



**US Army Corps  
of Engineers®**  
**Albuquerque District**  
ACEQUIAS REHABILITATION PROGRAM

Draft  
Environmental Assessment  
and  
Finding of No Significant Impact  
for the

Acequia de Llano de San Juan Nepomuceño Rehabilitation Project  
Taos County, New Mexico

Prepared by

U.S. ARMY CORPS OF ENGINEERS  
ALBUQUERQUE DISTRICT  
4101 Jefferson Plaza NE  
Albuquerque, New Mexico 87109

September 2015

**Finding of No Significant Impact  
for the  
Acequia de Llano de San Juan Nepomuceño Rehabilitation Project  
Taos County, New Mexico**

The U.S. Army Corps of Engineers (Corps), Albuquerque District, in cooperation with and at the request of the New Mexico State Engineer's Office and the members of the Acequia Llano de San Juan Nepomuceño Association (Acequia Association), is planning a project to rehabilitate the Acequia de Llano de San Juan Nepomuceño (Acequia) in Taos County, New Mexico. The proposed project area is located on the Rio Santa Barbara near the community of Llano, approximately four miles southeast of Peñasco, New Mexico and 20 miles south of Taos, New Mexico.

The proposed rehabilitation work on the Acequia would be conducted under Section 1113 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended. Section 1113 authorizes the Acequia Rehabilitation Program for the restoration and rehabilitation of irrigation ditch systems (acequias) in New Mexico. This acequia rehabilitation project also qualifies under Section 215 of the Flood Control Act of 1968 (Public Law 90-483), as amended. Section 215 provides that the Secretary of the Army may enter into an agreement to credit or reimburse the costs of certain work accomplished by States or political subdivisions thereof, which later is incorporated into an authorized project.

The Acequia diverts water from the Rio Santa Barbara near the historic town of Hodges, approximately three quarters of a mile upstream of the proposed project area. From the diversion, the water proceeds into the acequia madre, which extends in a generally northwesterly direction for a total distance of approximately 27,561 feet (5.22 miles) to the desagua at the border of Picuris Pueblo. The Acequia has a non-adjudicated priority date of March 19, 1907; however, its construction date is noted as 1796 in the declaration of ownership of water rights filed with the County of Taos. As of 2007, the Acequia irrigates 1620 acres and serves 230 members. Cultivated crops include orchards of fruit trees (apples, prunes, etc.), hay, alfalfa, and vegetable gardens. Approximately 3,300 feet of the Acequia is located midway up a steep hillside and is subject to frequent rockslides. The material (soil, rocks, boulders, woody debris) accumulates in the Acequia bed and disrupts water delivery to Acequia members. The proposed project area is too steep to bring in mechanical equipment for annual cleaning and so the Acequia Association has relied on a team of draft horses to do this. In recent years it has been impossible to locate a trained horse team to pull out the large boulders that fall from the steep, gravelly slopes. In addition, land owners below the Acequia (who are not Acequia Association members) object to large rocks being rolled out of the Acequia and on to their property. The purposes of the proposed Acequia rehabilitation project are to improve water delivery efficiency and reduce maintenance requirements. The proposed action would not change or affect water rights, or the amount of flows diverted.

The Corps proposes to rehabilitate the Acequia de Llano de San Juan Nepomuceño by placing approximately 3,300 linear feet of currently open channel in a 5-foot reinforced concrete (RC) pipe on current grade with RC manholes located every 400 feet along the alignment. Each end of

the pipeline, upstream and downstream, would have a RC transition headwall. A source of borrow material to cover the pipeline has not yet been identified. Whether the borrow site is a commercial facility or private entity, the Corps will assure that 1) the area will be devoid of any significant biological or cultural resources; and 2) the soil material will be free of contaminants. Because slopes are so steep in the proposed project area, it is expected that once a section of pipe is laid, covered, and compacted, that area would serve as access to the next section. After laying the pipe, the area would be reseeded with appropriate native plants or, in agricultural areas, with pasture grasses. Existing roads would be used for access to the area. Equipment staging and refueling would be confined to designated staging areas outside the floodplain of the Rio Santa Barbara and outside wetland or riparian habitat. Project construction is scheduled to begin in November following irrigation season, and would take approximately four months.

Other alternatives considered in this Environmental Assessment include taking no action (the No-Action Alternative), rerouting the Acequia, or lowering the Upper Llano Road grade. These alternatives were too costly or impractical and were therefore eliminated from further analysis.

The Acequia de Llano de San Juan Nepomuceño is eligible for nomination to the National Register of Historic Places and the New Mexico State Register of Cultural Properties. The current rehabilitation project would change a moderate portion of the alignment (approximately 3,300 feet out of a total of 27,561 feet or 14.5%). The Corps has determined that the proposed Acequia rehabilitation project would have no adverse effect to historic properties. Consultation with the New Mexico State Historic Preservation Office (NMSHPO) has been initiated and final determination is pending. Should previously undiscovered artifacts or features be unearthed during construction, work would be stopped in the immediate vicinity of the find, a determination of significance made, and a mitigation plan formulated in coordination with the NMSHPO and with Native American groups that may have concerns in the project area.

Tribes indicating an interest in activities in Taos County were sent a scoping letter to assess if there were any potential tribal concerns with the project. To date, the Corps has received no indication of tribal concerns that would impact the project.

As required by the Endangered Species Act, the Corps has determined that the project would have no effect on any threatened or endangered species or designated or proposed critical habitat receiving protection under the Endangered Species Act.

The proposed action is the rehabilitation of an existing irrigation structure. Therefore, the project is exempt from the provisions of Sections 404 and 401 of the Clean Water Act (33 CFR 323.4). Wetlands exist within the project area, but impacts to these wetlands would be minimized and monitored. Therefore, the project complies with Executive Order 11990, Protection of Wetlands.

Best Management Practices to protect the environment that would be implemented as part of this project include the following:

- The contractor would be required to have emission control devices on all equipment.
- To control dust and wind erosion, soils within the construction zone would be kept wet. Stockpiles of debris, soil, sand, or other materials that could produce dust would be

watered or covered. Materials transported on- or off-site by truck would be covered. The contractor would be required to comply with local soil sedimentation and erosion-control regulations.

- All fuels and lubricants would be stored outside of the 100-year floodplain of Rio Santa Barbara and construction equipment would be inspected daily and monitored during operation to prevent leaking fuels or lubricants from entering surface water.
- A Storm-Water Pollution Prevention Plan is required. Aquatic habitat would be protected with silt fencing, geotextiles, or straw bales to prevent runoff of sediments from areas disturbed by construction. Orange construction fence would be placed in front of the silt fence to prevent construction workers from entering wetland and aquatic habitat.
- All construction equipment would be cleaned with a high-pressure water jet before entering and upon leaving the project area to prevent introduction or spread of invasive plant species. Waste water would be disposed following all Federal, State, and local regulations.
- Temporary fencing to control livestock shall be installed when construction requires removal of permanent fences. All temporary fences shall be removed after construction and the permanent fence restored to the original condition.
- Following construction, the soil would be stabilized and revegetated with appropriate native plant species or pasture grasses.

The proposed action would not change or affect water rights or the amount of water diverted. The proposed action would result in minor or temporary effects on soils, air quality, noise levels, vegetation, wetlands, floodplains, and wildlife species and habitat during construction. The following elements were analyzed, but would not be significantly affected by the proposed action: climate, physiography, geology, water quality, waters of the U.S., special status species, visual resources, human health and safety, aesthetics, land use, Indian Trust Assets, and environmental justice. Beneficial effects would occur to land use and socioeconomics with increased efficiency of the Acequia.

The proposed action is being coordinated with Federal, State, and local agencies with jurisdiction over the biological and cultural resources of the proposed action area. Based upon these factors and others discussed in the following environmental assessment, the proposed action would not have significant effects on the human environment. Therefore, an environmental impact statement would not be prepared for the proposed rehabilitation work on the Acequia.

---

Date

---

Patrick J. Dagon  
Lieutenant Colonel, U.S. Army  
District Commander

**CERTIFICATION OF LEGAL REVIEW**

The *Environmental Assessment for the Acequia de Llano de San Juan Nepomuceño Rehabilitation Project, Taos County, New Mexico*, has been fully reviewed by the Office of Counsel, Albuquerque District, and is approved as legally sufficient.

---

M. LeeAnn Summer  
District Counsel

---

Date

# TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION .....	1
1.1 Background and Location .....	1
1.2 Purpose and Need.....	1
1.3 Regulatory Compliance.....	2
2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES .....	6
2.1 Proposed Action .....	6
2.2 The No-Action Alternative.....	6
2.3 Alternatives Considered but Not Analyzed.....	6
3.0 EXISTING ENVIRONMENT AND FORESEEABLE EFFECTS.....	7
3.1 Physiography, Geology, and Soils .....	7
3.2 Climate and Climate Change.....	7
3.3 Water Resources.....	8
3.4 Floodplains and Wetlands .....	10
3.5 Air Quality, Noise, and Aesthetics.....	10
3.6 Vegetation Communities.....	12
3.7 Noxious Weeds and Invasive Species.....	13
3.8 Wildlife.....	13
3.9 Special Status Species .....	14
3.10 Cultural Resources.....	17
3.11 Socioeconomic Considerations and Land Use .....	18
3.12 Environmental Justice.....	19
3.13 Indian Trust Assets .....	20
3.14 Human Health and Safety.....	20
3.15 Hazardous, Toxic, and Radioactive Waste (HTRW) .....	20
3.16 Cumulative Impacts.....	21
4.0 CONCLUSIONS AND SUMMARY .....	22
5.0 PREPARATION, CONSULTATION AND COORDINATION.....	23
5.1 Preparation .....	23
5.2 Quality Control.....	23
5.3 Consultation and Coordination.....	23
6.0 REFERENCES .....	24

## **Appendix A: Cultural Resources Coordination**

Tribal Consultation Letter

Response Letters from Tribes

Cultural Resources Survey Report

State Historic Preservation Office Correspondence

## **Appendix C: Agency Coordination Review Letter and Notice of Availability**

## LIST OF FIGURES

Figure 1. Location of proposed project area shown on USGS 7.5” quadrangle maps, Penasco NM (36105-B6) and El Valle, NM (36105-A6).....	3
Figure 2. Proposed project survey areas. USGS 7.5’ El Valle (36105-A6) and Penasco (35106-B6).....	4
Figure 3. Acequia de Llano de San Juan Nepomuceño existing conditions.....	5
Figure 4. Climate characteristics in Penasco, Taos County, NM near project area. Graphs generated by City-data.com (2015).....	8

## LIST OF TABLES

Table 1. Count of woody plants likely to be affected by the proposed action at Acequia de Llano de San Juan Nepomuceño. ....	3
Table 2. Federal and State, Endangered, Threatened and Proposed Candidate Species, and Rare Plants in Taos County, New Mexico with Potential to Occur in the Project Area. ....	15
Table 3. Rare Plants in Taos County, NM (New Mexico Rare Plants Technical Council 2015). 17	

## 1.0 INTRODUCTION

### 1.1 Background and Location

The U.S. Army Corps of Engineers, Albuquerque District (Corps), in cooperation with and at the request of the New Mexico Office of the State Engineer and the members of the Acequia San Juan Nepomuceño Association (Acequia Association), is proposing to rehabilitate part of the Acequia de Llano de San Juan Nepomuceño Acequia (Acequia), Taos County, New Mexico. The Acequia is located near the town of Llano, approximately 4 miles southeast of the town of Peñasco (Figure 1). The Acequia provides irrigation water to approximately 1,620 acres of cultivated land for 230 *parsientes*. Cultivated crops include orchards (apples, prunes, etc.), hay, alfalfa, and vegetable gardens (Bonifacio Vasquez, personal communication). The water diversion structure is located on the Rio Santa Barbara near the historic town of Hodges, approximately three quarters of a mile upstream of the project area. From the diversion, the water proceeds into the Acequia madre, which extends in a generally northwesterly direction for a total distance of approximately 5.2 miles to the *desagua* at the border of Picuris Pueblo lands (Figure 2).

The Acequia de Llano de San Juan Nepomuceño consists of the aforementioned Acequia madre and three primary laterals, each of which is considered an independent acequia system. The system as originally constructed exhibited a traditional open earthen ditch form, without concrete-lining or piping. Since its original construction, the ditch has had no major modifications other than those accompanying routine maintenance and use (Bonifacio Vasquez, personal communication). At present, the entire system still operates as an open earthen ditch.

The proposed rehabilitation work on the Acequia San Juan Nepomuceño would be conducted pursuant to Section 1113 of the Water Resources Development Act of 1986 (WRDA 1986; Public Law 99-662), as amended. Section 1113 authorized the Corps to establish the Acequia Rehabilitation Program for the restoration and rehabilitation of irrigation ditch systems (acequias) in New Mexico. The Corps would provide 75 percent of construction funding and is, therefore the Federal action agency for this project. The Office of the State Engineer would be the project sponsor and, along with the Acequia Association, would be responsible for the remaining 25 percent of construction costs. The Acequia Association would be responsible for operation and maintenance once the project is complete.

### 1.2 Purpose and Need

The Acequia de Llano de San Juan Nepomuceño has a non-adjudicated priority date of March 19, 1907. Its construction date, however, is noted as 1796 in the declaration of ownership of water rights filed with the County of Taos, making it one of the earliest acequias in the area. As of 2007, the Acequia irrigates 1,620 acres and serves 230 members.

Approximately 3,300 feet of the Acequia is located midway up a steep hillside and is subject to frequent rockslides (Figure 3). The material (soil, rocks, boulders, woody debris) that accumulates in the Acequia bed disrupts water delivery to Acequia members. The area is too steep to bring in mechanical equipment for annual cleaning and so the Acequia Association has



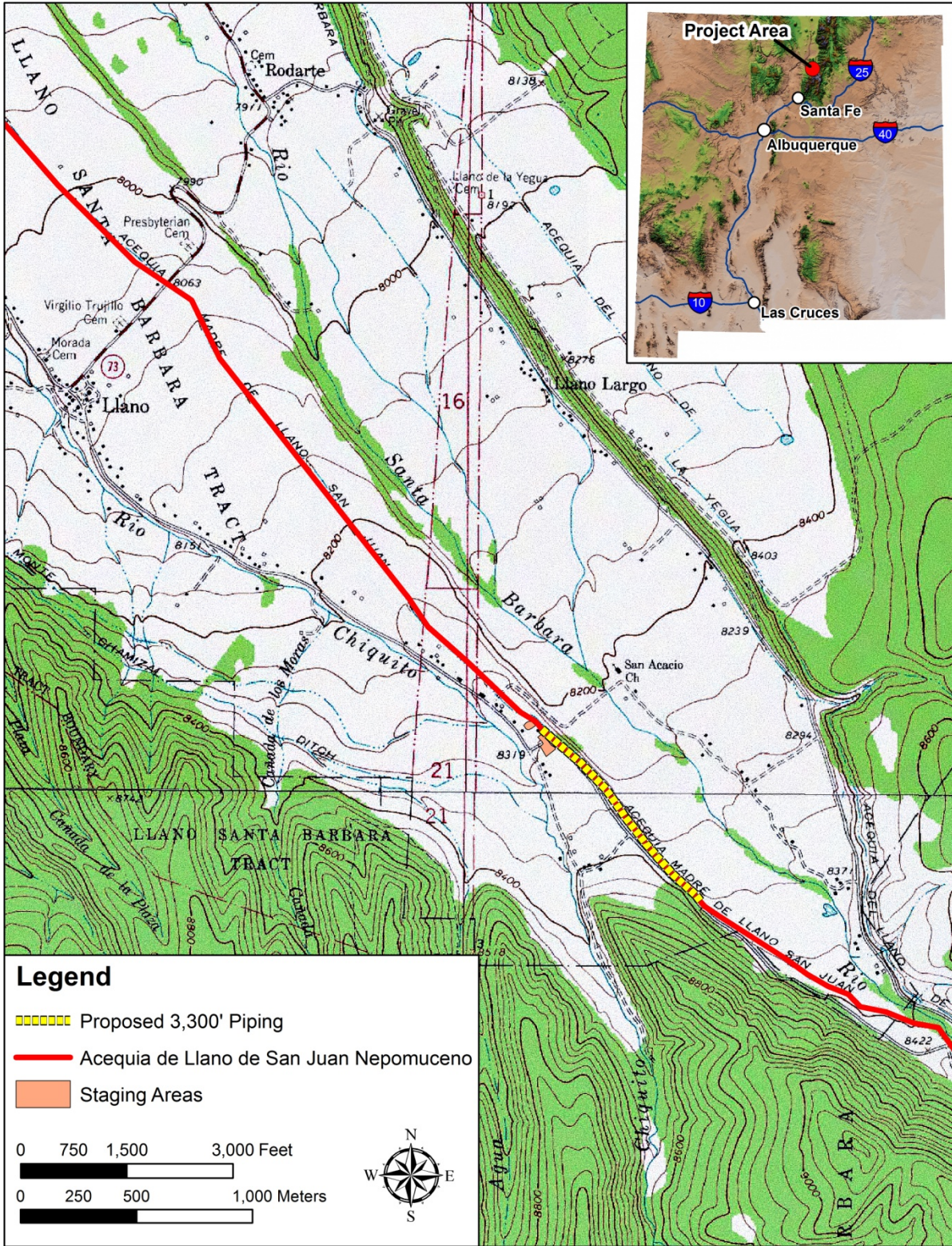
relied on a team of draft horses to do this. In recent years it has been impossible to locate a trained horse team to pull out the large boulders that fall from the steep, gravelly slopes. In addition, land owners below the Acequia (who are not Acequia members) object to large rocks being rolled out of the Acequia and on to their property.

