexico is located at 34 to 37°N, right at the boundary of the subtropics and the midlatitudes. It experiences a midlatitude climate in the winter months, characterized by large area storm systems moving along the path of the jet stream. Because the region is in the interior of the North American continent, these storms lose much of their moisture as precipitation over the Sierra Nevada and Rocky Mountains between their origin over the northwest Pacific Ocean and their arrival in New Mexico. Consequently, these storms often bring less precipitation to New Mexico than to areas to the north or west. These storms are typically "rejuvenated" as they encounter sources of moisture east of the Rockies, producing greater precipitation over the plains of eastern New Mexico than in the central

part of the state. High snow packs can result in significant spring runoff flows along the Rio Grande mainstem in the study area.

Winter precipitation is highly variable from year-to-year, depending on the sea surface temperatures in the northeastern tropical Pacific. During El Niño years, the eastern tropical Pacific Ocean surface is warm, producing moister air over the ocean that feeds into winter storm systems, producing wet winters and higher spring and summer flows in the Southwestern U.S. including New Mexico. Dry winters occur when the eastern tropical Pacific Ocean surface is cool, which reduces evaporation and results in dry air over the ocean. Less moisture is available for storm formation and winter precipitation and spring runoff flows in the Southwestern U.S. are reduced (Sheppard et al. 2002).

With the onset of spring/summer, the storm track moves northward, and the study area is dominated by dry air masses and windy conditions in the late spring and early summer. In the late summer (July, August, and September), the North American Monsoon brings moist subtropical air masses into the region, and precipitation is dominated by localized convection and is sporadic within and between years. Local precipitation may reduce agricultural water demand and cloudy conditions in late summer may reduce evaporative demand.

While monsoon precipitation can impact the available water in the system, and how it is allocated, the dominant control on water availability is the volume and persistence of the snowpack in the Upper Rio Grande. The remainder of this appendix focuses on projected impacts of climate change on Upper Rio Grande snowpack and runoff, and the implication of these changes for Middle Rio Grande water supply.

1.2.3 Recent Changes

1.2.3.1 Temperature

Temperature increases affect snowpack by reducing the length of the freeze season at all altitudes, increasing the share of winter precipitation that falls as rain, and increasing the amount of snowmelt runoff that occurs during winter and early spring at the expense of a snow pack that persists later in the year and favors more runoff in late spring and summer.

Temperatures in the West have shown a relatively steady rise beginning in the early 20th Century: the consensus view is that recent increases in temperature in the Western U.S. exceed observations in the historic record beginning in the late 19th Century (USGCRP 2017). Across the Mountain West, average annual temperatures for 2001-2009 were 0.8°C (1.4°F) higher relative to the average for 1895-2000 (MacDonald 2010). Temperature increases were greater in areas to the south and at lower elevation. Particularly troubling for the region's snowpack and spring runoff have been increases in winter (January, February, March, or JFM) temperatures. The observational record of 1950-1999 shows an increase in maximum average JFM temperatures of 1.53°C (2.8°F) and an increase in minimum average JFM temperatures of 1.72°C (3°F) (Bonfils et al. 2008).

In the Southwestern U.S. as a whole, encompassing New Mexico, Colorado, Arizona, Utah, Nevada, and California, the decade 2001-2010 was the warmest of all decades from 1901-2010, with temperatures increasing approximately 0.9°C±0.3°C over the period 1901-2010 (Hoerling et al. 2013).

Rates of warming in high elevation areas may be considerably greater than across the Southwest as a whole. In an analysis of National Weather Service and SNOTEL site data in the San Juan Mountains, Rangwala and Miller (2010) detect a rate of warming of 1.8°F (1°C) per decade from 1990 to 2005. Lower elevation sites experienced greatest warming during the winter months, warming in winter at an average rate of 2.7°F (1.5°C) per decade. This is significant because it contributes to reductions in the area of the snowpack, and a reduction in the length of the freeze season. Higher elevation sites experienced their greatest warming during the summer months, with temperatures increasing at a rate of

2.7°F (1.5°C) per decade during this season. The differences in the season of greatest warming are likely due to the reduction in the cooling effects on air temperatures of snow on the ground. Increases in winter minimum temperatures increased faster than winter maximum temperatures at lower elevations in the San Juan Mountains.

1.2.4 Recent Precipitation Trends

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 (e.g., Pacific Decadal Oscillation (PDO) vs. ENSO). Because of the high inter-annual, decadal and longer-term variability in precipitation, detecting changes in precipitation has been more challenging than detecting changes in temperature.

To date, no trends have been observed in annual water year precipitation from 1895/96 through 2010/11 for the six-state Southwest (NOAA 2013b). Seasonal time series show no trends for winter, spring and summer, and fall shows a slight upward, but not statistically-significant, trend. 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.

1.2.5 Rio Grande Hydrologic Trends

To better understand current trends in the Middle Rio Grande, the USACE ECB 2014-10 Inland Hydrology tool (https://maps.crrel.usace.army.mil/projects/rcc/portal.html) was accessed 10 August 2018. For the USGS stream gage Rio Grande at Albuquerque (8330000), the tool reported a decreasing trend in annual maximum monthly flows. However this trend is like influenced by flood regulations that cap flood flows to approximately 6,000 cfs in this reach of the Rio Grande (Figure 3).

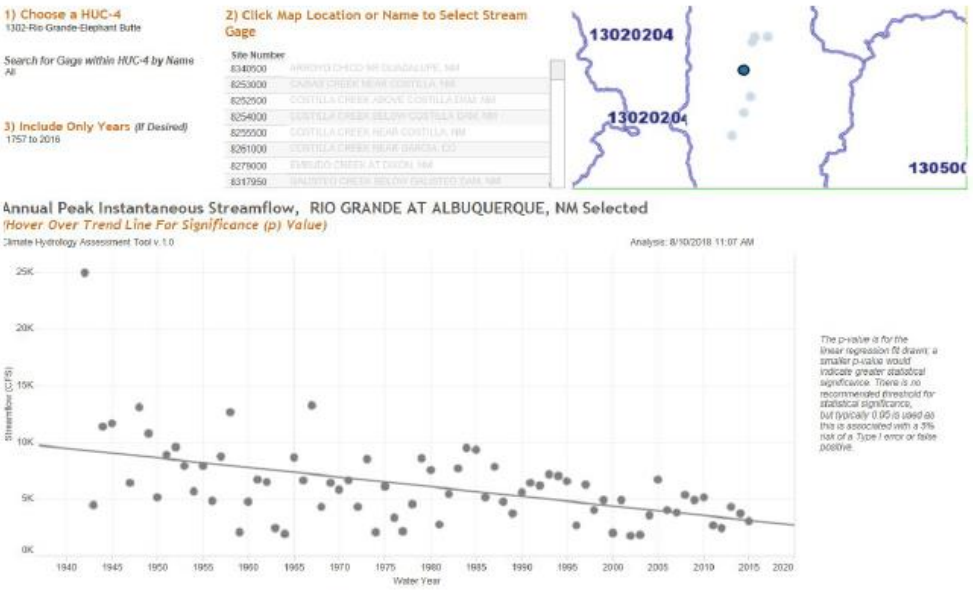

Figure 2 Trends in annual maximum daily discharge at the Rio Grande at Albuquerque, NM stream gage (-84.7568*Year+173934, R2=0.254238, p-value<0.0001).

A similar downward trend is observed upstream at the Rio Grande at Embudo, NM (8729500) gage, which upstream of flood regulation on the Rio Grande mainstem (Figure 4). This suggests that at least a portion of the downward trend at both gages may be due to long-term changes in runoff within the basin. In most years, annual maximum flows are associated with spring runoff, and this declining trend is consistent with persistent dry conditions since about 1999 in the basin. These changes are consistent with observed increases in winter and spring season temperatures, a 25% decrease in April 1 snow water equivalent in the watershed, and small decreases in April-July stream flows (Chavarria and Gutzler 2018).

Appendix A - Climate and Climate Change, Middle Rio Grande Basin, New Mexico

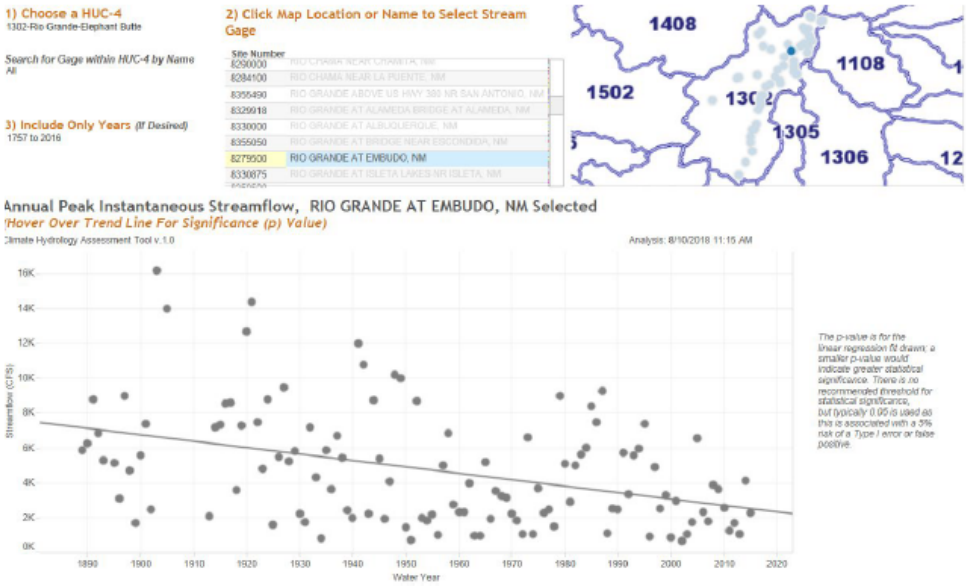

Figure 3 Trends in annual maximum daily discharge at the Rio Grande at Embudo, NM stream gage (-36.8533*year+76785.9, R2= 0.16403, p-value < 0.0001)

The USACE Nonstationarity Detection Tool (https://maps.crrel.usace.army.mil/projects/rcc/portal.html), accessed 15 March 2016) identifies changes stream flows at a gage that may be due to a range of factors, including changes in technology, stream regulation, the construction of dams, cyclical climate changes, and long term changes in climate due to global warming. The tool is able to detect abrupt and smooth changes in the mean and variance of maximum annual flows, as well as the presence and strength of long-term trends. The year at which a change is detected is called the "change point". Statistical detection of nonstationarities is influenced by sample size, sample variance, the magnitude of the change, and the location of the change point within the hydrologic time series. Consequently, for the purposes of interpreting the output of this tool, a nonstationarity is identified as a five-year window around a change point or series adjacent change points where multiple different statistical methods identify a nonstationarity.