The Corps proposes to rehabilitate the Acequia by placing the approximately 3,300-foot earthen section in reinforced concrete pipe and burying it in excavated trenches along the existing Acequia grade. Project construction is scheduled to begin in November at the end of irrigation season with an expected duration of about four months. The Acequia Association members would be responsible for assuring operation and maintenance upon project completion.

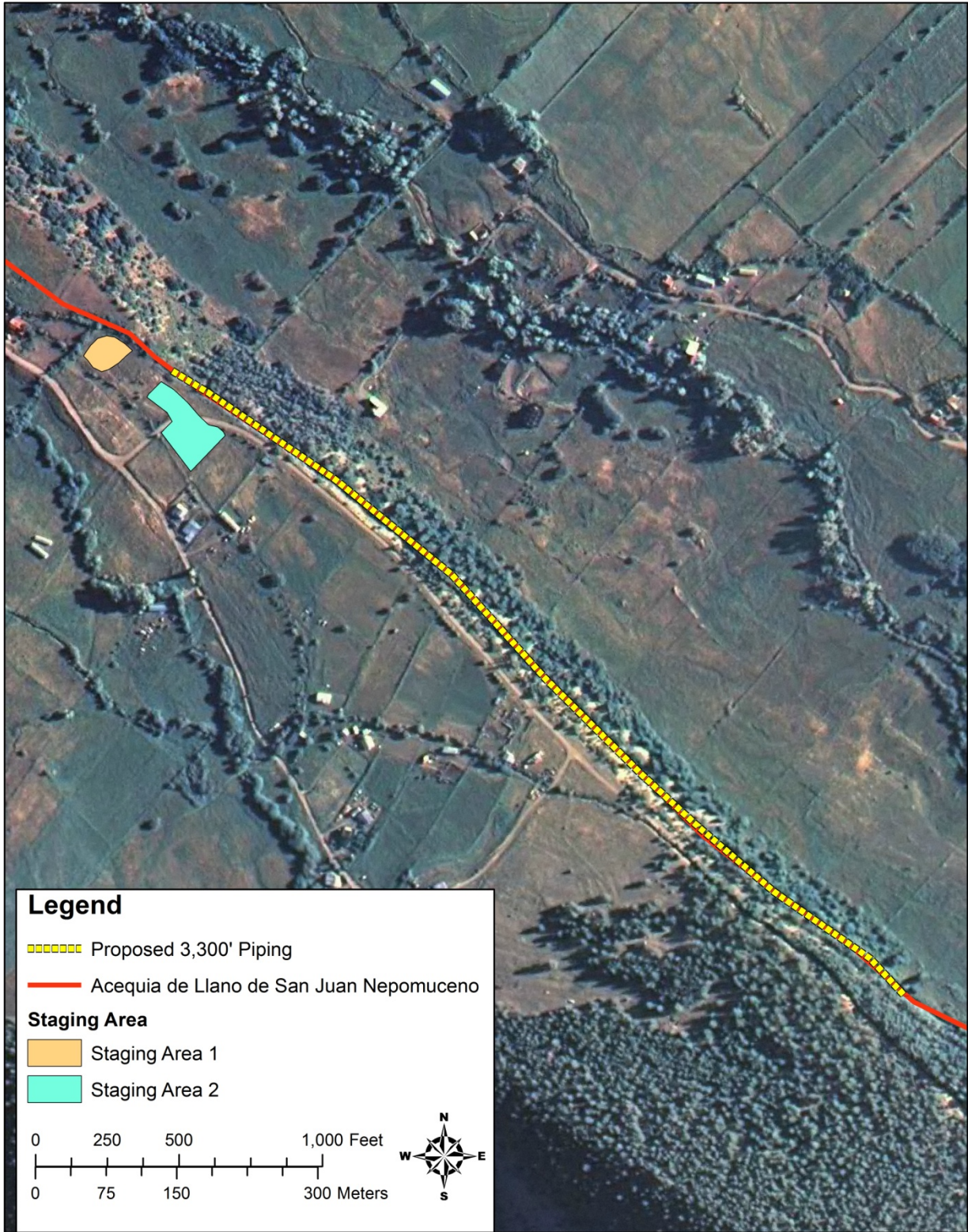
### **1.3 Regulatory Compliance**

This Draft Environmental Assessment (DEA) was prepared by the Corps, Albuquerque District, in compliance with all applicable Federal Statutes, regulations, and Executive Orders, including the following:

- National Historic Preservation Act (16 U.S.C. 470 *et seq.*)
- Archaeological Resources Protection Act (16 U.S.C. 470 *et seq.*)
- Clean Water Act (33 U.S.C. 1251 *et seq.*)
- Clean Air Act (42 U.S.C. 7401 *et seq.*)
- Endangered Species Act (16 U.S.C. 1531 *et seq.*)
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations
- Occupational Safety and Health Act of 1970 (29 U.S.C. 651 *et seq.*)
- Executive Order 11988, Floodplain Management
- National Environmental Policy Act (42 U.S.C. 4321 *et seq.*)
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Part 1500 *et seq.*)
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 *et seq.*)
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Executive Order 11990, Protection of Wetlands
- U.S. Army Corps of Engineers' Procedures for Implementing NEPA (33 CFR Part 230; ER 200-2-2)
- Farmland Protection Policy Act (7 U.S.C. 4201 *et seq.*)
- Executive Order 13112, Invasive Species
- Federal Noxious Weed Act (7 U.S.C. 2814)
- Migratory Bird Treaty Act (16 U.S.C. 703 *et seq.*)
- Fish and Wildlife Coordination Act (48 Stat. 401; 16 USC 661 *et seq.*)
- Section 438 of the Energy Independence and Security Act of 2007 (Public Law 110-140 Section 438, 121 Stat. 1492, 1620)
- Executive Order 13524, Federal Leadership in Environmental, Energy, and Economic Performance



**Figure 1.** Location of proposed project area shown on USGS 7.5" quadrangle maps (Peñasco and El Valle).



**Figure 2.** Locations of proposed piping and project staging areas.



(a)



(b)



(c)



(d)

**Figure 3.** Acequia de Llano de San Juan Nepomuceño existing conditions: (a) view of the Acequia looking downstream (note steep, loose banks); (b) view of the Acequia from the Upper Llano Rd, looking upstream (note the boulders piled to the left of the Acequia); (c) view along Acequia alignment looking upstream (note boulders); (d) steep, eroding hillsides above Acequia.

This DEA also reflects compliance with all applicable State and local regulations, statutes, policies, and standards for conserving the environment such as water and air quality, endangered plants and animals, and cultural resources.

## **2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**

### **2.1 Proposed Action**

The Corps proposes to rehabilitate the Acequia de Llano de San Juan Nepomuceño by replacing approximately 3,300 linear feet of currently open channel with a 5-foot-diameter reinforced concrete (RC) pipe on current grade with RC manholes located every 400 feet along the alignment. Each end of the pipeline, upstream and downstream, would have a RC transition headwall. A source of borrow material to cover the pipeline has not yet been identified. Whether the borrow site is a commercial facility or private entity, the Corps will assure that 1) the area will be devoid of any significant biological or cultural resources; and 2) the soil material will be free of contaminants. Because slopes are so steep and access is restricted adjacent to the ditch, it is expected that once a section of pipe is laid, covered, and compacted, the new ground surface would serve as access to the next section. After laying the pipe, the area would be reseeded with appropriate native plants or, in agricultural areas, with pasture grasses. Existing roads would be used for access to the area. Equipment staging and refueling would be confined to two pastures that are outside the floodplain of the Rio Santa Barbara (Figure 1), and do not contain wetland or riparian habitat. Project construction is scheduled beginning in November following the irrigation season and would take approximately four months.

### **2.2 The No-Action Alternative**

Under the No-Action Alternative there would be no modification of the existing Acequia. Rocks and debris would continue to slide down the hillside and come to rest in the Acequia itself. The Acequia Association would continue to have difficulty finding qualified persons and draft horse teams to remove the debris from this difficult-to-access area. Even if it were possible to easily remove rocks and debris from the Acequia, the Acequia Association would have no place to dispose of this material. Under the No-Action Alternative, this material would likely continue to collect in the Acequia and decrease its hydraulic efficiency. Ultimately, failure of the Acequia would be possible and would leave downstream landowners without irrigation water, threatening their livelihood and that of the small historic agricultural community.

### **2.3 Alternatives Considered but Not Analyzed**

Alternatives that were considered and eliminated from further analysis included:

1. Rerouting the Acequia around the steep hillside; determined to not be feasible because the possible route was so lengthy that the project became prohibitively costly.
2. Lowering the Upper Llano roadway to nearly the elevation of the Acequia; determined not to be feasible because this would generate large amounts of spoil that would be costly to remove from the site. In addition, ownership of the roadway is not clear.

### **3.0 EXISTING ENVIRONMENT AND FORESEEABLE EFFECTS**

#### **3.1 Physiography, Geology, and Soils**

The proposed project area lies near the boundary between the Petran Montane Conifer Forest and the Petran Subalpine Conifer Forest provinces (Brown and Lowe 1981) in the Rio Grande basin in north-central New Mexico. Elevations in the region vary from about 7,500 feet above sea level near the Rio Santa Barbara to nearly 13,000 feet in the Sangre de Cristo Mountains.

The surface geology of the Llano area includes primarily clastic, unconsolidated deposits from the middle Pleistocene to the uppermost Miocene (NMBGMR 2003). The Rio Santa Barbara valley is composed of alluvium derived of upper and middle Quaternary sediments. In the immediate project area, surface geology consists of much older limestone derived during the Pennsylvanian and Permian periods.

Soils within the project area are mapped in two units: Maes-Etoe complex and Fernando clay loam (NRCS 2015a). The Acequia alignment is classified as Maes-Etoe complex, mountain flank, derived from sandstone and shale and with a profile of cobbly loam over a base of very to extremely cobbly sandy loam (NRCS 2015a). Slopes are very steep (40-80%), depth to water table is more than 80 inches, and soils have a low to moderate available water capacity (5.4-6.1 inches; NRCS 2015a). The proposed project staging area comprises alluvial fans material (Fernando clay loam). This alluvium is derived of igneous and metamorphic rocks, and has 3-5% slopes, a depth to water table of more than 80 inches, and a high available water capacity (11.6 inches; NRCS 2015a).

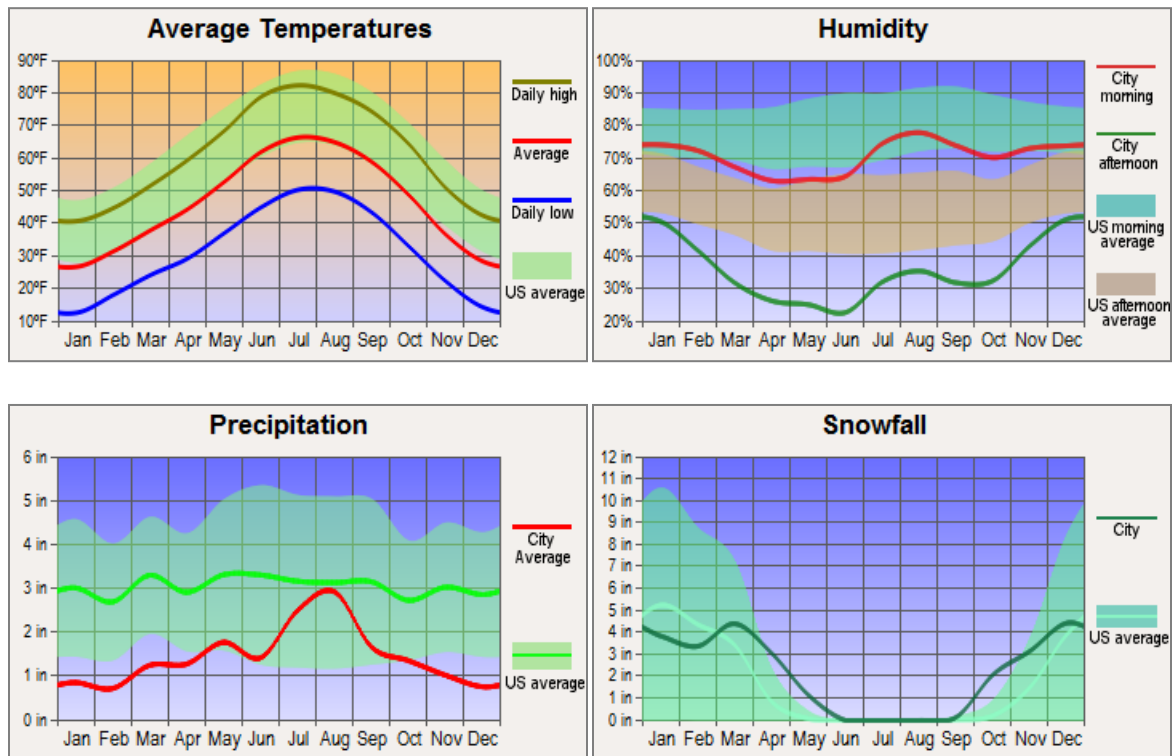
The proposed action would have minor, temporary effects on these soils during construction. Because the pipe would follow the existing Acequia alignment and grade, no additional excavation would be necessary. An additional two feet of cover (fill) material would then be placed over the pipe to provide protection. These actions would disturb the soil profile in an approximately 1-acre area. Surface disturbance associated with construction vehicles and staging would total approximately 1.1 acres. Standard Best Management Practices (BMPs) to prevent on- and off-site erosion would be incorporated in the contract specifications, and would include silt fences, straw bales, geotextiles, or similar measures. Following installation of the RC pipe, the trench would be backfilled and surface soil would be stabilized and revegetated using appropriate native plant species or pasture grasses. Use of these BMPs would ensure that soils are only minimally affected by the proposed work. Therefore, there would be no long-term and cumulative impacts to soils.

The No-Action Alternative would have no effect on soils.

#### **3.2 Climate and Climate Change**

Taos County has a semiarid climate; however, local weather is highly varied because of the wide range in elevation and the uneven topography. Elevations in the county range from 5,900 feet at the Rio Grande to over 13,000 feet in the Sangre de Cristo Mountains. Climate records are available from the weather station at Peñasco Ranger Station, approximately 4 miles northwest

of the proposed project site (WRCC 2015). The project area has a mid-latitude desert climate, with an annual average precipitation of 15.02 inches. Precipitation is irregular, but there is typically a pattern of monsoonal rains in July and August as Gulf of Mexico air masses penetrate into the region (Figure 4). Cyclonic precipitation occurs during winter months, with average annual snowfall of 33.8 inches. Average diurnal temperature fluctuations of 20° F to 30° F are characteristic of the project area. Summer temperatures are warm and winters are mild (Figure 4).



**Figure 4.** Climate characteristics in Peñasco, Taos County, NM near project area. (Graphs generated by City-data.com 2015.)

Global climate change related to emissions of greenhouse gases (*e.g.* carbon dioxide, methane, nitrous oxide, chlorofluorocarbons) is predicted to result in a drier Southwest with greater variation in precipitation (Backlund *et al.* 2008).

Construction equipment associated with the proposed project would produce carbon emissions; however, their contribution to greenhouse gas emissions would be negligible. Neither the proposed action nor the No-Action Alternative would have a detectable effect on climate in the short or long term.

### 3.3 Water Resources

The project area is located on the Rio Santa Barbara, which flows northwest and into Embudo Creek at the community of Rio Lucio. Embudo Creek continues west and flows into the Rio

Grande near the community of La Junta. There are no gauges on the Rio Santa Barbara, and the closest gauge on Embudo Creek is at Dixon, near the confluence with the Rio Grande. Peak flows on Embudo Creek (USGS gauge number 8279000) averaged over the 78-year period of record occur during the spring snowmelt in late May and approach 400 cubic feet per second (cfs). During the rest of the year, discharge fluctuates between 30 and 50 cfs. Discharges on the Rio Santa Barbara are expected to be much less than those on Embudo Creek. The proposed pipe installation would not change the amount of water withdrawn from the Rio Santa Barbara or used in agriculture.

Piping the acequia will cease infiltration through the ditch bottom and is expected to increase streamflow volume downstream. The estimated increase is expected to be approximately 4,000 cubic feet in a 24-hour period. The current structure would support this increase. The increased acequia water volume is expected to be utilized for irrigation.

Section 402 of the Clean Water Act (CWA; 33 U.S.C. 1251 *et seq.*), as amended, regulates point-source discharges of pollutants into waters of the United States and specifies that storm-water discharges associated with construction activities shall be conducted under the National Pollution Discharge Elimination System (NPDES) guidance. Construction activities characterized by clearing, grading, and excavation are associated with storm-water discharges, potentially subjecting the underlying soils to erosion by storm-water flows. The NPDES general permit guidance would apply to this project because the total construction area is more than one acre; therefore, a Storm-Water Pollution Prevention Plan (SWPPP) is required prior to the start of construction. During construction of the proposed project, standard BMPs to prevent on- and off-site erosion and storm-water discharges, and to prevent sediment from entering the Rio Santa Barbara, would be incorporated in contract specifications. Therefore, water quality impacts from storm-water and sedimentation due to the proposed work are expected to be negligible and short-term.

Construction waste water would be properly contained and would not be allowed to enter waterways or to be discharged prior to being treated to remove pollutants. Disinfection waste water shall be disposed of off-site at an approved facility in accordance with all Federal, State, regional and local laws and regulations. Therefore, the proposed construction would have no long-term effect and no measurable cumulative impacts on water quality in the Acequia, the Rio Santa Barbara, Embudo Creek, or the Rio Grande.

There would be no water quality impacts from the No-Action Alternative.

Section 404 of the CWA regulates the discharge of fill material into waters of the United States and adjacent wetlands. Section (f) of the Act states that certain discharges associated with irrigation are exempt from requiring a Department of the Army (DA) permit under Section 404 of the CWA. Even under this exemption, a DA permit under Section 404 would be required if any discharge of dredged or fill material contains any toxic pollutant. The Corps does not anticipate adding any toxic pollutant to the proposed fill. A DA permit under Section 404 also would be required if the purpose of the action is to convert an area of the waters of the United States to a new use, and the flow for circulation of waters is impaired or the reach of such waters is reduced. The proposed action would not alter the flow or quantity of water diverted, or change



the land use in the affected area. The proposed action is the rehabilitation of an existing irrigation structure; therefore, the project is exempt from the provisions of Sections 404 and 401 of the CWA (33 CFR 323.4).

Under Section 303(d)(1) of the CWA, States are required to develop a list of waters within the State that do not support their designated uses as established in the State water quality standards (WQS). For each water body on this §303(d) list, States must establish a total maximum daily load (TMDL) for each pollutant that causes the waters to be “impaired.” A TMDL analysis is established to restore a water body and to ensure that WQS are maintained for that water body. The New Mexico Environment Department’s Surface Water Quality Bureau established TMDLs for the Upper Rio Grande watershed, including the Rio Santa Barbara in 2005 (NMED-SWQB 2005).

### **3.4 Floodplains and Wetlands**

Executive Order 11988 (Floodplain Management) requires Federal agencies to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains. According to the Federal Emergency Management Agency’s (FEMA) flood risk map, none of the proposed project area occurs within the 100-year floodplain (FEMA 2015) of the Rio Santa Barbara or any other body of water. The nature of acequia systems inherently depends on the diversion structure or distribution system being located in the floodplain; however, no additional development would occur within the floodplain as a result of the proposed action. Rehabilitating the Acequia with its small water allocation would not contribute to additional development, but would allow present agricultural land uses to continue. Neither the proposed action nor the No-Action Alternative would result in any additional development in the Rio Santa Barbara floodplain. There would be no adverse effect to these floodplains from the proposed action.

Executive Order 11990 (Protection of Wetlands) requires that Federal agencies take action within their Congressional authorities to minimize the destruction, loss or degradation of wetlands. Agencies must avoid undertaking or providing assistance for new construction located in wetlands whenever there is a practicable alternative. No wetlands exist in the proposed project area; therefore, the proposed action would not have any direct, indirect, or cumulative effect on wetlands.

The No-Action Alternative would not affect floodplains or wetlands.

### **3.5 Air Quality, Noise, and Aesthetics**

The Clean Air Act of 1970, as amended, established National Ambient Air Quality Standards for six criteria air pollutants: ozone, airborne particulates, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. If measured concentrations of the six pollutants exceed their respective standards, the U.S. Environmental Protection Agency can designate the area as a non-attainment area for that pollutant.

The Upper Rio Grande Valley Intrastate Air Quality Control Region 157 covers 6,136 square

miles in the northern section of the State including Taos County. No exceedances of the National Ambient Air Quality Standards have been measured in the air quality monitoring network in Santa Fe County (NMED 2015); therefore, the area is currently in attainment of all Federal air quality standards.

Air quality in Taos County is generally good and the county is classified as an air quality attainment area (USEPA 2015). Class I air quality areas are designated natural areas, including national parks, national monuments, and wilderness areas, where air quality is subject to maximum limits on degradation. The Class I air quality areas closest to the proposed project area are the Pecos Wilderness, about 10 miles to the south, and Wheeler Peak Wilderness, about 35 miles to the northeast (NMED-AQB 2010). Although these areas — especially the Pecos Wilderness — are close to the proposed project area, the limited duration and scope of the proposed work make it unlikely that there would be any effect to Class I air quality areas.

The proposed action would result in a temporary, localized, and negligible increase in suspended dust (coarse particles) from construction activities. BMPs to be followed during construction to minimize dust include the following:

- Access roads and disturbed soil would be wetted.
- All vehicles involved in transporting fill material, rubble and spoil to or from the project site would be covered and would have required emission control equipment.
- Stockpiles of debris, soil, sand, or other materials that could produce dust would be watered or covered.

Once construction is complete, the operation of the Acequia would have no further effect on air quality. Therefore, air quality in Llano and in Taos County would not be adversely affected by the proposed project.

Background noise levels in the proposed action area are low, as is typical for an agricultural area. The Occupational Safety and Health Administration (OSHA) noise standards limit noise levels to 90 decibels (dBA) averaged over an eight-hour day (29 CFR 1910.95). The Center for Hearing and Communication (2015) advises that noise levels above 85 dBA would harm hearing over time and noise levels above 140 dBA can cause damage to hearing after just one exposure. During construction, noise would temporarily increase in the vicinity during vehicle and equipment operation and may be audible from nearby residences. Noise levels in the immediate work area would likely be comparable to that generated by a tractor (up to 90 dBA) when immediately adjacent to the equipment, but the noise would attenuate rapidly with increased distance. The increase in ambient noise during construction would not be loud enough to harm hearing, and would be temporary, ending when construction is complete. Large equipment noise may be heard from a distance at times, adding to noise levels generated from non-construction traffic and surrounding homes. There would only be a slight, cumulative increase in noise levels during the period of construction.

To reduce construction noise, construction contract BMPs would require that equipment and activities comply with State and local noise control ordinances. Overall, the proposed action would have no significant affect on noise levels in the environment.

Aesthetically, the proposed project area is in a rural area with minimal development and ample open space between residences and associated farm buildings. The Llano area is scenic with pastoral valleys, steep, forested hillsides, and views of the surrounding mountains. The Acequia de Llano de San Juan Nepomuceño presently runs through an open channel along a steep hillside and there is some evidence that people use the adjacent maintenance path for recreation. During construction, equipment would be temporarily present in the staging area and along the Acequia alignment but this would be short-term in nature. After project completion, the Acequia would no longer be an open channel and open water would not be visible; there may be a negative effect to aesthetic conditions for those who recreate in the immediate area during the irrigation season. Conversely, the ground surface above the buried piping would be easier to traverse than the existing, debris-strewn condition, and may enhance the appreciation of visitors. Overall, the project would not significantly affect visual resources in the project area.

The No-Action Alternative would have no effect on air quality, noise levels, or aesthetic appreciation of the project area.

### **3.6 Vegetation Communities**

The project area lies near the juncture of the Petran Subalpine and Petran Montane Conifer Forests biotic communities (Brown and Lowe 1981; Brown 1982). New Mexico's Comprehensive Wildlife Conservation Strategy (NMDGF 2006) places the Llano area within the Southern Rocky Mountains Ecoregion. Corps personnel visited the site on 28 April, 23 May 2011, and 21 Sep 2015. A list of plants observed on the site visits is provided in Appendix B. Photographs taken along the Acequia route show the existing vegetation condition (Figure 3). The predominant vegetation on hill slopes and the surrounding upland is a mixed-aged forest with white fir, Douglas fir, Gambel's oak, and aspen. The gently sloped valley bottom has been converted to agricultural fields. Vegetation in the irrigated valley includes pasture grasses, alfalfa and annual crops. Rio Santa Barbara and numerous other acequias flow through the Llano area. Permanent, year-round flow in the Acequia de Llano de San Juan Nepomuceño supports a riparian community of willow, alders, and sedges.

Under the proposed action, a total of 3.85 acres of vegetation would be disturbed during trenching operations that are needed to lay the pipeline (2.75 acres) and to accommodate staging activities (1.10 acres). Because piping the Acequia would effectively remove the accessible water, a narrow row of ditch bank plants are not expected to return after construction activities have been completed. To determine how many trees and shrubs would be affected by the proposed action, all woody vegetation within 15 feet of the centerline of the Acequia was inventoried on the 23 May 2011 and 21 Sep 2015 site visits (Table 1). Only the river-right/eastside of the Acequia was surveyed because the steep embankment on the west side of the Acequia would preclude any construction activities. Trees were counted if they had a diameter at breast height (DBH) of 4 inches or greater. Alders typically grew in clumps and were counted if one of the stems had a 4-inch or greater DBH. Willows also grew in clumps but single stems do not typically grow that large; therefore, willows were counted if they were more than 10 feet in height.

In summary, there would be minimal short- and long-term adverse effects to vegetation by the proposed project by directly removing vegetation and indirectly reducing the water available to vegetation. Cumulatively, this and other rehabilitation projects that reduce water loss from the Acequia would result in a small decrease in tree and shrub cover along the Acequia route.

**Table 1.** Count of woody plants likely to be affected by the proposed action at Acequia de Llano de San Juan Nepomuceño.

<b>Common name</b>	<b>Number of plants to be affected</b>
Aspen	45
Chokecherry	1
Gambel's oak	1
Narrowleaf cottonwood	4
Thinleaf alder	34
White fir	5
Willow (several species)	65

Under the No-Action Alternative, periodic removal of pioneer vegetation and regenerating woody plants would continue to be performed along the margins of the earthen ditch. Considering that this activity has been performed for the past 219 years, the No-Action Alternative would not significantly affect vegetation in the project area.

### **3.7 Noxious Weeds and Invasive Species**

Executive Order 13112 directs Federal agencies to prevent the introduction of invasive (exotic) species and to control and minimize the economic, ecological, and human health impacts that invasive species cause. In addition, the State of New Mexico, under administration of the New Mexico Department of Agriculture, designates and lists certain weed species as being noxious (NMDA 2009). “Noxious” in this context means plants not native to New Mexico that may have a negative impact on the economy or environment and are targeted for management or control. In order to prevent new infestations of noxious weeds and invasive species, the construction contractor would be required to clean all equipment before entering the project area and to ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Following construction, native species or pasture grasses would be seeded, minimizing the opportunity for invasive species to colonize the area. No Federal or State noxious weeds were identified during site visits. To minimize the spread of invasive species that may have escaped detection, the contractor would also be required to clean equipment before initially entering and upon leaving the project area. The proposed action is in compliance with the Federal Noxious Weed Act and Executive Order 13112.

### **3.8 Wildlife**

Mammals occurring in Taos County and in the Petran Subalpine and Petran Montane Conifer Forest biotic communities typically include small mammals such as squirrels, mice, gophers, rats, rabbits, chipmunks, badgers, raccoon, and skunks. Larger mammals may include species

such as gray and red foxes (*Urocyon cinereoargenteus*, *Vulpes vulpes*, respectively), coyote (*Canis latrans*), bobcat (*Lynx rufus*), black bear (*Ursus americanus*), and mule deer (*Odocoileus hemionus*). Mountain lion (*Puma concolor*) are unlikely to venture within the proposed project area due to its proximity to humans.

Resident and migratory birds that have the potential to occur in the vicinity of the proposed project include Western Kingbird (*Tyrannus verticalis*), Northern Mockingbird (*Mimus polyglottos*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Black-chinned Hummingbird (*Archilochus alexandri*), Williamson's Sapsucker (*Sphyrapicus thyroideus*), Northern Flicker (*Colaptes auratus*), Dark-eyed Junco (*Junco hyemalis*), Pine Siskin (*Carduelis pinus*), Mountain Chickadee (*Poecile gambeli*), Western Meadowlark (*Sturnella neglecta*), Pinyon Jay (*Gymnorhinus cyanocephalus*), Black-billed Magpie (*Pica hudsonia*), Common Raven (*Corvus corax*), Great Horned Owl (*Bubo virginianus*), Red-tailed Hawk (*Buteo jamaicensis*), Swainson's Hawk (*Buteo swainsoni*), American Kestrel (*Falco sparverius*), Northern Goshawk (*Accipiter gentilis*), Northern Harrier (*Circus cyaneus*), Turkey Vulture (*Cathartes aura*), several species of warblers, vireos, wrens, swallows and sparrows, and numerous others. To protect migratory birds and their eggs and young, as required by the Migratory Bird Treaty Act, no vegetation disturbance or clearing would take place during the nesting season from April 15 through September 15.

Aquatic species that are associated with the Rio Santa Barbara watershed have the potential to be affected by the proposed Acequia because seasonal aquatic habitat would be lost. However, no fish were observed in the Acequia during site visits. The proposed Acequia improvement project would not change the amount of water diverted or patterns of land use, and would not affect water quality or quantity in the Rio Santa Barbara. Best management practices would be used to prevent sediment from entering the creek. Therefore, it is unlikely that aquatic species listed would be affected by the proposed work.

As stated in the construction contract specifications, temporary fencing to control livestock shall be installed when construction requires removal of permanent fences. All temporary fences shall be removed after construction and the permanent fence restored to the original condition.

Most of the foreseeable effects of the proposed action on wildlife in the construction area would be minor, of short duration, temporary in nature, and would result in negligible disturbance. Surface water would still be available to wildlife year round from the nearby Rio Santa Barbara and seasonally from the other acequias in the area. Under the proposed action, some wildlife species would be temporarily displaced during construction. No direct negative impacts are expected to occur to wildlife as a result of the proposed action or the No-Action Alternative.

### **3.9 Special Status Species**

Three agencies have primary responsibility for protecting and conserving plant and animal species within the proposed action area. The United States Fish and Wildlife Service (USFWS), under the authority of the Endangered Species Act of 1973, has the responsibility for Federally listed species. The NMDGF has the responsibility for State-listed wildlife species. The New Mexico State Forestry Division (Energy, Minerals, and Natural Resources Department) has the

responsibility for State-listed plant species. Federal and State listed species with the potential to occur in Taos County are listed in Table 2 (USFWS 2015a, NMDGF 2015). None of the special status species listed in Table have been detected in the project area during any of the three site visits, nor is suitable habitat present along the Acequia de Llano de San Juan Nepomuceño alignment.

**Table 2.** Federal and state listed species for Taos County, New Mexico, with likelihood of occurring in the vicinity of the proposed project area.

Common name	Scientific name	Federal status	State status	Likelihood of occurrence in project area
<b>BIRDS</b>				
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	E	E	Unlikely. No suitable habitat in Project Area.
Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	T		Unlikely. No suitable habitat in Project Area.
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T		Unlikely. Occur in dense, multi-storied forests with closed canopy.
White-tailed Ptarmigan	<i>Lagopus leucura altipetens</i>		E	Unlikely. Occurs at timberline above 10,000'.
Common Black-Hawk	<i>Buteogallus anthracinus</i>		T	Unlikely. Prefer mature, well developed desert riparian woodlands.
Bald Eagle	<i>Haliaeetus leucocephalus</i>		T	Likely. Known to occur in general area during winter/spring.
Peregrine Falcon	<i>Falco peregrinus</i>		T	Unlikely. Rare in Taos County.
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>		T	Unlikely. A Rare transient in New Mexico.
Boreal Owl	<i>Aegolius funereus</i>		T	Unlikely. Occurs mainly at elevations above 9500'.
White-eared Hummingbird	<i>Hylocharis leucotis</i>		T	Unlikely. Species is said to be accidentally transient in region.
Gray Vireo	<i>Vireo vicinior</i>		T	Unlikely. Occurs in arid juniper woodlands.
Baird's Sparrow	<i>Ammodramus bairdii</i>		T	Unlikely. Breeds in shortgrass prairies and mountain meadows.
<b>MAMMALS</b>				
Meadow jumping mouse	<i>Zapus hudsonius luteus</i>	E	E	Unlikely. No suitable habitat in Project area.
Black-footed ferret	<i>Mustela nigripes</i>	E		Unlikely. No suitable habitat in Project area. Not verified in region.
Canada lynx	<i>Lynx canadensis</i>	T		Unlikely. Occurs in northern coniferous forests.
American marten	<i>Martes americana</i>		T	Unlikely. Occurs in dense, mature coniferous forests.
<b>MOLLUSCS</b>				
Sangre de Cristo peacclam	<i>Psidium sanguinichristi</i>		T	Unlikely. Known to occur only in high altitude lakes.