For the Rio Grande at Albuquerque gage, the only nonstationarity in the annual maximum flow record for 1950-2015 occurs in the mid-1990s (Figure 5). It is represented by a reduction in mean peak flow discharge, but not a detectable change in the variance. This change is not directly related to any changes at this USGS gage.

In comparison, the Rio Grande at Embudo gage for the period 1950-2015 has two clear nonstationarities centered on 1978-80 and again around 1995. These changes are not directly correlated with changes at this USGS gage. These changes in the mean appear to coincide with shifts in the Pacific Decadal Oscillation, from cool to warm circa 1976 and from warm to cool circa 1997. No statistically significant trends in flow were detected for this period.

Appendix A - Climate and Climate Change, Middle Rio Grande Basin, New Mexico

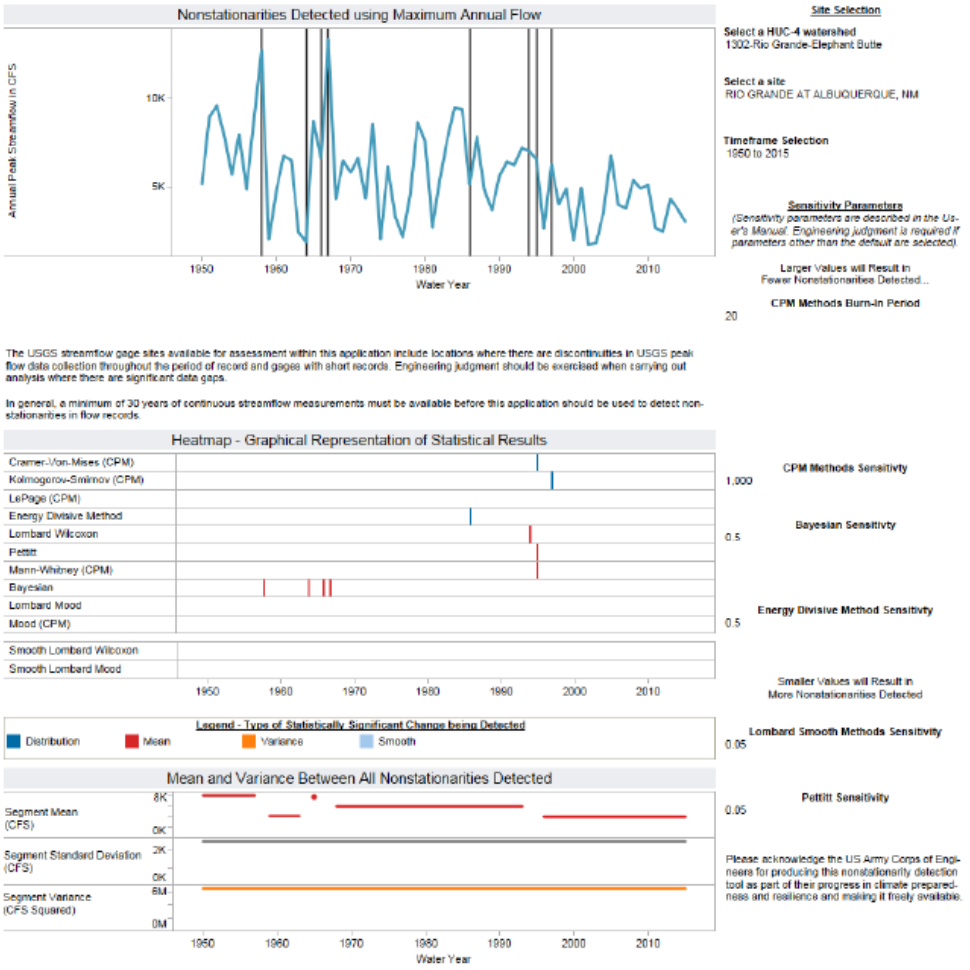

Figure 4 Nonstationarities in annual maximum flow, Rio Grande at Albuquerque gage.

Appendix A - Climate and Climate Change, Middle Rio Grande Basin, New Mexico

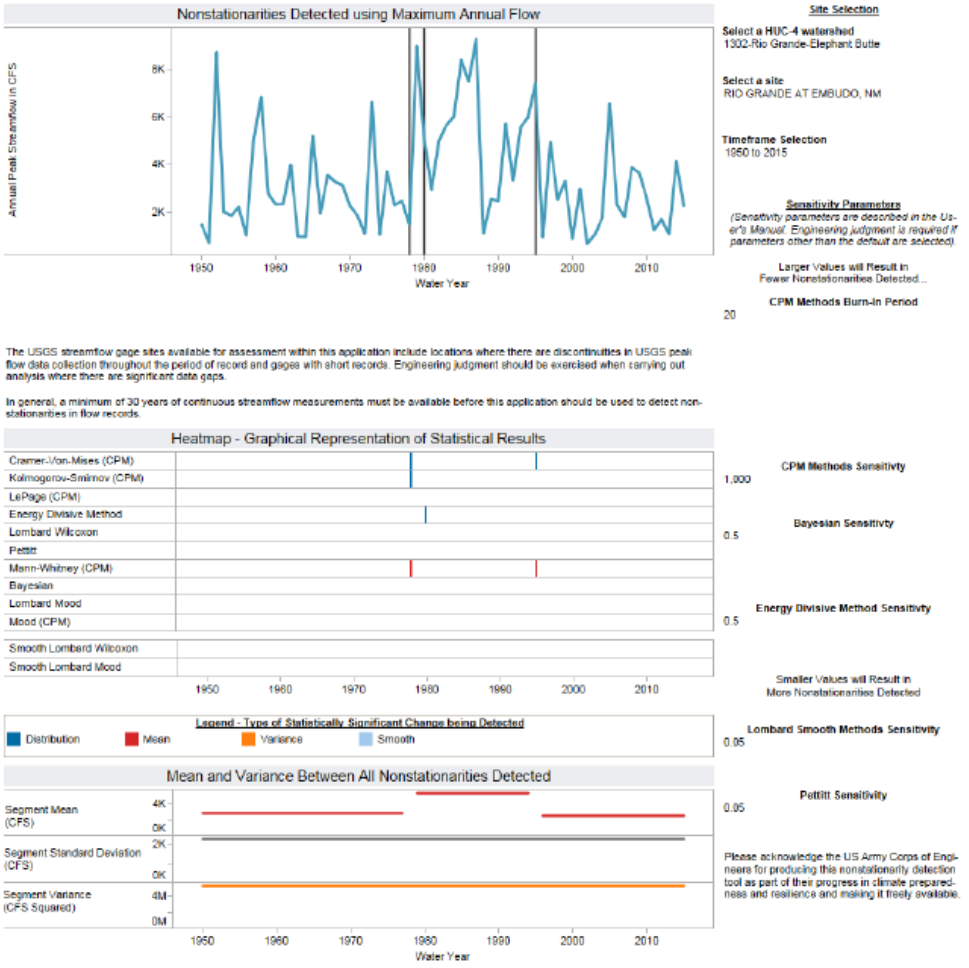

Figure 5 Nonstationarities in annual maximum flow, Rio Grande at Embudo, New Mexico gage.

1.2.6 Existing Conditions Summary

Analysis for this project was conducted in accordance with ECB 2016-25. La Joya is located in a semi-arid climate region characterized by warm winters and hot summers, and annual precipitation less than 10 inches. The La Joya acequia draws water from the Rio Grande through an upstream diversion and delivers it to fields located on the Rio Grande flood plain. The primary climate –related concern of this study is future water quantity. This is primarily a function of the size and water volume of the headwaters snowpack in mountains of the Upper Rio Grande basin. In recent years, drought conditions have reduced snowpack volumes, and higher winter and spring temperatures have encouraged earlier snow melt. As a result, runoff volumes have been reduced and late summer flows lower than previously in the basin. Snowpack sublimation under warmer and windier spring weather conditions has also been observed.

1.3 Projected Climate Futures

Recent overviews of climate change in the Southwestern United States (SWUS) have been provided in (Garfin et al. 2013), (Melillo et al. 2014), and NOAA (2013b). Important syntheses of climate change impacts to New Mexico and Colorado include New Mexico Office of the State Engineer (2006) and Ray et al. (2008).