The Mexican Spotted Owl is a Federally Threatened species. The range of the Mexican Spotted Owl occurs from southern Utah and Colorado south through the mountains of Arizona, New

Mexico, and west Texas into the mountains of central Mexico. The owl is widely but patchily distributed throughout its range, with distribution reflecting the availability of forested mountains and canyons, and in some cases rocky canyonlands (USFWS 2015b). In the recovery plan (USFWS 2015c), recovery units (RU) were established, and the proposed project is within the Southern Rocky Mountain –NM Physiographic Province RU. Federally designated critical habitat is not present in the project area or in the vicinity. The nearest critical habitat unit is SRM-NM-4, located approximately 7 miles north of the proposed project area. In general, these owls inhabit steep terrain and canyons in this RU. They typically occur in mixed-conifer forests on steep slopes in the Sangre de Cristo Mountains, and in the Jemez Mountains they occupy canyons incised into the Los Alamos Tuff. The species could potentially occur within the vicinity of the project area; however, due to the proximity to preferred habitat, and ease of mobility of the owl, and the limited disturbance of the proposed project, there would be no effect to the Mexican Spotted Owl.

The Black-footed ferret, a Federally Endangered species, prefers open grassland habitat with mixed shrubs. The distribution of the Black-footed Ferret is closely sympatric with that of prairie dogs and all viable breeding populations have been associated with prairie dog colonies. There were no Black-footed ferrets or prairie dog towns observed at or near the proposed project area during the site visits. Due to the lack of preferred habitat and no presence of prairie dog towns, there would be no effect to this species by the proposed project.

The Bald Eagle was removed from the Department of the Interior's list of threatened and endangered species on June 28, 2007. However, the Bald Eagle is a State Threatened species and is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The Bald Eagle is normally found near major waterways and larger lakes where adequate food supplies may be found. The species is known to occur in New Mexico primarily during the late fall and winter months and utilizes large trees for perching and forages primarily for fish, ducks, and carrion along rivers and at local reservoirs. Due to the lack of water and food sources in the proposed project area during winter, the ease of mobility of the Bald Eagle and the limited disturbance of the proposed project, there would be no effect to the Bald Eagle.

The Federally and State endangered Southwestern Willow Flycatcher requires large tracts of mature stands of riparian willow thickets, which does not exist in the proposed project area, and no designated critical habitat exists within or in the vicinity of the proposed project.

The Federally-Threatened Yellow-billed Cuckoo is typically found in lower elevation riparian areas with large tracts of mature, native canopy and dense understory vegetation and this habitat does not exist in the proposed project area. No proposed critical habitat exists in the vicinity of the proposed project area. Therefore, there would be no effect to the Yellow-billed Cuckoo.

The Meadow jumping mouse, a Federal and State Endangered species, is usually found in wet meadows and along the margins of canals and marshes. Their preferred habitat – relatively tall (24 in.) dense sedges and grasses (Frey 2006) — does not occur within the proposed project area. No proposed critical habitat exists in the vicinity of the proposed project area. No proposed critical habitat occurs in the vicinity of the project area. Therefore, there would be no effect to the Meadow jumping mouse.

The Canada lynx, a Federally Threatened species, is associated with dense forest stands and are unlikely to visit the proposed project area due to human inhabitation. Lynx would not be affected by the proposed action due to the limited disturbance of the proposed project, the lack of preferred habitat in the project area, and the ease of mobility of the Lynx.

The Forestry Division of the New Mexico Energy, Minerals, and Natural Resources Department has the responsibility for maintaining the State list of rare, threatened and endangered plant species. The New Mexico Rare Plants Technical Council (2015) indicates that eleven rare plant species may occur in Taos County (Table 3). Although these plants occur in Taos County, they are not known to exist within the project area, nor were these species or their habitats detected during site visits. Therefore, there would be no direct, indirect or cumulative effect to these rare plants by the proposed action or.

The No-Action Alternative would not affect rare of listed species or their designated or proposed critical habitat.

**Table 3.** Rare Plants in Taos County, NM (New Mexico Rare Plants Technical Council 2015).

<b>Common Name</b>	<b>Scientific Name</b>
Cyanic milkvetch	<i>Astragalus cyaneus</i>
Taos milkvetch	<i>A. puniceus var. gertrudis</i>
Ripley's milkvetch	<i>A. ripleyi</i>
Alpine larkspur	<i>Delphinium alprestre</i>
Robust larkspur	<i>D. robustum</i>
Smith's whitlowgrass	<i>Draba smithii</i>
Pecos fleabane	<i>Erigeron subglaber</i>
Clipped wild buckwheat	<i>Ergonum lachnogynum var. colobum</i>
New Mexico stickseed	<i>Hackelia hirsuta</i>
Small-headed goldenweed	<i>Lorandersonia microcephala</i>
Arizona willow	<i>Salix arizonica</i>

### 3.10 Cultural Resources

In general, the project area has seen little archaeological survey. A search of the New Mexico Cultural Resource Information System showed a number of historic and archaeological sites on Federal lands surrounding the project area, and several within a half mile of the project area. No archaeological sites or other historic properties, aside from the Acequia de Llano de San Juan Nepomuceño itself, however, were known to occur within the project footprint.



Corps archaeologists conducted a 6.24-acre survey of the project area on May 23, 2011, supplementing an initial site visit conducted in the fall of 2008. This survey included the alignment of the Acequia segment to be piped, as well as two staging areas on private land. The survey identified two historic properties, the Acequia de Llano de San Juan Nepomuceño itself, and LA170127, a newly recorded site containing the heavily disturbed remnants of an historic structure with associated features and artifacts, likely dating to the mid-20th century. LA170127 is in very poor condition, and contains little potential to provide significant information. The site is considered ineligible for listing in the National Register of Historic Places.

The Acequia de Llano de San Juan Nepomuceño is a historic property considered eligible for listing on the National Register of Historic Places. The proposed action would alter one aspect the ditch: the open, earthen ditch form. While the Corps recognizes that the placement of concrete piping would alter the form of this 3,300 foot segment of the Acequia, the placement of pipe would only affect 14.5 percent of the total length of the Acequia, and is a reversible condition that can be altered at any time to restore the system to its original open ditch design. Even with piping, the segment of ditch in the project area would retain integrity of alignment and function. This project is therefore consistent with the Secretary of the Interior's Standards for the rehabilitation of historic properties (36 CFR 67.7 and 36 CFR 68.2[b]).

Consistent with the Department of Defense's American Indian and Alaska Native Policy, signed by Secretary of Defense William S. Cohen on October 20, 1998, and based on the State of New Mexico Indian Affairs Department's 2011 Native American Consultations List, American Indian tribes that have indicated they have concerns in Taos County were sent scoping letters regarding the proposed project (Appendix A). To date, the Corps has received no indication of tribal concerns that would impact this project; responses were received from the Hopi Tribe, the Navajo Nation, and the Pueblo of Isleta, all of which indicate no tribal concerns at this time. No Traditional Cultural Properties are known by the Corps to occur within or adjacent to the project area.

The Corps is of the opinion that the proposed Acequia de Llano de San Juan Nepomuceño Rehabilitation Project would have no adverse effect to historic properties. The Corps submitted eligibility recommendations and documentation of a finding of no adverse effect to historic properties to the New Mexico State Historic Preservation Office (NMSHPO) on July 13, 2011 (see Appendix A). Should previously undiscovered artifacts or features be discovered during construction, work would stop in the immediate vicinity of the find, a determination of significance made, and consultation would take place with the NMSHPO and with Native American groups that may have concerns in the project area, to determine the best course of action.

### **3.11 Socioeconomic Considerations and Land Use**

The population of Taos County was 29,979 persons in 2000 (U.S. Census Bureau 2000). The July 2014 population estimate was 33,084, an increase of 10.3% since 2000 (U.S. Census Bureau 2014). Estimated median household income in Taos County was \$32,637 in 2013, significantly lower than New Mexico as a whole (\$44,927). During 2013, 25.3% of the Taos County population was below the poverty level (U.S. Census Bureau 2014).

Taos is the county seat and the largest community in Taos County. The local employers are primarily in retail trade, tourism (including lodging), and food services. Other local work includes health care, social assistance, construction and transportation, and public services such as education, utilities, and government. Ethnically, approximately 56% of Taos County residents are Hispanic, 36% are White and 6% are Native American. While the community of Llano is not recognized by the U.S. Census Bureau, nearby Peñasco (a census-designated place) had a population of 572 persons in 2000 and its population was estimated at 524 in 2009-2013 (U.S. Census Bureau 2014).

In 2013, the annual average unemployment was 9% in Taos County and 7.2% in New Mexico. The seasonally adjusted unemployment rate for Taos County in July 2015 was 9.6%, whereas the statewide rate was 6.5% (New Mexico Department of Workforce Solutions 2015).

The proposed action area is rural with small farms and dispersed residential housing. Current land use centers on families farming small acreages of irrigated cropland and livestock grazing (cattle, sheep, goats, and horses). Recreational use in the vicinity of the proposed action area may include hiking, horseback riding, and fishing in the nearby Rio Santa Barbara.

The proposed action would have a beneficial effect on existing land uses and socioeconomic resources in the project area and would facilitate the traditional acequia culture to continue. All Acequia members would benefit from the proposed action. Cumulatively, this and other rehabilitation projects on the Acequia would benefit the agricultural community of the Llano area.

The No-Action Alternative, in contrast, would compromise the viability of the Acequia de Llano de San Juan Nepomuceño. Irrigated agriculture and the historic community of Llano would stagnate or decline as maintenance of the Acequia system would become increasingly difficult. Under the No-Action Alternative, the combination of increasing difficulty in Acequia maintenance and a declining trend in the farming population would threaten the Acequia's viability (Ackerly 1996). Therefore, the No-Action Alternative would have a direct adverse effect on socioeconomic and land use, diminishing the agricultural economic base of the community.

### **3.12 Environmental Justice**

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations; February 11, 1994) was designed to focus the attention of Federal agencies on the human health and environmental conditions of minority and low-income communities. It requires Federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations and proposed actions. The 1995 EPA guidance document, "Environmental Justice Strategy: Executive Order 12898" defines the approaches by which the EPA would ensure that disproportionately high environmental and/or socioeconomic effects on minority and low-income communities are identified and addressed. Further, it establishes agency-wide goals for all Native Americans with regard to Environmental Justice issues and concerns.

The proposed Acequia rehabilitation project would be conducted under Section 1113 of the Water Resources Development Act of 1986 (Public Law 99-662; 33 U.S.C. 2201 *et. seq.*), as amended. The Section 1113 program is largely intended to provide needed technical and financial assistance to acequia and community ditch associations in which water resources are degrading and in need of improvement. Acequia associations find maintenance of these systems increasingly challenging. The proposed action would benefit all Acequia members as a whole by allowing the culturally and historically significant Acequia de Llano de San Juan Nepomuceño to continue to function. The proposed action would also benefit those non-Acequia members living in the valley at the base of the slope onto whose property boulders and other debris collect. All proposed work would be in a rural, agricultural area. The construction would not disrupt or displace any residential or commercial structures. There would be no disproportional affect on the health or environment of minority and low-income communities as a result of the proposed action. The proposed action would have a minor long-term beneficial effect on environmental justice.

Under the No-Action Alternative, in contrast, the Acequia members would likely face increasing difficulty in maintaining the Acequia system. As Taos County residents have relatively lower incomes than average and a greater percentage of minorities than the State of New Mexico, the No-Action Alternative would be likely to have a minor adverse effect on this low-income and minority area.

### **3.13 Indian Trust Assets**

Indian Trust Assets (ITAs) are legal interests in assets held in trust by the United States for Indian tribes or individuals. Examples of ITAs include land, minerals, hunting and fishing rights, water rights, titles and money. The Indian Trust Responsibility requires that all Federal agencies take all actions reasonably necessary to protect such trust assets. The Department of Defense's American Indian and Alaska Native Policy, signed by Secretary of Defense William S. Cohen on October 20, 1998, and DOI's Secretarial Order 3175 require that the Corps consult with tribes and assess the impacts of its projects on ITAs. American Indian tribes that have indicated they have concerns in Taos County have been contacted regarding the proposed project, as described in Section 3.10 above. To date, the Corps has received no indication of concern regarding effects to ITAs from the proposed work. There would be no effect on Indian Trust Assets by the proposed action or the No-Action Alternative.

### **3.14 Human Health and Safety**

There would be no effect from the proposed action on community services, such as law enforcement, fire protection, emergency medical care, or schools. Construction workers would abide by OSHA safety regulations. Neither the proposed action nor the No-Action Alternative would create long- or short- term adverse effects on human health or safety.

### **3.15 Hazardous, Toxic, and Radioactive Waste (HTRW)**

Since the proposed action would be in a rural area and the water would be used nearly exclusively for irrigation, there would be little risk of HTRW contamination. All planned construction would be conducted in accordance with Federal, State, and local pollution control laws. Requirements would include the contractor's storage and use of fuels, herbicides, and other potential contaminants, and the implementation of the National Pollutant Discharge Elimination System (NPDES) permit for storm water pollution prevention from construction activities. There would be no adverse short- or long-term effects related to HTRW on either the proposed action or the No-Action Alternative.

### **3.16 Cumulative Impacts**

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."

Cumulative effects are analyzed individually for each resource area in Sections 3.1 through 3.15. These analyses address the cumulative impact of the direct and indirect effects of the proposed action when added to the aggregate effects of past, present, and reasonably foreseeable future actions. For all resources, the aggregate effect of past and present actions was considered to be represented by the current, existing condition of the resource. Therefore, the specific effects of individual past and present actions typically were not cataloged in the analysis. In order for direct or indirect effects to incrementally add to the effects of past, present, or reasonably foreseeable future actions, they must overlap with those effects in time or space.

The time frame for analysis of cumulative effects varied, depending on the duration of direct and indirect effects. For example, direct effects resulting from construction were expected to persist for relatively short periods of time (about four months). Conversely, indirect effects resulting from operation of the rehabilitated Acequia system would persist for the life of the facility. Similarly, the geographic bounds for cumulative effects analysis varied with the resource under consideration, depending on zone of influence of the direct or indirect impact being analyzed.

The proposed action lies within a rural area in Taos County (Figures 1 and 2). The proposed improvements to the Acequia would not significantly impact the current conditions of the local environment and would help retain the farming practices of the community. For these reasons, the proposed project, when combined with past, present, or future activities in the Acequia de Llano de San Juan Nepomuceño area would not significantly add to or raise local cumulative adverse environmental impacts to a level of significance.

#### **4.0 CONCLUSIONS AND SUMMARY**

This Environmental Assessment addresses the potential effects of the rehabilitation of the Acequia de Llano de San Juan Nepomuceño. Impacts to the environment would be non-significant and short-term. Long-term benefits to the Acequia association members and to the historic character of the Llano community would result from the project. The proposed project would not result in any moderate or significant, long-term, or cumulative adverse effects. Therefore, construction of the proposed project would not significantly affect the quality of the human environment and is recommended for implementation.

## 5.0 PREPARATION, CONSULTATION AND COORDINATION

### 5.1 Preparation

This Environmental Assessment was prepared by the U.S. Army Corps of Engineers, Albuquerque District. Personnel primarily responsible for preparation include:

Stephen Ryan	Biologist
Jeremy Decker	Archaeologist
Patricia Phillips	Project Manager
Ben Alanis	Design Branch Chief
Traci Baker	Geotechnical Engineer
Tim Tetrick	Cost Engineer
Steve Wagner	Environmental Engineer
Denise Saiz	Specifications

### 5.2 Quality Control

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

Michael Porter	Acting Chief, Environmental Resources Section
William DeRagon	Biologist
Gregory Everhart	Archaeologist

### 5.3 Consultation and Coordination

Agencies and entities contacted formally or informally during the preparation of this EA are listed below. Entities provided the Draft EA for review and comment are marked with an asterisk (\*).