1.3.1 Projected Changes in Temperature, Precipitation

Climate change in the Upper Rio Grande basin was modeled by Reclamation (2011a, b) using the Hybrid Delta-ensemble approach (Brekke et al. 2010) employing output from 16 models from the CMIP3 multi-model dataset. The outputs are average monthly precipitation and surface air temperature generated from a suite of 16 CMIP3 models forced by 3 IPCC SRES scenarios for future greenhouse gas emissions (112 model realizations total). The scenarios chosen are the A2 (high emissions), A1B (business-as-usual emissions) and B1 (low emissions) scenarios. The baseline period is the 1990s. The spatial resolution of the model is 1/8° (about 12 x 12 km).

The basin-average mean-annual temperature is projected to increase by approximately 1.8-3.3°C (5-6°F) during the 21st Century (Reclamation 2011a) relative to the 1990s. Temperature changes are anticipated to be uniform over the basin and to increase steadily through time.

All future scenarios for both the 2010-2039 and the 2040-2069 periods showed average temperatures above those of the historical baseline of 1950-1999. In the period 2010-2039 (Figure 3), the median warming is projected at 2.5°F (1.4°C), with a range of 1-4°F (0.5-2.25°C). The majority of models predict between 2 and 3°F warming. Precipitation was much more variable, ranging from about -16 to +12% relative to the baseline, with the majority of models predicting a change of between -5% and +4%.

In the period 2040-2069 (Figure 4), warming is more pronounced. Median warming is projected to be approximately 4.25°F (2.4°C), ranging from a low of just above 1°F to a high close to 7°F (3.9°C), and with the majority of warming ranging from about 3.75 to 5.25°F. These findings are similar to other studies to the increases of 2-4°C by 2050 (Barnett and Pierce 2009) and 4.93-8.44°C by 2071-2100 (USGCRP, 2017).

Median precipitation declines by about 2.5% relative to the historic baseline, with 50% of the values ranging between -10% to +2.5%, and the limits of the full dataset ranging from about-22% to +15% relative to the baseline. The projected declines are in line with the 0-10% declines cited by Barnett and Pierce (2009).

1.

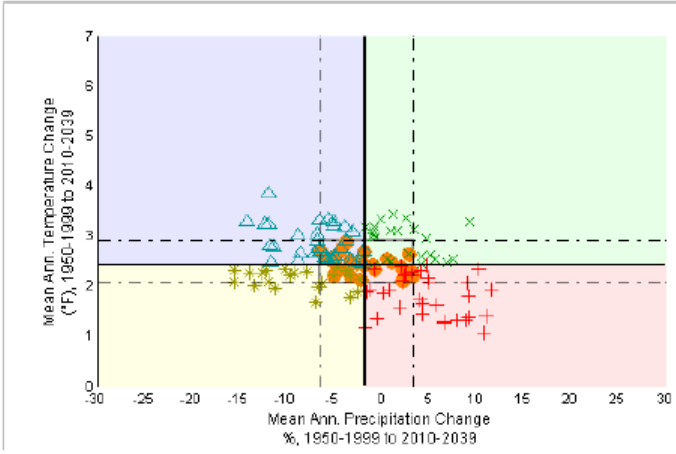

Figure 6 Modeled changes in temperature and precipitation in the period 2010-2039.

2.

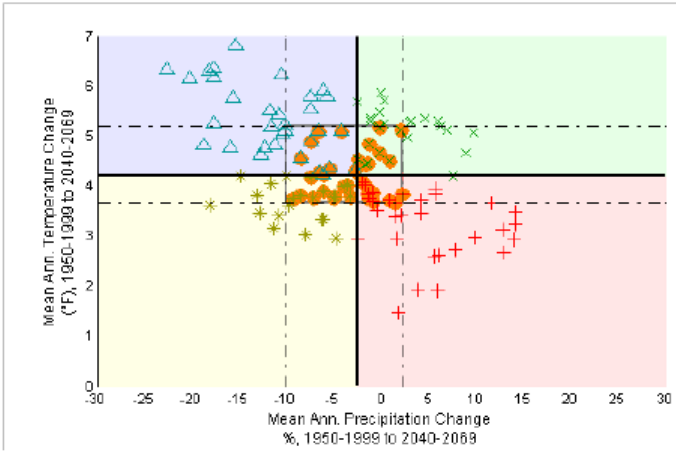

Figure 7 Modeled changes in temperature and precipitation in the period 2040-2069.

1.3.2 Hydrologic Impacts

Hydrologic changes have been studied primarily at the regional and watershed levels, with most efforts focused on the Colorado and Upper Rio Grande Basins.

Reductions in snowpack, declines in snow water equivalence, and advances in snowmelt are all projected to contribute to substantial declines in flows in the Southwest's rivers (Cayan et al. 2013). Studies of the Colorado River show that flow on the Colorado River is likely to be reduced by 10 to 30% (see discussion in Barnett and Pierce 2009). However, due to earlier spring snowmelt and higher evaporation rates, it is projected that the total basin storage in regional reservoirs could decline by as much as 32% to 40% (Christensen et al. 2004, Leung et al. 2004). Since the headwaters of the Rio Grande are located farther south than those of the Colorado, it is probable that projected declines in flow in the Rio Grande will equal or exceed those for the Colorado River (Cayan et al. 2013). Changes in temperature and precipitation patterns are expected to drive reductions in snowpack (Elias et al. 2015). Higher temperatures are projected to delay the date at which precipitation falls as snow in the fall and cause a 4-6 week earlier shift in the date at which precipitation reverts to rain in the spring. The altitude at which a winter snowpack will develop is anticipated to rise. In the 2005, the RMCO (2005) noted that 10 of the previous 16 years in the Rio Grande Basin had snowpack below the long-term average, a trend that has continued since.

The snow water content of the snowpack has also declined westwide (Mote et al. 2005), and this trend is anticipated to continue. Compared to the water content of the April snowpack for the period 1950-1999, modeling studies of the Colorado River watershed project that the content of water contained in April snowpack will decline by approximately 38% by the end of the 21st century in models driven by high emissions scenarios (Christensen and Lettenmaier 2007). Similar reductions in snow water equivalence are predicted for all watersheds in the West.

Regional climate models driven by high emissions scenarios indicate that the snowpack may be non-existent south of 36°N (approximately the latitude of the City of Española, New Mexico) by 2100 (Gutzler et al. 2006). The same study showed reductions in snow water equivalence of approximately one-third to one-half (approximately 50-200 mm of water) compared to the 1961-1985 average in the San Juan Mountains.

Lower overall snowpack volume and SWE, and earlier snowpack melting, are expected to drive down low summer flows (Gleick 2000). The net effect of these changes is projected to be reduction in available surface water.

Currently, the most detailed assessment of climate change impacts to New Mexico above Elephant Butte Dam is provided by the Upper Rio Grande Impact Assessment (Reclamation et al. 2013). This study modeled projected flows in the Rio Grande above Elephant Butte Dam for the period 1950-2099 under SRES A2 (high emissions), A1B (moderate emissions) and B1 (low emissions) scenarios using 112 CMIP3 model realizations. The modeled climate outputs were passed to a Variable Infiltration Capacity (VIC) model to generate simulated overland flow that was routed down the Rio Grande and its tributaries using the URGSim model. Modeling assumed no changes to current dam operations, irrigation practices or other socio-economic practices in the future in order to assess the impact of climate change on current river flows.

The models project a decline in average Rio Grande stream flows of approximately one third (Figure 9), along with a reduction of at least one fourth in imported San Juan-Chama Project water. The model simulations consistently project decreasing snowpack, an earlier and smaller spring snowmelt runoff, and an increase in the frequency, intensity and duration of both droughts and floods (Reclamation et al. 2013).

Native inflows to the San Luis Valley in the Upper Rio Grande are anticipated to decline by approximately 33% by the end of the 21st Century compared to today (Reclamation et al. 2013). This would likely reduce consumptive use in the San Luis Valley by about 25%, and result in an approximately 50% decline in downstream water deliveries to New Mexico by the end of the 21st Century (Reclamation et al. 2013).

Simulated flows for the Rio Grande at Otowi show steep declines in peak spring runoff and early summer flows, but little shift in the timing of peak runoff (Reclamation et al. 2013). Annual average flows are projected to decrease 29% on average at Otowi gage (from about 1,400 cfs during the historic period (1950-1999) to about 1,000 cfs by the 2090s) (Reclamation et al. 2013).

At the Central Avenue gage in Albuquerque, flows are anticipated to decrease 36%, from an annual average of approximately 1,100 cfs during the historic period (1950-1999) to less than 700 cfs by the 2090s (Reclamation et al. 2013). May through August flows are likely to be reduced significantly, but there is likely to be little advance in spring runoff timing (Reclamation et al. 2013).

Appendix A - Climate and Climate Change, Middle Rio Grande Basin, New Mexico

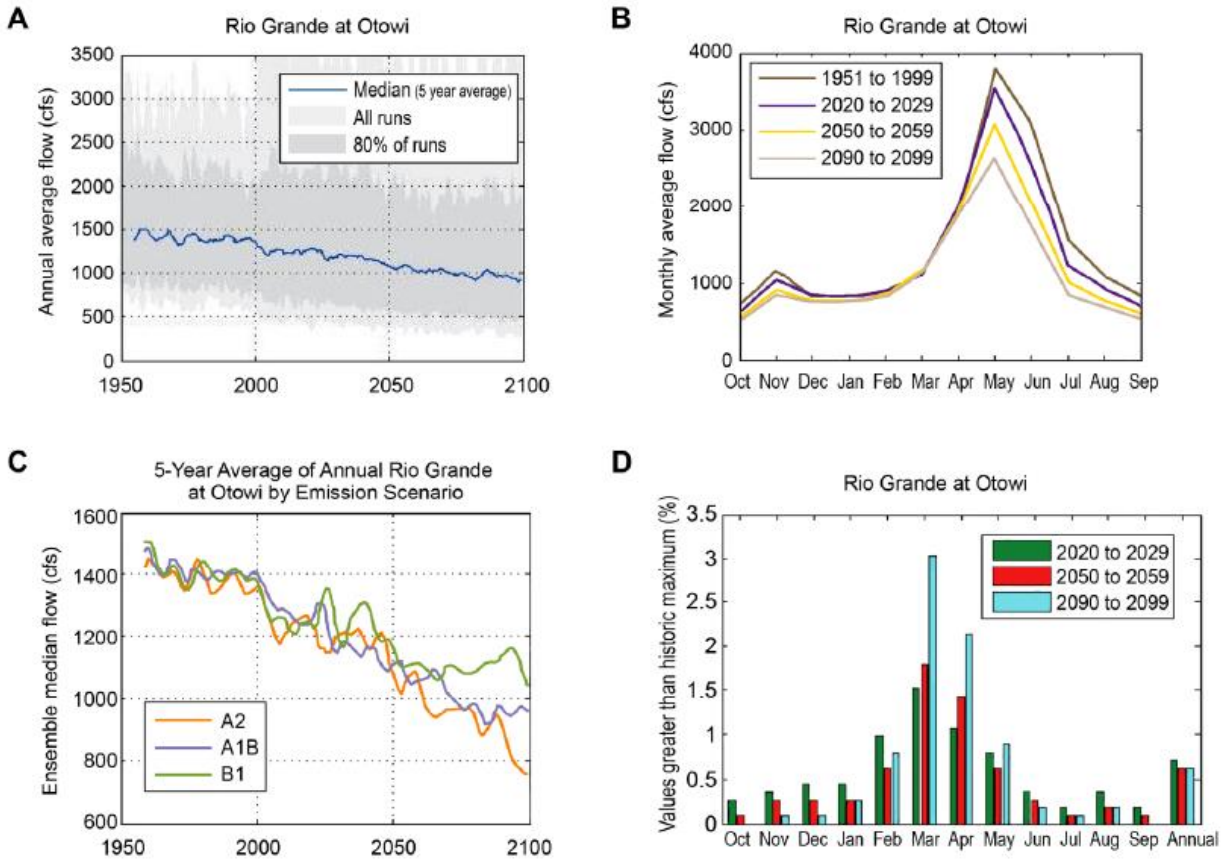

Figure 8 Projected Rio Grande flows at Otowi Gage (Reclamation et al. 2013: Fig. 31).

The Climate Hydrology Assessment Tool provides information on projected maximum annual flows based on data downscaled from 93 Coupled Model Intercomparison Programme 5 (CMIP-5) models. Figure 9 shows the range of model projections for annual maximum flow for the period 2000-2099. Collectively, the models show a small, decreasing trend for the Middle Rio Grande (HUC 1302, Rio Grande above Elephant Butte). Looking at the average of the annual maximum monthly flows across all the models, there is a downward trend that is statistically significant (Figure 10). Taken together, these estimates support prior regional and larger-area studies that suggest an overall decrease in spring runoff flooding in the region under a warmer future climate, regardless of whether precipitation increases or decreases.

Finally, USACE also has developed a tool that examines projected vulnerability of specific USACE business lines to climate change. Using this Watershed Vulnerability Assessment tool (https://maps.crrel.usace.army.mil/projects/rcc/portal.html, accessed 10 august 2018), the future vulnerability of the Middle Rio Grande (HUC 1302) was assessed with respect to stream flow. The lowest flows, those exceeded 90% of the time that would be expected to be typical of late summer stream conditions, are anticipated to decline significantly over the 21st century, especially under drier future scenarios. This provides additional lines of evidence that summer flow volumes, and therefore available irrigation water, are likely to be lower in the future.

At the same time, increased temperatures are likely to increase potential evaporation across the region, and drought conditions are likely to become more frequent and more intense. Crop water demand is likely to rise as a result.

1.3.3 Future Without-project Conditions Summary

Models project substantial warming over the 21st Century of 5-7°F by 2100 as compared to late 20th averages. Modeling using RCP scenarios suggests warming may reach as much as 8.5 to 10°F by 2100 under plausible high emissions (large radiative forcing) scenarios, which is slightly higher than earlier estimates. Even with no net changes in precipitation, such warming will exert profound effects on regional hydrology by altering snowpack, spring runoff and evaporation rates. Hydrologic modeling by Reclamation indicates an up to 33% reduction in Rio Grande water supply in the 21st Century. Snowpack changes are likely to cause these flows to peak earlier in the water year, and for late summer flows to be reduced relative to today as a result. Water supply is very likely to remain a critical issue for La Joya acequia users.

1.3.4 Future With-project Conditions Summary

The project will have no significant impact on regional climate.

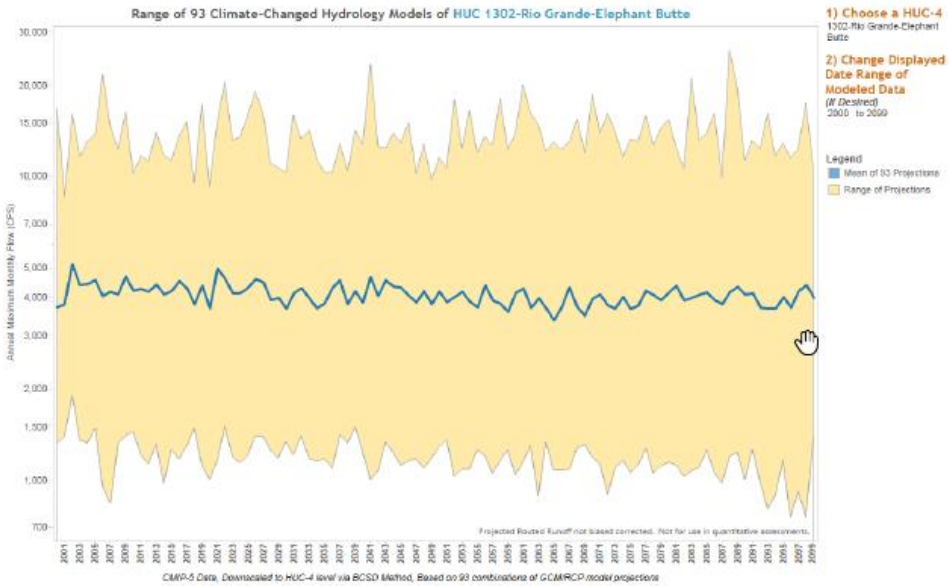

Figure 9 Projected annual maximum monthly stream flow for the Middle Rio Grande (HUC 1302).

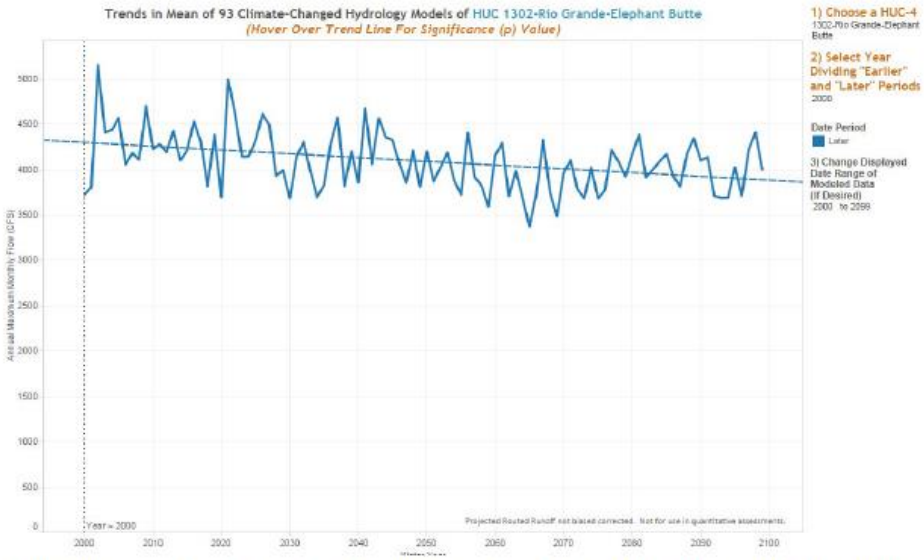

Figure 10 Projected annual maximum monthly stream flow for the Middle Rio Grande (HUC 1302).

1.4 Projected Impacts to Project Features (Resilience Risk)

Resilience risk refers to risks to the project or its performance due to climate change that have not been mitigated by project design. Table 2 outlines the vulnerability of proposed project to climate change, summarizes climate change impacts and risks, and suggests possible mitigation actions to reduce the risk of climate change impacts to potential management features.

Table 2 Climate change impacts to project features

Measure	Vulnerability	Projected Climate Change Impacts and Qualitative Risks
Acequia modification This structural solution is designed to reduce water loss to evaporation and seepage between the diversion dam at the Rio Grande and its use in La Joya.	• Decreases in stream flow that might reduce water availability in the acequia.	Projected Climate Change Impacts: • Smaller snowpacks, advances in spring runoff timing may lead to reductions in total runoff volumes, and decreases in late summer base flow, which may reduce available water supply • Increased temperature and decreased soil moisture/precipitation could lead to increased crop water demand. Risks to acequia: • The acequia may have less water to transmit during parts of the growing season.