U.S. Fish and Wildlife Service *	Kiowa Tribe of Oklahoma
New Mexico Interstate Stream Commission *	The Hopi Tribe
New Mexico State Historic Preservation Office	Navajo Nation
New Mexico Department of Game and Fish *	Pueblo de Taos
New Mexico Environment Department *	Pueblo of Isleta
County Manager, Taos County	Pueblo of Picuris
Acequia de Llano de San Juan Nepomuceño Assoc.*	Apache Tribe of Oklahoma
Kewa Pueblo (formerly Pueblo of Santo Domingo)	Jicarilla Apache Nation
Ohkay Owingeh (formerly San Juan Pueblo)	

## 6.0 REFERENCES

- Ackerly, Neal W. 1996. A review of the historic significance and management recommendations for preserving New Mexico's acequia systems. Report prepared by Dos Rios Consultants, Inc. for the New Mexico Historic Preservation Division, Santa Fe.  
<[http://www.nmacequiacommission.state.nm.us/Publications/nackerly\\_aceq\\_rpt96.pdf](http://www.nmacequiacommission.state.nm.us/Publications/nackerly_aceq_rpt96.pdf)>.
- Backlund, Peter, Anthony Janetos, and David Schimel. 2008. The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States. Final Report of the U.S. Climate Change Science Program Subcommittee on Global Change Research. Available at:  
<[http://www.usda.gov/oce/climate\\_change/SAP4\\_3/CCSPFinalReport.pdf](http://www.usda.gov/oce/climate_change/SAP4_3/CCSPFinalReport.pdf)>.
- Brown, David E. 1982. Desert Plants: Biotic Communities of the American Southwest-United States and Mexico. University of Arizona, Superior, Arizona.
- Brown, David E., and C.H. Lowe. 1981. Biotic Communities of the Southwest Map. USDA Forest Service, Ft. Collins, Colorado. GIS files accessed from:  
<[http://azconservation.org/downloads/biotic\\_communities\\_of\\_the\\_southwest\\_gis\\_data/](http://azconservation.org/downloads/biotic_communities_of_the_southwest_gis_data/)> (accessed: 16 Sep 2015)
- Center for Hearing and Communication. 2015. Noise levels in our environment fact sheet.  
<<http://www.chchearing.org/noise-center-home/facts-noise/common-environmental-noise-levels>> (accessed: 15 Sep 2015).
- City-data.com. 2015. Profiles- New Mexico Very Small, Towns, and Villages (fewer than 1000 residents). <<http://www.city-data.com/city/Peñasco-New-Mexico.html>> (accessed: 1 September 2015)
- Federal Emergency Management Agency (FEMA). 2015. Flood Map Service Center, Peñasco, NM. Available at:  
<<https://msc.fema.gov/portal/search?AddressQuery=penasco%2C%20nm>> (accessed: 22 Sep 2015).
- Frey, J.K. 2006. Status of the New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*) in the Sangre de Cristo Mountains, New Mexico; Final Report. Southwest Ecosystem Consultatants, Radium Springs, NM.
- Natural Resources Conservation Service (NRCS). 2015a. Online Soil Survey for Taos County. U.S. Department of Agriculture, New Mexico. <<http://websoilsurvey.nrcs.usda.gov/app/>> (accessed: 16 Sep 2015).
- Natural Resources Conservation Service (NRCS). 2015b. Wetland Indicator Status.  
<<http://plants.usda.gov/wetinfo.html>> (accessed: 15 Sep 2015).

- New Mexico Bureau of Geology and Mineral Resources (NMBGMR). 2003. Geologic Map of New Mexico, 2003, Scale 1:500,000. Available at: <http://geoinfo.nmt.edu/publications/maps/geologic/state/home.cfm#download>
- New Mexico Climate Change Advisory Group. 2006. *Final Report, December 2006*. New Mexico Environment Department, Santa Fe, New Mexico.
- New Mexico Department of Agriculture (NMDA). 2009. New Mexico Noxious Weed List. Available at: <http://www.nmda.nmsu.edu/apr/noxious-weed-information/> (accessed 15 Sep 2015).
- New Mexico Department of Game and Fish (NMDGF). 2006. Comprehensive Wildlife Conservation Strategy for New Mexico. New Mexico Department of Game and Fish. Santa Fe, New Mexico. 526 pp + appendices. Available: <http://www.wildlife.state.nm.us/download/conservation/habitat-handbook/cwcs/Comprehensive-Wildlife-Conservation-Strategy.pdf> (accessed: 17 Sep 2015).
- New Mexico Department of Game and Fish (NMDGF). 2015. New Mexico Species List/Species Account – BISON-M. <http://www.bisonm.org> (accessed: 15 Sep 2015).
- New Mexico Department of Workforce Solutions. 2015. Economic Research and Analysis. Table A: Civilian Labor Force, Employment, Unemployment and Unemployment rate. <http://www.dws.state.nm.us/Labor-Market-Information/Data-and-Statistics/Economic-Data> (accessed: 16 Sep 2015).
- New Mexico Environment Department (NMED). 2015. Nonattainment areas in New Mexico. Air Quality Bureau, [http://www.nmenv.state.nm.us/aqb/modeling/aqcr\\_map.html](http://www.nmenv.state.nm.us/aqb/modeling/aqcr_map.html) (accessed: 10 Sep 2015).
- New Mexico Environment Department, Air Quality Bureau (NMED-AQB). 2010. New Mexico Air Quality Bureau Air Dispersion Modeling Guidelines, Revised April 2010. Available: [https://www.env.nm.gov/aqb/modeling/documents/NM\\_AirDispersionModelingGuidelines\\_Apr082010.pdf](https://www.env.nm.gov/aqb/modeling/documents/NM_AirDispersionModelingGuidelines_Apr082010.pdf) (accessed: 10 Sep 2015).
- New Mexico Environment Department, Surface Water Quality Bureau (NMED SWQB). 2005. Final Approved Total Maximum Daily Load for the Upper Rio Grande Watershed (Part 2) Cochiti Reservoir to Pilar, NM. Santa Fe, NM. Available at: [https://www.env.nm.gov/swqb/Rio\\_Grande/Upper/2012/index.html](https://www.env.nm.gov/swqb/Rio_Grande/Upper/2012/index.html) (accessed: 15 Sep 2015).
- New Mexico Rare Plants Technical Council. 2015. New Mexico Rare Plants home page. Albuquerque, NM. <http://nmrareplants.unm.edu> (Latest update: 20 April 2015.)



- U.S. Census Bureau. 2000. Profile of General Demographic Characteristics: 2000 Census of Population and Housing: New Mexico. <<http://www.census.gov/prod/cen2000/dp1/2kh35.pdf>> (accessed: 16 Sep 2015).
- U.S. Census Bureau. 2011. American Community Survey Fact Finder: <<http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>> (accessed: 17 Sep 2015).
- U.S. Environmental Protection Agency (USEPA). 2015. *Air Quality by geographic area: Taos County, New Mexico*. <[http://www.epa.gov/airquality/airdata/ad\\_rep\\_aqi.html](http://www.epa.gov/airquality/airdata/ad_rep_aqi.html)> (page last updated 14 Aug 2015).
- U.S. Fish and Wildlife Service (USFWS). 2015a. Environmental Conservation Online System, Species By county Report. Available at: <[http://ecos.fws.gov/tess\\_public/reports/species-by-current-range-county?fips=35055](http://ecos.fws.gov/tess_public/reports/species-by-current-range-county?fips=35055)> (accessed 21 Sep 2015).
- U.S. Fish and Wildlife Service (USFWS). 2015b. Ecological Services Southwest Region webpage, Mexican Spotted Owl Recovery Unit Detailed Descriptions. Available at: <[http://www.fws.gov/southwest/es/MSO\\_RecoveryUnitDetail.html#SROCKYNM](http://www.fws.gov/southwest/es/MSO_RecoveryUnitDetail.html#SROCKYNM)> (accessed 21 Sep 2015).
- U.S. Fish and Wildlife Service (USFWS). 2015c. Ecological Services Southwest Region webpage, Mexican Spotted Owl Recovery Units. Available at: <[http://www.fws.gov/southwest/es/MSO\\_RecoveryUnits.html](http://www.fws.gov/southwest/es/MSO_RecoveryUnits.html)> (accessed 18 Sep 2015).
- Western Regional Climate Center (WRCC). 2015. Period of Record Monthly Climate Summary Penasco RS, New Mexico (296705). Available at: <<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm6705>> (accessed 22 Sep 2015).

**Appendix A**  
Cultural Resources Coordination



Routing: J.Decker \_\_\_\_\_  
G.Everhart \_\_\_\_\_  
J.Alcon, Chief\_\_

February 4, 2011

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

Honorable «FName» «LName»  
«Title», «Tribe»  
«Address»  
«CityStateZip»

Dear «Title» «LName»:

The U.S. Army Corps of Engineers (Corps), Albuquerque District, at the request of the New Mexico Office of the State Engineer / Interstate Stream Commission and the Acequia Llano de San Juan Nepomuceño (Community Ditch) Association, is planning a construction project that would rehabilitate the Acequia de Llano de San Juan Nepomuceño (Nepomuceño), Taos County, New Mexico. The proposed project would replace approximately 4000 feet of open earthen ditch with underground piping. The project is authorized under Section 1113 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662; 33 U.S.C. 2201 et. seq.), as amended. The Act authorizes the Corps' Acequia Rehabilitation Program for the restoration and rehabilitation of irrigation ditch systems (acequias) in New Mexico.

The project area is located along the Rio Santa Barbara, a tributary of the Rio Grande, and work will take place approximately 1.5 miles southeast of the community of Llano (see enclosed Figure 1). Llano is located 2 miles south of Peñasco, and approximately 20 miles south of Taos. The project area is located on unplatted lands within the Llano Santa Barbara Tract of the Santa Barbara land grant. The project area is found in part on both the El Valle (36105-A6) and Peñasco (36105-B6) UGSG 7.5' topographic quadrangle maps (1964 edition).

The Nepomuceño acequia system was originally built in about 1796. To date, the ditch system has remained essentially unaltered other than years of routine maintenance and operation. The acequia continues to operate as an open earthen ditch. Irrigation water flows are diverted from the Rio Santa Barbara into two primary irrigation ditches, the other being the Acequia del Llano de la Yegua (Yegua). The Yegua acequia irrigates the east side of the valley, while the Nepomuceño acequia serves the west side. Nepomuceño measures about 27,561 feet (5.22 miles) in length that

generally flows in a northeasterly direction from its diversion point near Hodges, to the desagues at the boundary of Picuris Pueblo lands. Nepomuceño is an acequia madre, and feeds three lateral ditches.

The purpose of the project is to rehabilitate approximately 4,000 lineal feet of the acequia located in an extremely steep area that is subject to frequent rock slides. The project area is too steep to safely and practically bring in mechanical equipment for annual cleaning, and in recent years it has been impossible to locate a trained horse team to pull out the large boulders that fall from the steep gravelly slopes. In addition, the land owners below the acequia in the problem area are not acequia members, and object to large rocks being rolled out of the acequia and into their property. The boulders are particularly detrimental to the system in that they impede flows within the ditch, and cause damage to the ditch banks as they erode down slope.

Rehabilitation includes installing underground piping such as concrete, PVC, or metal conduit along the length of ditch that is on the steep slope; affecting 14.51 percent of the total length of the acequia. The proposed project would have no effect to the ditch alignment or function. Piping will alleviate the need to annually clean this segment of the ditch, and will allow the ditch to continue to function properly, providing efficient water delivery to all 230 *parsientes* located downstream from this segment.

Corps archaeologists conducted an archaeological survey including a segment of ditch within the Association's right-of-way, as well as two proposed staging areas on private property on May 23, 2011. Two historic archaeological resources were observed during the survey, including the acequia system itself, and the foundation of a stucco home (LA170127) that was occupied in the mid-1900's (see enclosed Figure 2). The historic structure foundation and rubble is located on the access road adjacent to one of the possible staging areas for the project, and will be avoided by all project activities. The Acequia de Llano de San Juan Nepomuceño itself is considered historic due to its age.

The Corps is seeking input for consideration during planning of the project. The purpose of this scoping letter is to provide you with the opportunity to submit comments or concerns you may have regarding potential effects for the proposed project. Specifically, any concerns you may have regarding the environment such as natural, biological, or cultural resources; wildlife, vegetation, and special status species; air, water, or sound quality; aesthetics; health and safety; or Indian Trust Assets; or Traditional Cultural Properties that may occur in the project area.

Your input will be used in preparing an environmental assessment to comply with the National Environmental Policy Act (NEPA).

Please provide written comments regarding environmental concerns to Stephen Ryan, biologist; and, comments regarding cultural resources to Jeremy Decker, archaeologist, at the above address. If you have any questions or require additional information on the San Juan Nepomuceño Acequia Irrigation Pipeline Project, please contact Mr. Ryan at (505) 342-3333, Mr. Decker at (505) 342-3671, or myself at (505) 342-3281.

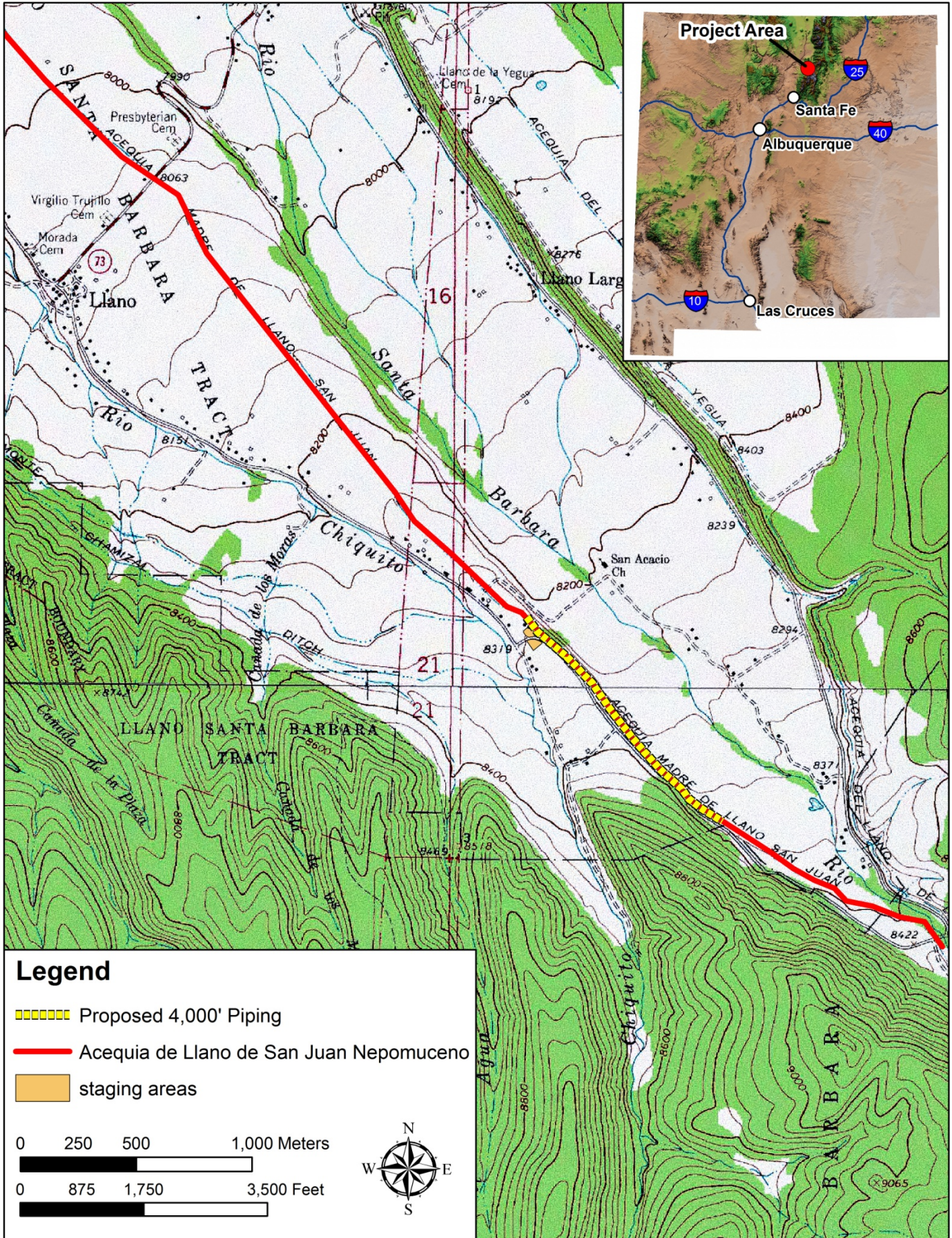
Sincerely,

Julie Alcon,  
Chief, Environmental Resources  
Section

Enclosure

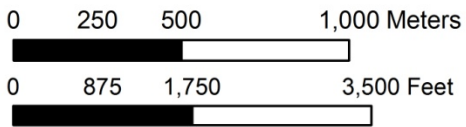
Copy furnished w/Encl:

**Figure 1: Project Location Map**



**Legend**

- Proposed 4,000' Piping
- Acequia de Llano de San Juan Nepomuceno
- staging areas





NMCRIS No. 120895

**A 6.24-ACRE CULTURAL RESOURCES INVENTORY  
FOR THE ACEQUIA DE LLANO DE SAN JUAN NEPOMUCENO,  
TAOS COUNTY, NEW MEXICO**

Prepared by

Jeremy. T. Decker

With contributions by

Sarah E. Beck

U.S. Army Corps of Engineers  
Albuquerque District

Prepared for

U.S. Army Corps of Engineers, Albuquerque District  
4101 Jefferson Plaza NE  
Albuquerque, NM 87109-3435  
Office: (505) 342-3283; Fax: (505) 342-3668