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APPENDIX B – Environmental Resources

United States Department of the Interior

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

In Reply Refer To:
Consultation Code: 02ENNM00-2018-SLI-0664
Event Code: 02ENNM00-2019-E-02701
Project Name: La Joya Acequia Phase IV

August 20, 2019

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
- Migratory Birds

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-0664

Event Code: 02ENNM00-2019-E-02701

Project Name: La Joya Acequia Phase IV

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

Project Description: Continuation of acequia conveyance treatments.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/34.35751438944703N106.83938737060518W

Counties: Socorro, NM

Endangered Species Act Species

There is a total of 15 threatened, endangered, or candidate species on this species list.

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

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

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

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

Mammals

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

Birds

NAME	STATUS
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
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Amphibians

NAME	STATUS
Chiricahua Leopard Frog *Rana chiricahuensis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1516	Threatened

Fishes

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

Snails

NAME	STATUS
Alamosa Springsnail *Tryonia alamosae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4371	Endangered
Chupadera Springsnail *Pyrgulopsis chupaderae* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6644	Endangered
Socorro Springsnail *Pyrgulopsis neomexicana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2806	Endangered

Crustaceans

NAME	STATUS
Socorro Isopod *Thermosphaeroma thermophilus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2470	Endangered

Flowering Plants

NAME	STATUS
Pecos (=puzzle, =paradox) Sunflower *Helianthus paradoxus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7211	Threatened
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 2 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Southwestern Willow Flycatcher *Empidonax traillii extimus* https://ecos.fws.gov/ecp/species/6749#crithab	Final
Yellow-billed Cuckoo *Coccyzus americanus* https://ecos.fws.gov/ecp/species/3911#crithab	Proposed

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Brewer's Sparrow *Spizella breweri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	Breeds May 15 to Aug 10

NAME	BREEDING SEASON
Burrowing Owl *Athene cunicularia* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
Golden Eagle *Aquila chrysaetos* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Gray Vireo *Vireo vicinior* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8680	Breeds May 10 to Aug 20
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Pinyon Jay *Gymnorhinus cyanocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15
Rufous Hummingbird *selasphorus rufus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Virginia's Warbler *Vermivora virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Willow Flycatcher *Empidonax traillii* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/3482	Breeds May 20 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

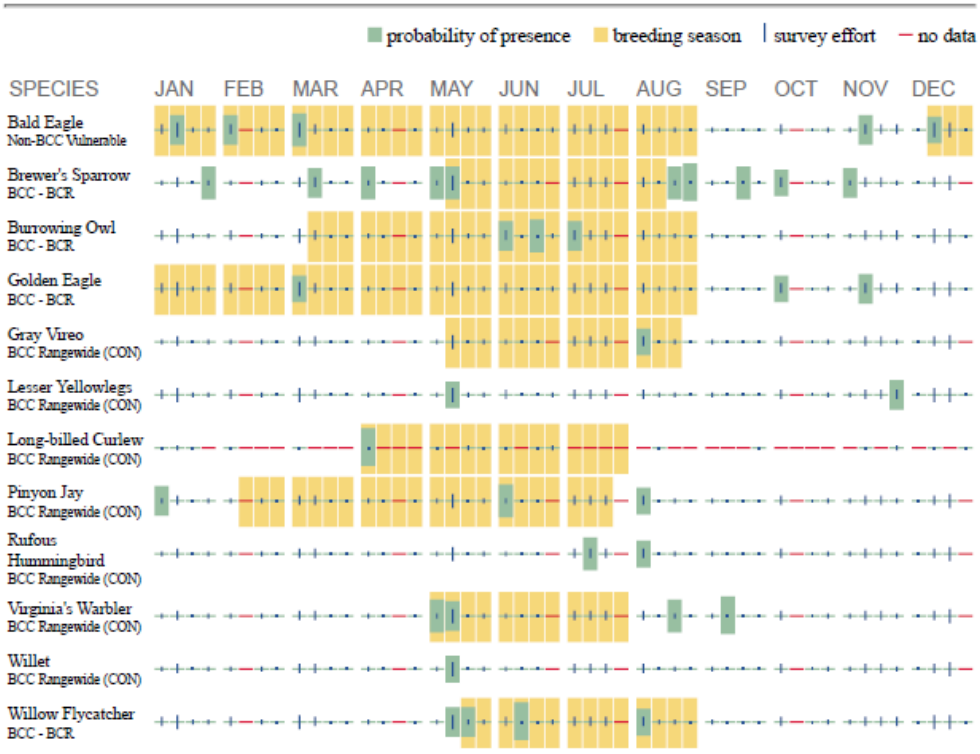
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of

interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC

use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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*

APPENDIX C – Cultural Resources

1. Memorandum of Agreement Between NM SHPO and USACE
2. Tribal Correspondence

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MEMORANDUM OF AGREEMENT
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS
AND
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER

SUBJECT: Resolution of Adverse Effects to the La Joya Acequia, Socorro County, New Mexico

1. WHEREAS, the U.S. Army Corps of Engineers (Corps), Albuquerque District, at the request of the project sponsors and concurring parties, the New Mexico Office of the State Engineer/Interstate Stream Commission (NMISC) and the La Joya Acequia Association (Association), is planning a project that would rehabilitate a combined distance of 2.6 miles of the 8.9-mile La Joya Acequia (Acequia, i.e., a historic irrigation canal or ditch). This activity is referred to herein as the "Project"; and

2. WHEREAS, construction of the Project includes the installation of approximately 1,280 linear feet of piping, and approximately 12,600 linear feet of concrete ditch lining; and

3. WHEREAS, Federal/Corps assistance is authorized under Section 1113 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended; where the Federal cost-share is 75 percent and the Corps is responsible for NEPA compliance, project design, and construction inspection; and

4. WHEREAS, the Corps' funding of this Project is subject to review as an undertaking under the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108, and its implementing regulations (36 CFR Part 800); and

5. WHEREAS, the Corps has established the Project's Area of Potential Effects (APE) as defined at 36 CFR § 800.16(d), as the construction footprint within the Association's right-of-way (ROW) as well as a staging area totaling 4.2 acres, for a total of 23.4 acres as shown in Attachment 1 (attached hereto and incorporated by reference); and

6. WHEREAS, the Corps has identified and recorded cultural resources within the APE, pursuant to 36 CFR § 800.4, and documented those findings in the reports titled "Investigations in the Middle Rio Grande Conservation District: A Cultural Resource Survey of Irrigation and Drainage Canals in the Isleta-South to La Joya Area," prepared for the Bureau of Reclamation by Michael P. Marshall and Christina L. Marshall and dated December 31, 1992, "A Cultural Resources Inventory of 17 Hectares Near Contreras, Socorro County, New Mexico," prepared for the Corps by Ronald. R. Kneebone and dated December 31, 1995, and "A Cultural Resources Inventory of 16.5 Acres for the Rehabilitation of the La Joya Acequia, near La Joya, Socorro County, New Mexico," prepared by Corps archaeologist Gregory D. Everhart and dated August 17, 2001; and

7. WHEREAS, the Corps has evaluated the National Register of Historic Places (NRHP) eligibility of the sites in or near the Project APE, which include LA 31768, LA 31769, LA 31770, LA 88333 (the village of La Joya de Sevilleta), and LA 109835 (the La Joya Acequia itself), and all of these sites have been previously determined eligible to the NRHP; and

8. WHEREAS, the Corps has evaluated effects associated with the Project and, following pre-consultation with the New Mexico State Historic Preservation Officer (SHPO) via e-mail dated February 27, 2018, and a meeting conducted on March 29, 2018, has determined that

construction of the Project does constitute an adverse effect to the Acequia (LA 109835) and the village of La Joya de Sevilleta (LA 88333)(Village), and that LA 31768, LA 31769, and LA 31770 are sufficiently outside the APE and will not be affected by project activities; and

9. WHEREAS, the Corps has notified the Advisory Council on Historic Preservation (ACHP), electronically via the e106 system, in a letter dated June 1, 2018, and the ACHP responded on June 15, 2018 (Attachment 2, attached hereto and incorporated by reference), and indicated that they will not participate in this process; and

10. WHEREAS, the Corps has afforded the Comanche Nation of Oklahoma, the Fort Sill Apache Tribe, the Kiowa Tribe of Oklahoma, the Mescalero Apache Tribe, the Navajo Nation, the Pueblo of Acoma, the Pueblo of Isleta, Ysleta del Sur Pueblo, the Hopi Tribe, and the White Mountain Apache Tribe the opportunity to participate in this process pursuant to 36 CFR § 800.2 and 36 CFR § 800.4, in a letter dated August 20, 2018, and none of these tribes have indicated any tribal concerns related to the Project or asked to participate as a consulting party in the Project; and

11. WHEREAS, the Corps has consulted with SHPO in accordance with Section 106 of the NHPA, and its implementing regulations (36 CFR § 800.6(b)(1)) to resolve the adverse effects of the Project on the Acequia and Village; and

12. WHEREAS, the Corps and the SHPO agree that this Memorandum of Agreement (Agreement) will be used to resolve adverse effects to the Acequia for future undertakings; and

NOW, THEREFORE, the Corps and SHPO agree that upon the Corps' decision to fund the Project, the Corps shall ensure that the following stipulations are implemented in order to mitigate the effects of the Project on historic properties, and that these stipulations shall govern the Project and all of its parts until this Agreement expires or is terminated.