New Mexico Annual State General Permit No. NM-11-193

Report No. USACE-ABQ-2011-003

July 12, 2011

---



# TABLE OF CONTENTS

<b>LIST OF FIGURES .....</b>	<b>II</b>
<b>LIST OF TABLES .....</b>	<b>III</b>
<b>NMCRIS INVESTIGATION ABSTRACT FORM (NIAF).....</b>	<b>IV</b>
<b>CHAPTER 1 INTRODUCTION AND PROJECT DESCRIPTION .....</b>	<b>1</b>
Purpose of the Survey and Project Background.....	1
Project Description and Location .....	1
Land Ownership.....	3
Project Personnel and Schedule .....	5
<b>CHAPTER 2 ENVIRONMENTAL SETTING.....</b>	<b>6</b>
Natural Environment.....	6
Physiography and Geology .....	6
Soils.....	6
Climate.....	6
Water Resources.....	8
Vegetation and Wildlife .....	8
Results of Records Check .....	8
Results of Tribal Consultation.....	9
Culture History and Literature Review .....	9
The Paleoindian Period (c. 12,500 BC to 5500 BC) .....	10
The Archaic Period (5500 BC to AD 400/600).....	10
The Ancestral Pueblo Period (AD 400/600 to AD 1540) .....	10
The Historic Period (AD 1540 to Present) .....	13
<b>CHAPTER 3 FIELD METHODS .....</b>	<b>19</b>
Introduction.....	19
Size of the Survey Crew, Transect Interval(s) and Transect Method.....	19
Field Conditions .....	19
Methods of Site Location and Site Recording.....	20
Photography and Documentation Methods .....	20
Strategies Employed for Collection or Limited Tests .....	20
<b>CHAPTER 4 RESULTS OF SURVEY.....</b>	<b>21</b>
Location of Cultural Properties .....	21
Acequia de Llano de San Juan Nepomuceno .....	21
Proposed Staging Areas and LA170127 .....	25
LA170127 .....	28
Interpretive Summary.....	31
<b>CHAPTER 5 SUMMARY AND RECOMMENDATIONS .....</b>	<b>33</b>
Evaluation and Statement of Significance.....	33
Effect Determination .....	34
Standards for Rehabilitation.....	34

---



Assessment of Adverse Effects .....	35
Summary and Recommendations.....	38

**REFERENCES..... 41**

**APPENDIX A CONFIDENTIAL SITE LOCATION DATA.... ERROR! BOOKMARK NOT DEFINED.**

## LIST OF FIGURES

Figure 1.1. Location of project area, shown on USGS 7.5” quadrangle maps Peñasco, NM (36105-B6) and El Valle, NM (36105-A6).....	4
Figure 2.1. Precipitation characteristics in Peñasco near project area. Graph generated by City.com (2011) .....	7
Figure 2.2. Temperature characteristics in Peñasco near project area. Graph generated by City.com (2011) .....	7
Figure 2.3. Temporal distribution of acequia systems in the nearby Santa Fe, Santa Cruz, Taos, and Costilla basins. Figure reproduced from Ackerly (1996:54, Figure 7) .....	16
Figure 4.1. Total length of the acequia madre, showing staging areas and construction footprint. USGS 7.5’ El Valle (A6-36105) and Peñasco (B6-36105).....	22
Figure 4.2. Project survey areas. USGS 7.5’ El Valle (A6-36105) and Peñasco (B6-35106).....	23
Figure 4.3. Photographs showing the project area. (a) Overview of the ditch facing downstream. (b) View of the ditch from above. Note the volume of rock stacked on the opposite bank. (c) West bank of the ditch looking upstream. Photo shows the volume of rock continuing to erode from the steep slope above the ditch. In other portions of the project area, the steep western bank is more than twice as high as the bank shown. (d) View down the extremely steep slope below the ditch. A number of rocks were thrown down slope in previous years, but recently landowners down slope have requested that rocks not be thrown onto their land. ....	24
Figure 4.4. Aerial view of Staging Areas 1 and 2, on property owned by Franklin Schwentker and an unknown owner respectively .....	26
Figure 4.5. Staging Area 1, facing north and looking up the west side of the proposed staging area along a small field ditch .....	27
Figure 4.6. Staging Area 1, facing northwest. The two track road leads to the staging area near the telephone pole .....	27
Figure 4.7. Staging Area 2, facing southeast.....	28
Figure 4.8. Left: mounded remains of the Feature 1 at LA170127, with two track access road in foreground. Staging Area 1 is in the background near the power pole. Right: south end of Feature 1, note the stucco fragments and heavy rodent disturbance .....	29
Figure 4.9. Remnants of concrete foundation at Feature 1.....	29
Figure 4.10. Features 2 and 3. Visible from Staging Area 1 by the occurrence of small currants within the features .....	30
Figure 4.11. Feature 4. Loose stone alignment extending southwest from Feature 1. ....	30

---



## LIST OF TABLES

Table 2.1.	Surveys conducted within 0.5 miles of project area.....	8
Table 2.2.	Known archaeological sites within 0.5 miles of project area.....	9



# NMCRIS INVESTIGATION ABSTRACT FORM (NIAF)

**NMCRIS No.:** 120895

## NMCRIS INVESTIGATION ABSTRACT FORM (NIAF)

<b>1. NMCRIS Activity No.:</b>  120895	<b>2a. Lead Agency:</b> US Army Corps of Engineers Albuquerque District	<b>2b. Other Agency(ies):</b>	<b>3. Lead Agency Report No.:</b> USACE-ABQ; 2011-003
--	---	-------------------------------	--

<b>4. Title of Report:</b> A 6.24-ACRE CULTURAL RESOURCES INVENTORY FOR THE ACEQUIA DE LLANO DE SAN JUAN NEPOMUCENO, TAOS COUNTY, NEW MEXICO  <b>Author(s)</b> Jeremy T. Decker	<b>5. Type of Report</b> <input type="checkbox"/> Negative <input checked="" type="checkbox"/> Positive
---	---

**6. Investigation Type**

Research Design  
  Archaeological Survey/Inventory  
  Architectural Survey/Inventory  
  Test Excavation  
  Excavation  
 Collections/Non-Field Study  
  Compliance Decision Based on Previous Inventory  
  Overview/Lit Review  
  Monitoring  
 Ethnographic Study  
  Site/Property Specific Visit  
  Historic Structures Report  
  Other

**7. Description of Undertaking (what does the project entail?):**

The Corps, in cooperation with the Acequia Llano de San Juan Nepomuceno Association, proposes to rehabilitate this section of ditch by constructing 4,000 feet of new five-foot diameter reinforced concrete piping (RCP) within the existing alignment of the segment of the ditch that is located on the steep slope. Once placed, the pipe will be covered by two feet of additional fill to protect the pipe and allow vehicles to drive down the ditch alignment on top of the pipe. Manholes will be spaced every 400 feet along the pipe to allow access for maintenance. A trash rack structure will be placed on the upstream entrance to block large materials from entering the pipe.

[   ] Continuation

<b>8. Dates of Investigation:</b> from: 23-May-2011    to: 23-May-2011	<b>9. Report Date:</b> 13-Jul-2011
--	------------------------------------

**10. Performing Agency/Consultant:** US Army Corps of Engineers Albuquerque District

**Principal Investigator:** Jeremy T. Decker

**Field Supervisor:** Jeremy T. Decker

**Field Personnel Names:** Gregory Everhart

**Historian / Other:**

**11. Performing Agency/Consultant Report No.:**  
USACE-ABQ-2011-003

**12. Applicable Cultural Resource Permit No(s):**  
NM-11-193

**13. Client/Customer (project proponent):**

Acequia Llano de San Juan Nepomuceno Association

**Contact: Bonifacio Vasquez (Commissioner)**

**Address:**

**Phone: 505-927-1264**

**14. Client/Customer Project No.:**

**15. Land Ownership Status (must be indicated on project map):**

Land Owner (By Agency)	Acres Surveyed	Acres in APE
Acequia Llano de San Juan Nepomuceno Association (acequia right-of-way)	3.33	3.33
Franklin Schwentker	1.73	1.73
Unknown Private	1.18	0.00
<b>TOTALS</b>	6.24	5.06

**16. Records Search(es):**

Date(s) of HPD/ARMS File Review: 4/18/11	Name of Reviewer(s): Jeremy Decker	
Date(s) of Other Agency File Review: 4/18/11	Name of Reviewer(s): Jeremy Decker	Agency: US Army Corps of Engineers

**17. Survey Data:**

a. Source Graphics [ ] NAD 27 [ x ] NAD 83 **Note: NAD 83 is the NMCRIS standard.**

USGS 7.5' (1:24,000) topo map  Other topo map, Scale:

GPS Unit Accuracy  <1.0m  1-10m  10-100m  >100m

Aerial Photo(s)

Other Source Graphic(s): 2009 NIAP Aerial Imagery

b. USGS 7.5' Topographic Map Name

USGS Quad Code

Penasco, NM	36105-B6
El Valle, NM	36105-A6

c. County(ies): TAOS

d. Nearest City or Town: Llano, NM

e. Legal Description:

Township (N/S)

Range (E/W)

Section

--	--	--

Projected legal description? [ ] Yes [ ] No [ x ] Unplatted

f. Other Description (e.g. well pad footages, mile markers, plats, land grant name, etc.):

Within the Llano Santa Barbara Tract of the Santa Barbara Land Grant

**18. Survey Field Methods:**

**Intensity:**  100% coverage  <100% coverage  
**Configuration:**  block survey units  linear survey units (l x w):  
 other survey units (specify):  
**Scope:**  non-selective (all sites/properties recorded)  selective/thematic (selected sites/properties recorded)  
**Coverage Method:**  systematic pedestrian coverage  
 other method (describe):

**Survey Interval (m):** 10      **Crew Size:** 2      **Fieldwork Dates:** from: 23-May-2011      to: 23-May-2011  
**Survey Person Hours:** 6.00      **Recording Person Hours:** 2.00      **Total Hours:** 8.00

**Additional Narrative:**

The survey took place on May 23, 2011 with Corps personnel meeting Acequia Llano de San Juan Nepomuceno Association Commissioner Bonifacio Vasquez. Pedestrian survey began immediately following this meeting. During survey, archaeologists took photographs of the ditch, and walked along the acequia alignment along the length of the proposed piping project, looking for evidence of archaeological materials and noting details of acequia context and construction. The precise route and alignment of the acequia were recorded via GPS during the fall of 2008 field visit, and verified during the current survey.

[ x ] Continuation

**19. Environmental Setting (NRCS soil designation; vegetative community; elevation; etc.):**

The project area is within the Intermontane Plateaus of the Southern Rocky Mountains Province (Fenneman and Johnson 1946; Natural Resources Conservation Service 2011). Landforms in most areas are controlled by the underlying sedimentary rock formations, with fluvial landforms in the Rio Grande rift basin. Elevation ranges between 4,600 to 9,300 feet (1,400 to 2,835 meters) in areas of the foothills and high mesas that border the Southern Rocky Mountains. The soil along the proposed project alignment is primarily mountainflank (Maes-Etoe complex) derived from sandstone and shale. The vegetation along the proposed project alignment is typical riparian willows and alder. The upland vegetation adjacent to the proposed project alignment includes Douglas fir, white fir, Gambel oak, and snowberry. Forests of Rocky Mountain Douglas-fir and white fir are at the higher elevations.

[ ] Continuation

**20.a. Percent Ground Visibility:** 0-50%      **b. Condition of Survey Area (grazed, bladed, undistributed, etc.):**

Visibility within the staging areas was fair, with 25-50% of the surface visible through the grass cover. In some areas, particularly around LA170127, rodent burrowing was intense and provided better ground visibility (50-75%). Visibility along the acequia segment was very poor, as a massive, linear pile of rounded cobbles removed from the ditch obscured the eastern bank. Slopes on either side of the ditch ranged from 45-75°, and were littered with additional loose stone.

[ x ] Continuation

**21. CULTURAL RESOURCE FINDINGS**       Yes, see next report section       No, discuss why:

[ ] Continuation

**22. Attachments (check all appropriate boxes):**

- USGS 7.5 Topographic Map with sites, isolates, and survey area clearly drawn (required)
- Copy of NMCRIS Map Check (required)
- LA Site Forms - new sites (with sketch map & topographic map) if applicable
- LA Site Forms (update) - previously recorded & un-relocated sites (first 2 pages minimum)
- Historic Cultural Property Inventory Forms, if applicable
- List and Description of Isolates, if applicable

[ ] List and Description of Collections, if applicable

23. Other Attachments:

[ x ] Photographs and Log

[ ] Other Attachments (Describe):

24. I certify the information provided above is correct and accurate and meets all applicable agency standards.

Principal Investigator/Qualified Supervisor: Printed Name: Jeremy T. Decker

Signature: [Handwritten Signature] Date: 7/12/11 Title: Archaeologist

25. Reviewing Agency: US Army Corps of Engineers, Albuquerque District  
Reviewer's Name/Date: [Handwritten Signature] 7-12-2011  
Accepted [ x ] Rejected [ ]

26. SHPO  
Reviewer's Name/Date:  
HPD Log #:  
Date sent to ARMS:

CULTURAL RESOURCE FINDINGS  
[fill in appropriate section(s)]

SURVEY RESULTS:

The survey identified two historic properties including the acequia itself, and LA170127, a badly dilapidated structural site dating to the latter half of the 20<sup>th</sup> century. No isolated occurrences were identified on survey.

Archaeological Sites discovered and registered: 1

Archaeological Sites discovered and NOT registered: 0

Previously recorded archaeological sites revisited (site update form required): 0

Previously recorded archaeological sites not relocated (site update form required): 0

TOTAL ARCHAEOLOGICAL SITES (visited & recorded): 1

Total isolates recorded: 0

Non-selective isolate recording?

HCPI properties discovered and registered: 1

HCPI properties discovered and NOT registered: 0

Previously recorded HCPI properties revisited: 0

Previously recorded HCPI properties not relocated: 0

TOTAL HCPI PROPERTIES (visited & recorded, including acequias): 1

MANAGEMENT SUMMARY:

In sum, the survey examined two proposed staging areas, and the portion of the Acequia de Llano de San Juan Nepomuceno to be impacted by the proposed project that would include installation of buried pipe along a 4,000 foot section. The survey identified two historic properties including the acequia itself, and LA170127, a badly dilapidated structural site dating to the latter half of the 20<sup>th</sup> century. No isolated occurrences were identified on survey.

Site LA170127 is located directly to the south of, and within the access road to, Staging Area 1. Other than driving through the site on the existing two-track road, it is the intent of the project proponents to avoid stockpiling within the site, as the remains of the structure make it difficult to stack materials. In addition, the Association would like to stack materials as far from the main road as possible to increase security, so stockpiling in the area north of the site is preferable to working within the site which is much closer to the county road.

[ ] Continuation

IF REPORT IS NEGATIVE, YOU ARE DONE AT THIS POINT.



# CHAPTER 1

## INTRODUCTION AND PROJECT DESCRIPTION

Sarah E. Beck and Jeremy T. Decker

### Purpose of the Survey and Project Background

---

The Water Resources Development Act (WRDA) of 1986 (Public Law 99-662; 33 U.S.C. 2201 et. seq. as amended), authorizes the Acequia Rehabilitation Program for 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 United States, 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. The Act also recognized community acequias as public entities, allowing acequia officials to serve as local sponsors of water related projects through the Department of Defense.

Section 215 of the Flood Control Act of 1968 (P.L. 90-483), as amended, provides that the Secretary of the Army may enter into an agreement to credit or reimburse the costs of certain work accomplished by states or political subdivisions thereof, which later is incorporated into an authorized project. The Secretary of the Army, when he determines it to be in the public interest, may enter into agreements providing for reimbursement to States or political subdivisions thereof for work to be performed by such non-Federal public bodies at water resources development projects authorized for construction under the supervision of the Chief of Engineers. The U.S. Army Corps of Engineers, Albuquerque District (Corps) would reimburse 75 percent of total project cost and is, therefore, the action agency for this project. The Corps has the authority for review and approval of the environmental and cultural impacts of the proposed project. The Office of the State Engineer/Interstate Stream Commission along with the Acequia Llano de San Juan Nepomuceño Association (Association) is the project sponsor, and would be responsible for the remaining 25 percent of construction costs. Project design and inspection would be undertaken by the Corps.

### Project Description and Location

---

The project area is located along the Rio Santa Barbara, a tributary of Embudo Creek, and work will take place approximately 1.5 miles southeast of the community of Llano (Figure 1.1). Llano is located 2 miles south of Peñasco, and approximately 20 miles south of Taos. The project area is located on unplatted lands within the Llano Santa Barbara Tract of the Santa Barbara land grant. The principal objective of the acequia rehabilitation project is to improve the maintenance of the acequia madre and the efficiency of water delivery to acequia members in response to frequent rockfall that interrupts water delivery to downstream portions of the system. Throughout the project area, steep slopes containing numerous rocks of various sizes (from pebbles to approximately three feet in diameter) are eroding rapidly and depositing rocks into the open earthen

ditch. In previous years it has been possible to clear the affected area using trained horse teams. In recent years, however, it has become impossible to find skilled horse teams. In addition, landowners on the properties located downhill of the ditch alignment are not Association members, and object to rocks being rolled out of the acequia and onto their property. The project area is too steep to allow for safe and practical use of mechanical equipment to clean the ditch, and as a result, annual cleaning of the ditch has become difficult to nearly impossible for the Association. Improvements made in the proposed project would provide for the efficient, timely, and equitable delivery of irrigation water to downstream portions of the ditch during the critical irrigation times of the growing season, as well as reducing the high costs of maintaining the earthen ditch. Project construction would be scheduled for a fall timeframe after summer water diversion is complete, to ensure that project work does not affect irrigation.