Stipulations

The Corps shall ensure that the following stipulations are implemented to document La Joya Acequia, Phase IV:

1. Prepare a mitigation report, which will include:

   a. A Historic Cultural Property Inventory (HCPI) base form and the HCPI Acequia detail form for the segment of La Joya Acequia within the APE as depicted in Attachment 1 for the current Project.

   b. An aerial image/topographic map (1:24k) documenting the extent of the current alignment of the Acequia, presenting both the current alignment and any known past alignment(s) if possible. Sources of information will include oral interviews with Association members and an archival records search at the Office of the State Engineer, Middle Rio Grande Conservancy District (MRGCD), and the Natural Resources Conservation Service. Current engineering drawings will be included in hardcopy as an appendix to the Report.

   c. Archival photographic documentation (DIGITAL Field Photography stored on DISC and printed on 5" x 7" archival stock paper) of the segment of Acequia La Joya within the APE of the current project. The photographer will use a 10.0 megapixel (2300 x 3000

pixel image @300 dots per inch resolution or greater) digital camera, set to the maximum resolution or largest pixel dimensions the camera allows. The photographs will be recorded on color digital TIFF (the preferred format) or JPEG FINE image files, recorded at a minimum of 8-Bit Color, in RGG color format.

d. Oral history interviews with Association members. Documentation collected during the interviews shall include, but not be limited to: information on engineering and construction of the entire Acequia; a general historical overview of the construction and use of the Acequia; and information on how the Acequia has changed over time in terms of crops planted, total acreage irrigated, association members, and the members' involvement in maintaining and using the Acequia.

e. The field work outlined in sections (a.) through (d.) above may be completed concurrently with construction work on Section D of the Acequia as shown in Attachment 1. No construction work will begin on Sections A, B, or C of the Acequia (as shown in Attachment 1) until field work is completed.

2. Reporting and Disbursement

a. The results of documentation gathered as part of this Agreement for the current Project shall be compiled into a summary report (Report). The Report shall include all information gathered in accordance with Stipulations 1.a-d above. The Corps shall adhere to Section 304 of the NHPA to protect any information in the report regarding confidential archaeological site locations.

b. A copy of a draft Report will be submitted to the SHPO for a 30-day review. The Corps will consider any comments provided by the SHPO and revise the Report as appropriate.

c. Following the review of the draft Report, the Corps will prepare a final Report. The final Report will be submitted to the SHPO in the format outlined below.

d. The documentation will be stored and printed in the following formats/media. With the exception of historic photos, scanning photographic prints to produce digital files is not acceptable due to the loss in image quality.

i. High-resolution photographs will be stored on Gold Archival Grade CD-Rs 4.7 gigabyte recordable disc (DVD-R) with a guaranteed lifespan of 100 years and will include, at least, the unaltered original files. SHPO will also accept JPEGS on DVD-R provided they are unaltered original camera files at 300 ppi or highest available resolution.

ii. Images will be printed on paper, printer, and ink combinations that meet or exceed 75-year archival standards. Printed images will be a minimum size of 8" x 10". The images shall be printed on 24# or heavier smooth-finish paper with brightness in the 88 to 96 range. The paper will meet ANSI or ISO Standards for archival paper.

iii. One acid-free paper copy in addition to the electronic copy in PDF format shall be provided to the SHPO.

e. Hard copies of the Report with any appendices will be provided to consulting parties. The Corps will retain two hard copies of the Report for archival purposes, as well as a

digital copy of the Report in PDF format. A copy of the archival photographs will also be retained and curated by the Corps as part of its permanent collection.

f. Reporting will be completed no later than two (2) years following the commencement of recording activities.

3. Professional Qualifications. All work carried out pursuant to this Agreement will be carried out under the direct supervision of qualified individuals meeting the Secretary of the Interior's Professional Qualification Standards for Archaeology and Historic Preservation (36 CFR Part 61).

4. Future undertakings that may have a potential effect on the Acequia and Village will be treated as described below:

a. The Corps shall complete a HCPI base form and HCPI Acequia Detail form, a sketch map, and representative photographs of the Acequia and any features for the segment of the Acequia within the APE.

b. The current alignment of the Acequia within the APE will be documented on an aerial image/topographic map (1:24k), presenting both the current alignment and any known past alignment(s) in accordance with Stipulation 1.b.

c. The Corps will provide this documentation along with a Section 106 consultation letter to the SHPO for review and concurrence.

d. If an adverse effect is anticipated, in addition to the information requested above in 2.a. through 2.c., the Corps will provide representative high resolution digital photographs following the standards in Stipulation 1.c. above and scaled sketch drawings of the Acequia within the APE.

5. Discoveries

a. In the event that unrecorded or unanticipated historic properties that may be eligible for nomination to the NRHP are located during construction activities, or it is recognized that such actions may affect a known historic property in an unanticipated manner, the Corps will terminate construction activities within 100 feet of the property and will take all reasonable measures to avoid or minimize harm to the property until consultation between the Corps, the SHPO, and any other interested party, regarding significance and effect can be concluded. The Corps will notify the SHPO within 72 hours and consult to develop actions that will take the effects of the undertaking into account. The Corps and SHPO will mutually agree upon time frames for the consultation.

b. In the event that any human remains are discovered during construction activities, the Corps shall notify the local law enforcement agency having jurisdiction in the area. In the event that the human remains are determined by law enforcement and the State Medical Investigator to have no medicolegal significance, the Corps shall follow Section 18-6-11.2 of the Cultural Properties Act (NMSA § 18-6-11.2) and implementing rule 4.10.11 NMAC.

6. Administrative Stipulations

a. Dispute Resolution. Should any signatory or concurring party to this Agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, the Corps shall consult with such party to resolve the objection. If the Corps determines that such objection cannot be resolved, the Corps will:

(1) Forward all documentation relevant to the dispute, including the Corps' proposed resolution, to the ACHP. The ACHP shall provide the Corps with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the Corps shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories, and concurring parties, and provide them with a copy of this written response. The Corps will then proceed according to its final decision.

(2) If the ACHP does not provide its advice regarding the dispute within the thirty-day (30) time period, the Corps may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the Corps shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories and concurring parties to this Agreement, and provide them and the ACHP with a copy of such written response.

(3) The Corps will be responsible for carrying out all other actions subject to the terms of this Agreement that are not the subject of the dispute.

b. Objections by the Public. At any time during implementation of the measures stipulated in this Agreement, should an objection to any such measure or its manner of implementation be raised by a member of the public regarding historic preservation, the Corps shall take the objection into account and consult as needed with the SHPO, or the ACHP, to determine how best to address the objection.

c. Duration. If the terms of this Agreement have not been implemented within five (5) years from the last date shown below, this Agreement shall be considered null and void, unless the signatories agree in writing to an extension for carrying out its terms. This extension will be limited to an additional five (5) years. If this Agreement is considered null and void, the Corps shall so notify the ACHP and parties to this Agreement, and if the Corps chooses to continue with the undertaking, shall re-initiate review of the undertaking in accordance with 36 CFR Part 800.

d. Amendments. Any signatory to this Agreement may propose to the Corps that the Agreement be amended, whereupon the Corps shall consult with the other parties to this Agreement to consider such an amendment. This Agreement will be amended when such an amendment is agreed to in writing by all signatories. The amendment will be filed with the ACHP and go into effect on the date of the last signature.

e. Termination. If the Corps determines that it cannot implement the terms of this Agreement, or if the SHPO determines that the Agreement is not being properly implemented, such party may propose to the other parties to this Agreement that it be terminated.

The party proposing to terminate this Agreement shall so notify all parties to this Agreement, explaining the reasons for termination and affording them at least 30 days to consult and seek alternatives to termination. The parties shall then consult.

Should such consultation fail, the Corps or other signatory party may terminate the Agreement by so notifying all parties.

Should this Agreement be terminated, the Corps shall either:

1. Consult in accordance with 36 CFR § 800.6 to develop a new Agreement; or

2. Request the comments of the ACHP pursuant to 36 CFR § 800.7.

f. Funding. All obligations and responsibilities of the Parties under this Agreement are subject to the availability of funding. Nothing herein obligates either party to the expenditure of funds.

g. Miscellaneous

1. Other Relationships or Obligations: This Agreement shall not affect any pre-existing or independent relationships or obligations.

2. Severability: If any provision of this Agreement is determined to be invalid or unenforceable, the remaining provisions shall remain in force and unaffected to the fullest extent permitted by law and regulation.

h. Execution. The Corps has submitted to the ACHP for its review the following: a letter notifying the ACHP of the adverse effect to the La Joya Acequia resulting from the intended project, and inviting the ACHP to participate in the resolution of that adverse effect. Based upon the materials submitted by the Corps, the ACHP has determined that the project does not meet the criteria for ACHP review (See Attachment B hereto). The ACHP nonetheless remains available for consultation in the event of new information, changes in the project or other matters that may arise. Execution of this Agreement by the Corps and the SHPO, and its submission to the ACHP, and implementation of its terms, shall be sufficient evidence that the Corps has afforded the ACHP an opportunity to comment on the undertaking and its effects on historic properties, and that Corps has taken into account the effects of the undertaking on historic properties.

SIGNATURE PAGE

MEMORANDUM OF AGREEMENT
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS
AND
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER

SUBJECT: Resolution of Adverse Effects to the La Joya Acequia, Socorro County, New Mexico

SIGNATORY PARTY:

US ARMY CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT

Larry Caswell, Jr.
Lieutenant Colonel, U.S. Army
District Commander

15 November 2019
Date

SIGNATURE PAGE

MEMORANDUM OF AGREEMENT
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS
AND
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER

SUBJECT: Resolution of Adverse Effects to the La Joya Acequia, Socorro County, New Mexico

SIGNATORY PARTY:

NEW MEXICO STATE HISTORIC PRESERVATION OFFICER

for Michelle Ensey — 10/24/19

Dr. Jeff Pappas
State Historic Preservation Officer

Date

SIGNATURE PAGE

MEMORANDUM OF AGREEMENT
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS
AND
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER

SUBJECT: Resolution of Adverse Effects to the La Joya Acequia, Socorro County, New Mexico

CONCURRING PARTY:

LA JOYA ACEQUIA ASSOCIATION

Marcel Abeyta _____ 10/22/2019

Marcel Abeyta
Commissioner
La Joya Acequia Association

Date


US Army Corps of Engineers
Albuquerque District
Attachment 1: La Joya Acequia
Phase IV Planned Improvements
(Sections "A", "B", "C", and "D")
Section "A"
Section "B"
Section "C"
Section "D"
Santa Fe
Albuquerque
NEW MEXICO
El Paso
Juárez
Rio Grande
0 0.125 0.25 0.5
Miles
La Joya Acequia
La Joya de Sevilleta
Socorro County, New Mexico
La Joya 7.5' USGS Quadrangle (unplatted)
1:10,000
C. Sinkovec 2/26/2018
Legend
Phase_IV_Alignment
Phase_IV_Addendum
Possible_Staging

ATTACHMENT 2: ACHP RESPONSE TO REQUEST FOR PARTICIPATION

Preserving America's Heritage

June 15, 2018

Mr. George H. MacDonell
Environmental Section Chief
U.S. Army Corps of Engineers
Albuquerque District
4101 Jefferson Plaza, NE
Albuquerque, NM 87109-3435

Ref: *La Joya Acequia Phase IV and Supplemental Area Improvement Project*
La Joya and Contreras, Socorro County, New Mexico
ACHPConnect Log Number: 012873

Dear Mr. MacDonell:

The Advisory Council on Historic Preservation (ACHP) has received your notification and supporting documentation regarding the adverse effects of the referenced undertaking on a property or properties listed or eligible for listing in the National Register of Historic Places. Based upon the information provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800), does not apply to this undertaking. Accordingly, we do not believe that our participation in the consultation to resolve adverse effects is needed. However, if we receive a request for participation from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), affected Indian tribe, a consulting party, or other party, we may reconsider this decision. Additionally, should circumstances change, and it is determined that our participation is needed to conclude the consultation process, please notify us.

Pursuant to 36 CFR §800.6(b)(1)(iv), you will need to file the final Memorandum of Agreement (MOA), developed in consultation with the New Mexico State Historic Preservation Officer (SHPO), and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the MOA, and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with the notification of adverse effect. If you have any questions or require further assistance, please contact Christopher Daniel at (202) 517-0223 or by email at cdaniel@achp.gov.

Sincerely,

LaShavio Johnson

LaShavio Johnson
Historic Preservation Technician
Office of Federal Agency Programs

ADVISORY COUNCIL ON HISTORIC PRESERVATION
401 [illegible] NW, Suite 308 • Washington, DC 20001-2637
Phone 202-517-0200 • Fax 202-517-6381 • achp@achp.gov • www.achp.gov

White Mountain Apache Tribe

Office of Historic Preservation
PO Box 1032
Fort Apache, AZ 85926
Ph: (928) 338-3033 Fax: (928) 338-6055

To: George H. Mac Donell, Chief, Environmental Resource Section

Date: October 06, 2019

Re: *Proposed Rehabilitation of two segments of the La Joya Acequia Irrigation Ditch*

The White Mountain Apache Tribe Historic Preservation Office appreciates receiving information on the project, dated September 11, 2019 . In regards to this, please attend to the following statement below.

Thank you for allowing the White Mountain Apache tribe the opportunity to review and respond to the above proposed rehabilitation of the La Joya Acequia Irrigation Ditch, near the historical community of La Joya, in Socorro County, central part of New Mexico. Upon reviewing the document/reports we've determined the proposed project plans will ***"Not have Adverse Effect"*** on the White Mountain Apache tribe's historic properties and/or traditional cultural properties. No further consultation is necessary.

Thank you for your continued collaborations in protecting and preserving places of cultural and historical importance.

Sincerely,

Mark T. Altaha

White Mountain Apache Tribe – THPO
Historic Preservation Office

Ysleta del Sur Pueblo
Tribal Council

119 South Old Pueblo Road * P.O. Box 17579 * El Paso, Texas 79917 * (915) 859-8053 * Fax: (915) 859-4252

October 2, 2019,

George H. MacDonell,
Chief, Environmental Resources Section
Department of the Army
Corps of Engineers, Albuquerque District
4101 Jefferson Plaza NE
Albuquerque, NM 87109-3435

Dear George H. MacDonell,

This letter is in response to the correspondence received in our office in which you provide Ysleta del Sur Pueblo the opportunity to comment on the proposed rehabilitation of two segments of the La Joya Acequia irrigation ditch under the Water Resources Development Act.

While we do not have any comments on the proposed undertaking and believe that this project will not adversely affect traditional, religious or culturally significant sites of our Pueblo and have no opposition to it; we would like to request consultation should any human remains or artifacts unearthed during this project be determined to fall under NAGPRA guidelines. Copies of our Pueblo's Cultural Affiliation Position Paper and Consultation Policy are available upon request.

Thank you for allowing us the opportunity to comment on the proposed project.

Sincerely,

Omar Villanueva
Tribal Council Assistant
Ysleta del Sur Pueblo
119 S. Old Pueblo Rd.
(915) 342-2557

ovillanueva@ydsp-nsn.gov

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APPENDIX D – Hazardous, Toxic, and Radioactive Waste

Phase I Environmental Site Assessment

La Joya Acequia Project Phase IV

U. S. Army Corps of Engineers

Albuquerque District

September 2019

US Army Corps
of Engineers
Albuquerque District

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Table of Contents

Table of Appendices

1 - Project Background and Objective

The Water Resources Development Act of 1986 (Public Law 99-62) authorized the restoration and rehabilitation of ditch systems (acequias) in New Mexico. This Act recognizes the cultural and historical significance of these systems in the settlement and development of the western portion of the United States, and authorizes funding for the rehabilitation of qualifying acequias and their attendant structure (USACE, 2001).The U.S. Army Corps of Engineers (USACE) was designated to administer acequia rehabilitation projects and is the federal action agency for the Conveyance Treatment for La Joya Acequia Project (USACE, 2001).

The project area is located between Belen and Socorro in central, New Mexico. The La Joya Acequia generally parallels the Rio Grande on the west side of the river for 14.5 kilometers (km) (9.0 miles (mi)) and is bounded by State Highway 60 on the north, the community of La Joya on the south, and the Sevilleta National Wildlife Refuge (Sevilleta) to the east and west. The headworks are located on the south side of State Highway 60, in the northwest quadrant of section 13, T. 2 N. R. 1 E., in the Middle Rio Grande Valley of northern Socorro County, New Mexico (Figure 1). The heading structure withdraws water from another ditch, the San Juan Main Canal, via the "Las Nutrias" lateral. From here, the acequia extends approximately 14.5 km (9.0 mi) south and provides irrigation water to about 324 hectares (ha) (800 acres (ac)) of farmland. It is the only communal acequia between Albuquerque and Elephant Butte Reservoir. All other ditches are part of the Middle Rio Grande Conservancy District's (MRGCD) conveyance system (USACE, 2001).

The problems associated with the existing system include sedimentation at the intake structure resulting from inefficient sluicing. This impedes flow to the ditch and necessitates frequent cleanout. Also, diversion of water from the San Juan Main Canal is causing scouring and erosion of the earthen components of the diversion heading above the weir, as well as the San Juan Main Canal banks below the weir. Recent concerns related to conveyance and infiltration losses, high sediment inflow, and increasing maintenance costs have resulted in the need for rehabilitation of the entire acequia. Rehabilitation of the La Joya Acequia will be completed in phases, with initial improvements and construction in 1996.

The initial improvements consisted of lining a 1.4 km (0.9 mi) section of earth ditch with concrete, installation of a 48-inch diameter pipe in another 0.6 km (0.4 mi) section, and the replacement of degraded plastic pipe with new pipe, plus hardened transition/protection structures. Future work involves replacing the earthen ditch with concrete lining, or a combination, rebuilding of road crossings, and installation of transition structures, sluice turnouts, footbridges, concrete headwalls, tree removal, and new maintenance roads.

The objective of this Phase I Environmental Site Assessment (ESA) is to identify, to the extent feasible pursuant to the processes prescribed in American Society for Testing and Materials (ASTM) E 2247-16, recognized environmental conditions in connection with the rural property. This ESA was conducted by an environmental professional possessing sufficient training and experience necessary to conduct a Phase I ESA, as defined in E 2247-16 3.2.33.

USACE published the initial Environmental Assessment (EA) on July 18, 2001, and a supplemental EA for Phase IV (PH IV; Figure 1). The supplemental EA fulfills USACE's responsibilities under the National Environmental Policy Act, Endangered Species Act, Fish and Wildlife Coordination Act; and National Historic Preservation Act.