The Corps, in cooperation with the Acequia Llano de San Juan Nepomuceño Association, proposes to rehabilitate this section of ditch by constructing 4,000 feet of new five-foot diameter reinforced concrete piping (RCP) within the existing alignment of the segment of the ditch that is located on the steep slope. Once placed, the pipe will be covered by two feet of additional fill to protect the pipe and allow vehicles to drive down the ditch alignment on top of the pipe. Manholes will be spaced every 400 feet along the pipe to allow access for maintenance. A trash rack structure will be placed on the upstream entrance to block large materials from entering the pipe. Two potential staging areas (1.73 and 1.18 acres; see Chapter 4 for descriptions) were originally identified on private property. The 1.73-acre parcel (Staging Area 1) is owned by Franklin Schwentker. Land ownership for the other parcel (Staging Area 2) could not be determined. Project proponents requested that the area be surveyed, but when owners of the potential staging area could not be contacted following the survey, the area was dropped from consideration as a staging area. As survey of the parcel was completed, it will be included in this report. All pipeline work is within the acequia's right-of-way. Project design has been completed by the Corps.

The proposed project is being undertaken to address and alleviate negative impacts currently being experienced by the acequia system that impair the acequia's function, create increasing damage, and generate labor and maintenance requirements that are beyond the Association's ability to address both technically and economically. Primary negative impacts include:

- 1) Erosion of numerous rocks down slope from an adjacent hillside into the ditch, resulting in blockage and causing damage to the banks of the earthen ditch.
- 2) The detrimental impacts of severe erosion resulting in rocks being deposited into the ditch endanger the acequia's continued function and jeopardize the continued use of this acequia segment; because this segment is the upstream portion of the acequia, the entire acequia system is impacted. Without some modification to the ditch, it is likely that the rocks will severely limit the efficiency of water delivery to all 230 *parsientes* located downstream of the project area. Piping this extent of the acequia would eliminate the need to continually clean this segment of ditch, resulting in more efficient flows, and decreased labor investment from acequia Association members.

## Land Ownership

---

Land in the project area is privately owned. Project construction will occur within the Acequia Llano de San Juan Nepomuceño Association's right-of-way. In addition, the two staging areas are privately owned by Franklin Schwentker and an unknown owner (Bonifacio Vasquez, personal communication). No soil disturbance is expected at the staging areas, which would be used only for stockpiling materials and equipment parking.



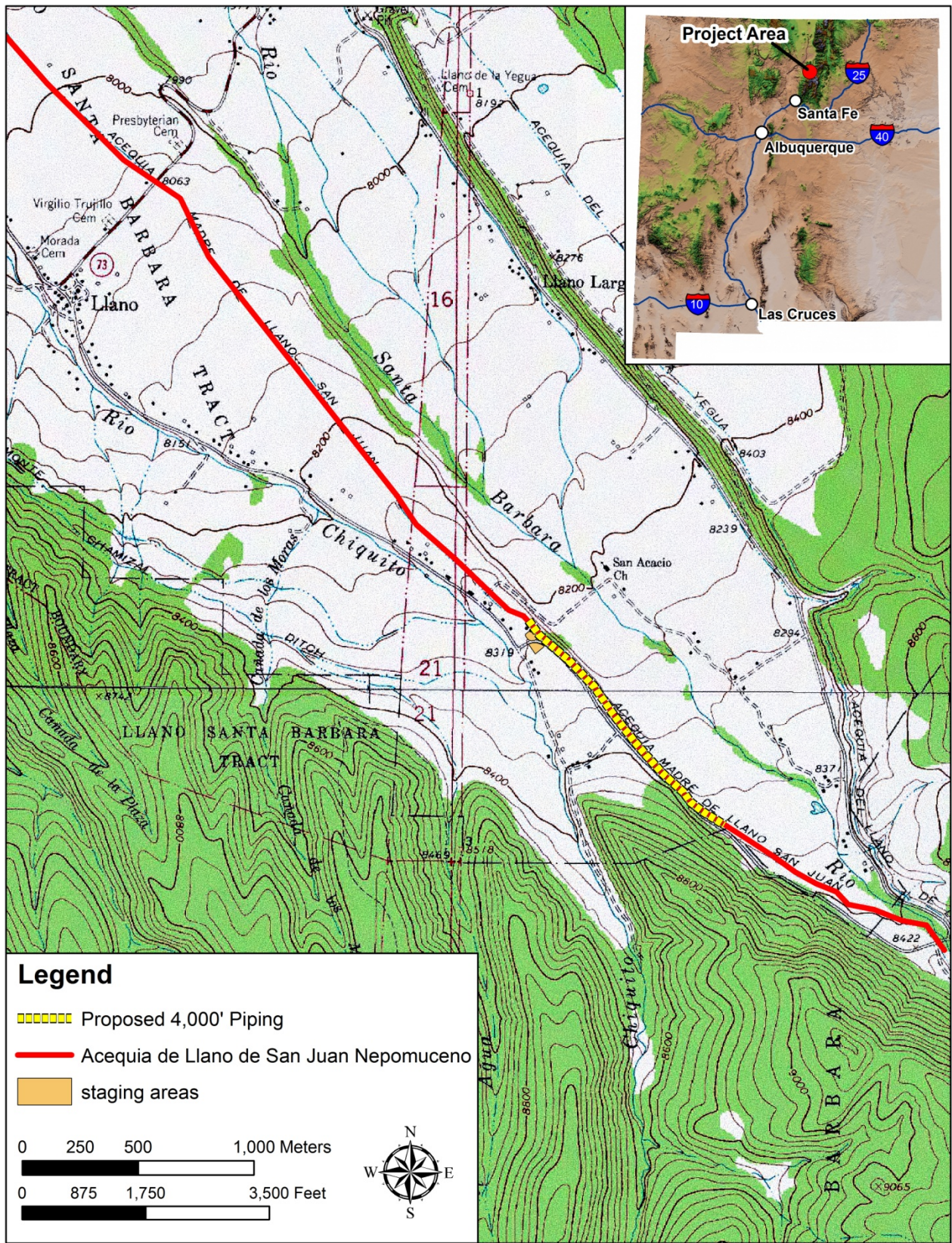


Figure 1.1. Location of project area, shown on USGS 7.5" quadrangle maps Peñasco, NM (36105-B6) and El Valle, NM (36105-A6).

## Project Personnel and Schedule

---

Corps personnel conducted an initial site visit for the project in the fall of 2008. Corps archaeologists Jeremy Decker and Gregory Everhart conducted a cultural resources survey on May 23, 2011. Jeremy Decker prepared this report, and Sarah Beck, Corps biologist, prepared the natural setting section appearing in Chapter 2 and contributed to this chapter. Gregory Everhart, Corps archaeologist, peer-reviewed this document. The project proponents would prefer to begin construction at the end of irrigation season in October, and expect construction to last approximately four months.

# CHAPTER 2

## ENVIRONMENTAL SETTING

Sarah E. Beck and Jeremy T. Decker

### Natural Environment

---

#### Physiography and Geology

The project area is within the Intermontane Plateaus of the Southern Rocky Mountains Province (Fenneman and Johnson 1946; Natural Resources Conservation Service 2011). Landforms in most areas are controlled by the underlying sedimentary rock formations, with fluvial landforms in the Rio Grande rift basin. Elevation ranges between 4,600 to 9,300 feet (1,400 to 2,835 meters) in areas of the foothills and high mesas that border the Southern Rocky Mountains. Elevation in the project area is approximately 8320 feet AMSL.

Most of the area is characterized by generally horizontal beds of sedimentary rocks (Natural Resources Conservation Service 2011). The sedimentary rocks have been eroded into plateaus, mesas, hills, and canyons. Wide valleys in the rift basin have accumulated deep alluvial sediments, and fan remnants are common. The Española Basin is a west-tilted half graben and a prominent feature of the Rio Grande rift. Surficial geology in the project area consists of west-dipping beds of the Tesuque Formation, which are middle to upper Miocene age (Kelson and Olig 1995), and modern alluvium associated with arroyo channels.

#### Soils

The soil along the proposed project alignment is primarily mountainflank (Maes-Etoe complex) derived from sandstone and shale and with a profile of cobbly loam over a base of very to extremely cobbly sandy loam (Natural Resources Conservation Service 2011). Slopes are very steep (40-80%), depth to water table is more than 80 inches, and soils have a low to moderate available water capacity (5.4-6.1 inches; NRCS 2011). The proposed project staging area comprises alluvial fans material (Fernando clay loam). These alluvium are derived of igneous and metamorphic rocks with 3-5% slopes, depth to water table is more than 80 inches, and soils have high available water capacity (11.6 inches; NRCS 2011).

#### Climate

Taos County has a semiarid climate. The project area has a mid-latitude desert climate, with an annual average precipitation amount of 15.02 inches (recorded for nearby Peñasco, NM, Western Regional Climate Center 2011). Precipitation is irregular, but there is typically a pattern of monsoonal rains in July and August as Gulf air masses penetrate into the region (Figure 2.1). Cyclonic precipitation occurs during winter months, with average annual snowfall of 11.6 inches. Average diurnal temperature fluctuations of 20° F to 30° F are characteristic of the project area. Summer temperatures are warm and winters are mild (Figure 2.2).

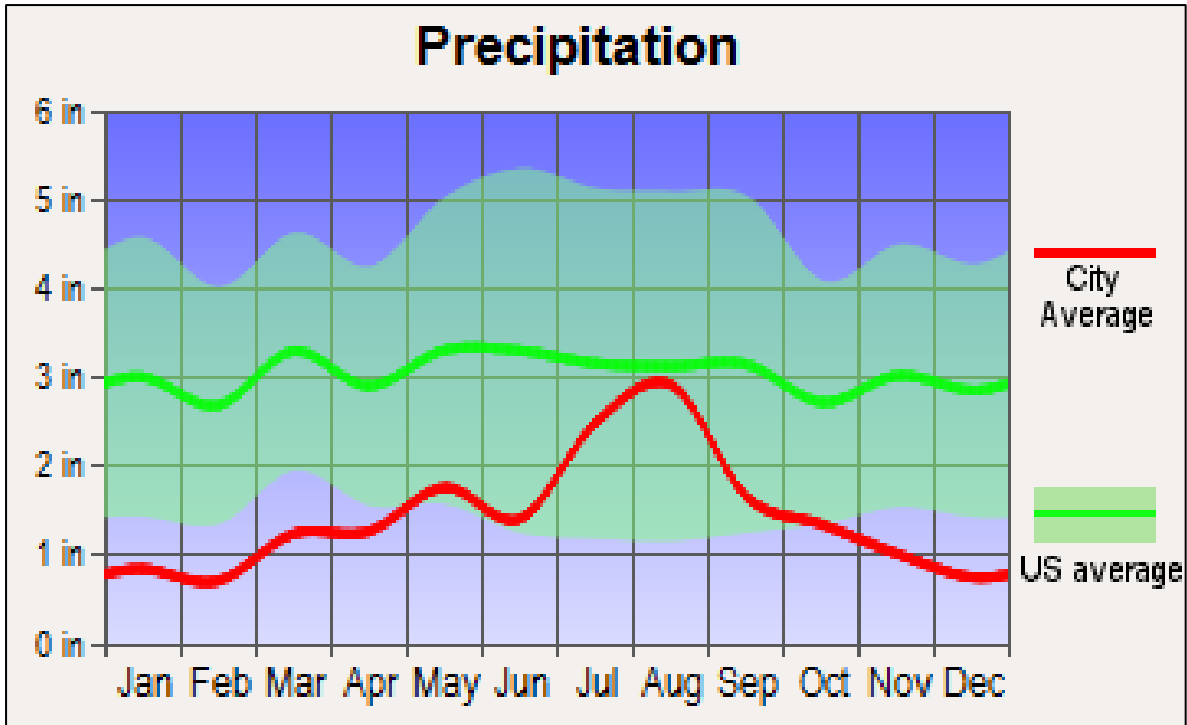


Figure 2.1. Precipitation characteristics in Peñasco near project area. Graph generated by City.com (2011).

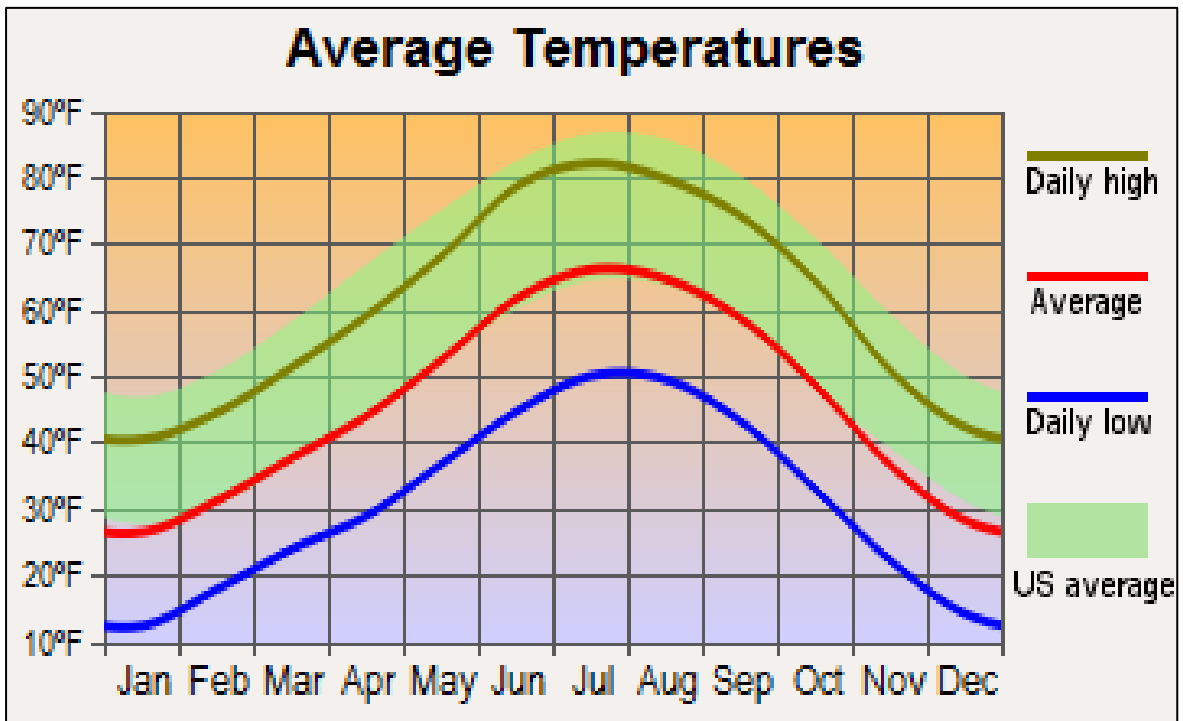


Figure 2.2. Temperature characteristics in Peñasco near project area. Graph generated by City.com (2011).

## Water Resources

The project area is located on the Rio Santa Barbara, which flows northwest and into Embudo Creek at the community of Rio Lucio. Embudo Creek continues west and flows into the Rio Grande near the community of La Junta. There are no gauges on the Rio Santa Barbara, and the closest gauge on Embudo Creek is at Dixon, NM, near to the confluence with the Rio Grande. Peak flows on Embudo Creek (USGS gauge number 8279000) averaged over the 78-year period of record occur during the spring snowmelt in late May and approach 400 cubic feet per second (cfs). During the rest of the year, discharge fluctuates between 30 and 50 cfs. Discharges on the Rio Santa Barbara are expected to be much less than those on Embudo Creek.

## Vegetation and Wildlife

The project area is located near the juncture of the Petran Subalpine and Petran Montane Conifer Forests biotic communities as described by Brown (1982). The vegetation along the proposed project alignment is typical riparian willows and alder. The upland vegetation adjacent to the proposed project alignment includes Douglas fir, white fir, Gambel oak, and snowberry. Forests of Rocky Mountain Douglas-fir and white fir are at the higher elevations. Some of the major wildlife species in this area are mule deer, elk, coyote, black bear, mountain lion, black-tailed jackrabbit, Gunnison's prairie dog, badger, piñon jay, black-billed magpie, mountain chickadee, red-breasted nuthatch, white-breasted nuthatch, collared lizard, fence lizard, and western rattlesnake.

## Results of Records Check

An online records check of the New Mexico Office of Cultural Affairs, Historic Preservation Division, Archaeological Records Management Section's (ARMS) database was conducted by Jeremy Decker on April 18, 2011. Table 2.1 lists archaeological surveys that have been conducted within 0.5 miles of the project area. According to the ARMS database and Corps' records, nine surveys have been conducted within 0.5 miles of the project area. These surveys total 245.3 acres and resulted in the recording of 20 unique historic properties. A screen-capture of the ARMS map server search is shown in Appendix A, Figure A.1.

Table 2.1. Surveys conducted within 0.5 miles of project area.