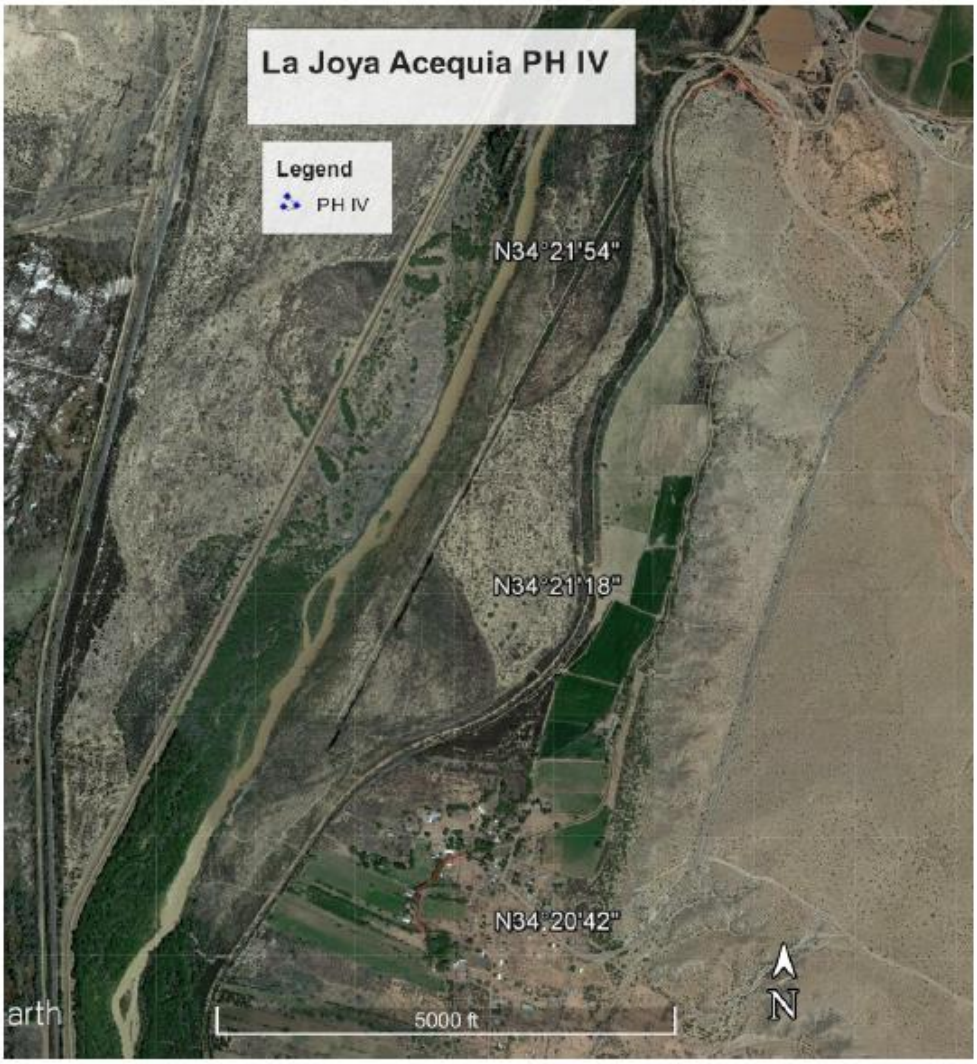

Figure 1: Proposed project area (red).

2 - Records Review

The purpose of the records review is to obtain and review records that will help identify recognized environmental conditions in connection with the project areas. The records review included the two project areas and a 1-mile buffer search boundary (Appendix A). The aerial analysis did not identify any areas of concern.

No mapped sites were found in Environmental Data Resources (EDR) search of available ("reasonably ascertainable ") federal, state and local records within the requested search area for the databases identified in Appendix B.

3 - Physical Setting

Irrigation flows are delivered to the La Joya Acequia inlet/sluice structure by the Middle Rio Grande Conservancy District via the Las Nutrias lateral ditch, which is located directly upstream (USACE, 2001). The existing inlet/sluice structure is concrete (USACE, 2001). Flow from the inlet/sluice structure enters the ditch through a 48 inch diameter outlet pipe (USACE, 2001). The inlet/sluice structure has a 48 inch diameter sluice gate with CMP and an overflow weir (USACE, 2001). Flows from the sluice gate and weir eventually enter the Rio Grande via an earth channel (USACE, 2001). The irrigation system downstream of the inlet/sluice structure consists of earth lined ditch, concrete lined ditch and underground pipe (USACE, 2001). Check gate structures, irrigation turnouts, road crossings and an overshot structures are located within the acequia (USACE, 2001).

Portions of the existing acequia which have not yet been improved suffer from the following problems: earthen ditch embankments are weak; significant conveyance losses (through seepage); damage to structure and sedimentation following monsoon storm events near arroyo crossings impacting conveyance; high operation and maintenance costs associated with the repairs and dredging of sediment following monsoon storm events; and reduced conveyance from trees and brush.

A current USGS 7.5 Minute Topographic Map was reviewed (Appendix C).

4 - Site Reconnaissance

A site reconnaissance occurred on 12 July, 2019. During which time the property was visually and physically observed. No structures were observed within the project area. Solid waste, hazardous substances, or petroleum products were not observed. The current use of the project area is rural agricultural and has not been likely involved in the use, treatment, storage, or generation of hazardous substances or petroleum products. There were no indications of current use that would suggest unauthorized use that involved in the use, treatment, storage, or generation of hazardous substances or petroleum products. Potable water sources are present within the project area but will not be impacted. Liquid storage systems, odors, pools of liquid,

drums, hazardous substance and petroleum product containers, unidentified substance container, and PCBs containing equipment were not observed within the project area.

The past uses of the property suggest the use, treatment, storage, or generation of hazardous waste or petroleum products is not likely. The current and previous use of adjoining properties includes lands within the La Joya Acequia Association (Association), between the ditch and the river are privately owned by the farmers and ranchers of the Association and MRGCD. However, the surrounding lands just east of the ditch and west of the river are within the boundaries of the Sevilleta National Wildlife Refuge, administered by the US Fish and Wildlife Service. The refuge encompasses 220,200 acres and is managed in its "natural" state with no public use (Crawford et al. 1993). The US Bureau of Land Management and the US Forest Service manage large tracts of federal lands farther west of the Refuge. These federal lands are primarily used for rangeland grazing. New Mexico state trust lands also occur in the area for waterfowl and upland game management. La Joya Waterfowl Area (353 acres) and Bernardo Waterfowl Area (1,676 acres) are both located only a short distance from the project area.

The primary use of the surface water in and near the Rio Grande is for agricultural consumption. The federal and state properties mentioned above, however, maintain large ponds and impoundments near the river as a productive stopover for migratory waterfowl. Stained soil or pavement was not visually observed within the project area. Stressed vegetation was not visually observed within the project area.

5 - Interviews

Marcel Abeyta (staging area land owner) was interviewed on 12 July 2019. Mr. Abeyta's response to the interview questionnaire is provided in Appendix D. During the interview, Mr. Abeyta was accompanied by his son, Tom Abeyta. Neither party had any knowledge of potentially hazardous site conditions, either historically or current. Tom was able to accompany USACE employees during the site walk-through to answer any questions that arose outside of the questionnaire.

USACE representatives were not able to conduct additional interviews during the site visit on 12 July, 2019.

6- Conclusion

USACE conducted a *Phase I Environmental Site Assessment for Forestland or Rural Property* in conformance with the scope and limitations of ASTM E 2247-16, of the La Joya Acequia PH IV Project. The records review, historic aerial photographs, site reconnaissance and interviews were used to assess the historic and existing environmental conditions within the project area and buffer. This assessment has revealed no evidence of recognized environmental conditions. This ESA did not identify the presence or likely presence of any hazardous substance, or petroleum products on or near the property that indicate an existing release, a past release, or threat of a release into the ground, groundwater or surface water of the property.

Based on the lines of evidence derived from the Phase I, a Phase II (ASTM E1903) is not warranted at this time. If areas of concern or contaminants are identified, construction shall be postponed and USACE will coordinate with the Association to determine the appropriate course of action.

7- References

Albuquerque District, U.S. Army Corps of Engineers (Corps). 1995. Environmental Assessment for Rehabilitation of La Joya Acequia, Socorro County, New Mexico.

Albuquerque District, U.S. Army Corps of Engineers (Corps). 2001. Finding Of No Significant Impact for conveyance treatment for La Joya Acequia, Socorro County, New Mexico.

Crawford, C.S., A.C. Cully, R. Leutheuser, M.S. Sifuentes, L.H. White, J.P. Wilber. 1993. Middle Rio Grande Ecosystem: Bosque biological management plan. Middle Rio Grande Biological Interagency Team, Albuquerque, New Mexico. 291 pp.

APPENDIX E – Notice of Availability

NOTICE OF AVAILABILTTY FOR PUBLIC REVIEW OF DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Notice of Availability of Draft Supplemental Environmental Assessment for the Conveyance Treatment for the La Joya Acequia Phase IV.

The U.S. Army Corps of Engineers (Corps) has released a Draft Supplemental Environmental Assessment (DSEA) for the continued rehabilitation of the La Joya Acequia. The objective of this proposed project is to reduce ditch maintenance and decrease seepage. The Corps has planned this project conjunction with the NM Interstate Stream Commission and the La Joya Acequia Association.

For public review, a hardcopy of this DSEA is available at the Rio Abajo Community Library, 28 Calle de Centro, Sur, La Joya, NM, and a digital copy posted on our Corps website at:

https://www.spa.usace.army.mil/Missions/Environmental/Environmental-Compliance-Documents/Environmental-Assessments-FONSI/

Please email or mail your comments to Amanda Velasquez at the below address by COB October 4, 2019.

Email Address: Amanda.L.Velasquez@usace.army.mil

Mailing Address: U.S. Army Corps of Engineers, Albuquerque District, Attn: Amanda Velasquez, Project Manager, Planning Branch, 4101 Jefferson Plaza NE, Albuquerque, NM 87109-3435

Disclosure of personal identifying information is voluntary when submitting comments. Failure to disclose information will not deprive an individual of his or her right to submit comments/input.