NMCRIS Number	Performing Agency	Survey End Date	Acres	Number of Sites	Survey Type
19901	USFS-Region 3	12/31/1987	7.09	0	Intensive
20814	USFS-Region 3	12/31/1988	0.5	0	Intensive
40548	USFS- Camino Real RD	7/13/1992	79	2	Intensive
50442	USFS-EI Rito RD	1/18/1996	65	13	Intensive
55757	NRCS	7/3/1996	15.3	2	Intensive
58170	USFS- Camino Real RD	4/10/1997	0.4	0	Intensive
63783	USFS- Camino Real RD	6/29/1998	18	0	Intensive
67490	USFS- Camino Real RD	3/24/2000	50	3	Intensive
73457	USFS- Camino Real RD	7/27/2000	10	0	Intensive

There are eight known archaeological sites within one-half mile of the project area; ARMS data for these sites are presented in Table 2.2. The majority of sites within 0.5 miles of the project area are historic sites including two historic rail lines (LA111680 and LA111681), four acequia segments (LA111683, LA111684, LA111685, LA111737) and a domestic structure (LA111676). LA145388, an artifact scatter, is the lone prehistoric site. In addition to the eight previously recorded sites, the NRCS noted the presence of historic acequias within their 1996 survey area. Both the Monte and Chamizal ditches were present, but NRCS chose not to record them as historic properties at that time. The Acequia de Llano de San Juan Nepomuceño was recorded as a site (LA111685) further upstream from the project area, but the section of ditch included in this project was not inspected with that recording. For the purposes of this document, the historic acequia will be referred to by name rather than using the previously assigned LA site number given to the stretch of ditch located further upstream on U.S. Forest Service land. In sum, the proposed project does not overlap with any known historic properties other than the Nepomuceño Acequia itself. No state or National Register listed properties are located within 0.5 miles of the project area.

Table 2.2. Known archaeological sites within 0.5 miles of project area.

LA Number	Site Type	Occupation Type	Site Size (m <sup>2</sup> )
LA111676	Structural	Historic	950
LA111680	Structural	Historic	900
LA111681	Structural	Historic	900
LA111683	Structural	Historic	1000
LA111684	Structural	Historic	1600
LA111685	Structural	Historic	800
LA111737	Structural	Historic	1000
LA145388	Non-structural	Prehistoric	1024

## Results of Tribal Consultation

---

Pursuant to 36 CFR 800.2, consulting parties in the Section 106 process identified for the Undertaking include the Corps, the Association, and the New Mexico State Historic Preservation Office. Consistent with the Department of Defense’s American Indian and Alaska Native Policy, signed by Secretary of Defense William S. Cohen on October 20, 1998, and based on the State of New Mexico Indian Affairs Department’s 2011 Native American Consultations List, American Indian tribes that have indicated they have concerns in Taos County were sent scoping letters regarding the proposed project. The Hopi Tribe responded on June 22, 2011 stating that no historic properties significant to the tribe would be affected by the project. In addition, responses were received from the Navajo Nation and from the Pueblo of Isleta on July 12, 2011, also indicating that no significant historic properties would be affected. No Traditional Cultural Properties are known to occur within or adjacent to the proposed project area.

## Culture History and Literature Review

---

The proposed project is within the Taos district of the Northern Rio Grande archaeological region (Cordell 1978, 1979; Crown et al. 1996; Stuart and Gauthier 1988). The following culture

history overview provides a general context for the last 14,500 years of known occupation around the project area—from the Ice Age to the present—and is based largely on the works of Cordell (1978, 1979) and Stuart and Gauthier (1988), describing trends in the northern Rio Grande in general, with specific focus on the Taos district where appropriate. Specific citations are provided from other referenced sources.

### The Paleoindian Period (c. 12,500 BC to 5500 BC)

Humans were present in North America by approximately 12,500 BC (Feidel 1999), and the Paleoindian period dates from this time to approximately 5500 BC. The most distinctive artifact types associated with the Paleoindian period are lanceolate spear points, many of which exhibit distinct basal flutes (large flake scars extending from the point base). Throughout the Great Plains and the Southwest, these points have been found associated with large ice-age mammal species such as mammoths, mastodons, and several extinct species of bison. While these finds have contributed to an image of Paleoindians as specialized big-game hunters, in reality they probably pursued more diverse subsistence strategies. The period appears to be characterized by low population densities and high mobility, resulting in Paleoindian sites being rare and having low archaeological visibility.

### The Archaic Period (5500 BC to AD 400/600)

The Archaic Period extends from approximately 5500 BC to AD 400 and represents a continuation of a hunting-gathering lifestyle; however, the range of animal species is similar to those found today, without many of the larger species (e.g. mammoth, camels) that became extinct after the end of the last ice age (cf. Irwin-Williams 1973). This represents the primary difference from the preceding Paleo-Indian Period. During the Archaic, both large and small animals were hunted and trapped. Based on the increasing presence of manos and metates (grinding stones usually used to grind corn or other seeds), it is clear that the processing of plants became more important later in the period. Towards the end of the Archaic, longer-term habitation sites that include shallow pithouses (structures at least partly dug into the ground) are found in central New Mexico.

Two major changes occurred towards the end of the Archaic. Indications of maize appear in the archaeological record by about 2000 BC; however, maize became relatively more common after 1000 BC. Finally, the bow and arrow appeared around AD 500 and replaced the spear as the primary weapon.

### The Ancestral Pueblo Period (AD 400/600 to AD 1540)

The Archaic Period is followed by the Ancestral Pueblo Period. Depending on the location within New Mexico, between three and five major phases are recognized within this period and are based on a host of characteristics, including house forms and construction techniques, settlement patterns, pottery types, and other elements of material culture. One of the key new developments during this period is the appearance and proliferation of pottery; because stylistic changes in ceramics over time are much better understood by archaeologists, the appearance of pottery makes Ancestral Pueblo sites much easier to place within a precise chronological sequence than preceramic sites.

The first chronological sequence developed for this period in the Southwest was the Pecos Classification (Kidder 1924: 84-88), which includes the Basketmaker III (AD 600-750), Pueblo I (AD 750-900), Pueblo II (AD 900-1100), Pueblo III (AD 1100-1300), and Pueblo IV (1300-1600) periods. Wendorf and Reed (1955) proposed an alternative sequence for the northern Rio Grande valley, which was defined largely on the basis of specific sets of changes in settlement pattern and site structure; these periods are termed Developmental (AD 400/600 to AD 1200), Coalition (AD 1200 to AD 1325), and Classic (AD 1325 to approximately AD 1540). The following discussion follows this classification scheme.

A number of general trends characterize the Ancestral Pueblo period in the northern Rio Grande valley. While hunting and gathering continued, reliance on agricultural products continually increased. Pithouse villages with larger communal structures indicate larger social groups living in one location for longer periods of time. Small living and storage rooms built on the ground surface (rather than into the ground, as with earlier pithouses) begin to appear early in this period, and increase in size and abundance. In later periods, above-ground architecture completely replaces pithouses for living and storage functions, with below-ground structures then being limited to communal and ceremonial use.

As populations increased, these small houses were replaced with large buildings of up to several hundred rooms made of rock and/or adobe. Not all of the rooms in these connected structures were necessarily occupied at once; often the large roomblocks grew by accretion, with older rooms being abandoned and new rooms being constructed over time. Overall, the Ancestral Pueblo period saw fundamental changes in architecture, shifts and growth in population, and agricultural reliance in the northern Rio Grande valley.

### Developmental Period (AD 400/600 to AD 1200)

The Developmental Period, dating between AD 400/600 and 1200, and represents a time of gradual transition from the Archaic period, and includes the appearance and spread of new technologies including ceramics and the bow and arrow. It is also characterized by the construction of more elaborate, substantial pithouses (Cordell 1978:42; Schmader 1994). The period is often subdivided into Early (AD 600 to 900) and Late (AD 900 to 1200).

The Developmental period is characterized by increasing sedentism made possible by greater reliance on agriculture. Increased precipitation during this period made intensified maize cultivation possible. A more sedentary existence is suggested also by the presence of pottery and large pit structures that were occupied for longer periods during the year (Allen and McNutt 1955; Schmader 1994), and by increased numbers of storage cists both inside and outside pithouses (Schmader 1994). Early Developmental ceramics consist of pottery types widely distributed throughout the Southwest, including both locally manufactured wares and others associated with the Mogollon culture area to the south (Anschuetz 1984). Early in the period the associated ceramics are similar to those found throughout northern New Mexico; later in time the stylistic attributes, including paint, design, and temper, become more locally distinctive. Pithouses during this time were more substantial than before, with structural elements reflecting greater investment in domestic architecture than previously. Dispersed, seasonal settlements inhabited by people with fluid group memberships are believed to characterize this period. Surface structures appeared toward the end of the period, along with an increase in site size (Anschuetz 1984: 27;



Wendorf and Reed 1955: 140). In the Taos District, population density is low throughout the period. Small, dispersed pithouse hamlets of one to four structures are known to the area by around A.D. 1000 (Crown et al. 1996:191), but there appears to be little utilization of the area until approximately A.D. 1100 (Cordell 1979a:143). Between A.D. 1100-1200 pithouse villages become more common (Cordell 1979a:143), suggesting more intensive use of the area in the Late Developmental Period. The first unit pueblos, some with as many as 18 rooms and associated kivas, begin to appear near the end of the Developmental around A.D. 1200 (Crown et al. 1996:191).

The Developmental period also saw changes in climatic conditions. The Early Developmental period witnessed an overall increase in precipitation, but with short-term periodicity and great variance and unpredictability in precipitation levels. Anschuetz (1984) suggests that populations were growing and that this increased density constrained mobility and increased competition for limited subsistence resources. As a result, populations were forced to increase agricultural production, while uplands provided buffers against potential floods on the floodplain and would have allowed dispersion for dry farming during favorable periods of rainfall. During the eleventh century, rainfall patterns shifted to greater short-term predictability and longer-term periodicity. According to Anschuetz, this resulted in more intensive but seasonal use of upland areas, probably in response to increasing population densities.

### Coalition Period (AD 1200 to 1325)

The Coalition Period, AD 1200 to 1325, is marked by a dramatic population increase in many portions of the northern Rio Grande region after around AD 1250, hypothesized to originate from an indeterminate combination of migration from other areas such as Mesa Verde, Chaco Canyon, or portions of west central New Mexico; and internal population growth. Crown et al. (1996) find strong evidence for population shifts throughout the region between AD 1150 and AD 1350; this was coincident with an overall trend toward increases in the number and density of sites, and a shift from dispersed habitations to aggregated residences. An important theme in the interpretation of this period is the relationship between a collapsing core area (the San Juan Basin) and its developing periphery (the Rio Grande valley) (Stuart and Gauthier 1988; Tainter 1987).

During this period, populations appear to shift throughout the northern Rio Grande. Different areas experience different degrees of population growth, likely stemming both from internal population increase and the arrival of groups from elsewhere. Regardless of the actual pace or trajectory of population growth, all regions experience aggregation (the consolidation of greater numbers of people into smaller numbers of communities) at more or less the same time between AD 1250 and AD 1300 (Crown et al. 1996).

In some areas, this shift precedes population increase, but follows it in others. In the Taos District, aggregation appears to precede population growth, with most of the inhabitants of the area apparently aggregating into two or three large pueblos by AD 1250, and pronounced population growth occurring after A.D. 1250 (Crown et al. 1996: 191-192). Even with this pronounced population growth, however, population levels remained low throughout all periods in the Taos District (Crown et al. 1996: 192). The pattern seen in the Taos District differs from the adjacent Pajarito District, where aggregation increases steadily until at least AD 1375, while population

peaks around AD 1300 and then drops off by AD 1375 (Crown et al. 1996: 196). This pattern is reversed in the nearby Chama District, where aggregation appears to precede sharp population growth by approximately 50 to 75 years (Crown et al. 1996: 193).

In general, Coalition period habitations continue the shift from pithouses to above-ground structures (Cordell 1978), and sites generally consist of linear or L-shaped room blocks (containing from two to 200 rooms, with structures containing between 13 and 30 rooms the most common) which tend to be located near major drainages (Stuart and Gauthier 1988). By their measure, Crown et al. (1996) note that nearly all habitation sites in the northern Rio Grande contained more than 50 rooms by AD 1300 (Crown et al. 1996: 199). In decorated ceramics, there is a shift from the use of mineral paint to organic paint represented by the appearance of Santa Fe Black-on-white (Cordell 1978).

### Classic Period (AD 1325 to 1540)

Substantial social and technological change is evident during the Classic period, beginning around AD 1325 (Cordell 1978; Stuart and Gauthier 1988; Wendorf and Reed 1955). By this time, the majority of the northern Rio Grande population lived in large aggregated settlements (Crown et al. 1996), some containing more than 1,000 rooms (Stuart and Gauthier 1988). The development of glaze-paint pottery occurred during this period, allowing relatively fine-grained chronological placement based on a series of stylistic and technological changes in the Rio Grande Glaze sequence. Glaze wares replaced black-paint wares in most regions (with the exception of the Jemez area, where Jemez Black-on-white persists for some time), and the appearance of this technology has been interpreted as evidence for migration from the west (Shepard 1942: 197-199), diffusion of ideas from the Zuni and Little Colorado areas (Wendorf and Reed 1955: 150, 161), local development, or a combination of the three. Glaze wares are not produced in the Taos District, but do appear as trade wares.

The end of the Classic period saw the arrival of the Spanish, first with Coronado's entrada of 1540, and then with the first establishment of a Spanish colony in 1598. By the time of European contact, some of the large Classic pueblos had already been abandoned for nearly a century. Theories on these abandonments include overpopulation, overexploitation of natural resources, drought, and conflict (Cordell 1978: 45). End dates for the Classic period have been alternatively designated as 1540, the year of Coronado's entry into the area; and approximately 1600, a time when the establishment of a permanent colony (1598) began to impinge significantly on Pueblo life. This report uses the earlier date, while recognizing the inherently arbitrary nature of using this as a cutoff.

### The Historic Period (AD 1540 to Present)

In general, this period in central and northern New Mexico is characterized by rapid change and acculturation (the exchange and adoption of cultural elements such as beliefs and behaviors between groups coming into contact with one another) among Indians, Spanish, Mexicans, and Anglo-Americans. This period, dating from about AD 1540 to the present, can be seen as a series of phases reflecting aspects of social interaction between different groups. In broad outline, key elements of these include (in chronological sequence): Spanish exploration followed by colonization; the Pueblo Revolt; the post-Revolt colonial period under Spanish and then Mexican rule; the annexation of New Mexico as a United States territory; and U.S. statehood.

Pueblo population throughout the northern Rio Grande region faced a general decline during this period as a result of multiple factors, including disease. In addition to missionary efforts to convert indigenous groups to Christianity, this period was also characterized by concerted efforts by the Spanish to consolidate control over Pueblo populations through strategies such as *reducción* (Spicer 1962), a policy of forced concentration of populations into a smaller number of more easily controlled settlements. In some portions of the Rio Grande, these efforts likely led in part to native dispersal into peripheral areas in order to escape Spanish control (Kulisheck 2002). Beginning around 1650, the Spanish established their own farms in the growing gaps between Pueblo lands.

Currently, there are four major linguistic groups among the Pueblo Indians of the Southwest—Zuni, Uto-Aztecan (Hopi), Tanoan, and Keres. The Tanoan language family is divided into three primary subgroups: Tiwa, Tewa, and Towa.

### The Spanish Colonial Period (AD 1540 – 1821)

When Coronado entered New Mexico in 1540, he found a series of large, aggregated villages concentrated along the length of the Rio Grande valley; the Rio Grande is one of the few parts of the Southwest where such aggregated population centers persisted into the Historic period. Coronado's 1540-1542 entrada noted the province of Yuque-Yunque, incorporating the Pueblo of Ohkay Owingeh as well as several other large villages in the Chama area, possibly including the large site of Sapawe (Schroeder 1979). Coronado's entry into the Southwest was followed by intermittent additional Spanish forays including two expeditions that reached Picuris Pueblo directly north of the project area. In 1591 Gaspar Castano de Sosa made contact with the pueblo (Brown 1979:270; Jenkins 1966; Reed 1943; Castano de Sosa 1965:124), and in 1598 Juan de Oñate visited Picuris for the first time. During that same year, Oñate established a permanent colony, with his primary base in the vicinity of Ohkay Owingeh near the location of modern Española (Simmons 1979), west of the project area. The establishment of the Spanish colony with a base in the Española area led to Spanish settlement throughout the surrounding area, including in the Santa Cruz River valley west of the current project area.

### *THE PUEBLO REVOLTS OF 1680 AND 1696*

The last decades of the seventeenth century were characterized by significant upheaval, as conflict escalated between indigenous populations and the Spanish colonial presence. The Pueblo Revolt of 1680 was a unified action on the part of several pueblos, in alliance with other indigenous groups including Apache and Navajo, who together successfully drove the Spanish out of New Mexico for more than a decade (Knaut 1995; Sando 1979). Twelve years later (AD 1692), Diego de Vargas led a Spanish contingent to retake New Mexico, beginning a process of reconquest that was intermittently violent between approximately 1692 and 1696.

Continued resistance culminated in a second revolt in 1696, which was of smaller scale than the 1680 revolt and was not ultimately successful (Edelman 1979; Espinosa 1988). After Vargas's Reconquest of 1692, he established a new *villa* in the Santa Cruz valley as a location for new Spanish settlement. This establishment resulted in the displacement of several Tano groups, who were granted resettlement by Vargas at "the site they could newly settle in the place and end of the Cañada they call Chimayó, next to the sierra," in the vicinity of the modern town of Chimayó (Kessell et al. 1998: 610). After a 1694 revolt involving the Jemez, Acoma, Zuni, and Navajo

was put down by the Spanish, another revolt broke out in 1696, centered on the displaced Pueblo groups in Chimayó (Spicer 1962). This revolt spread to involve Taos, Picuris, Santo Domingo, Cochiti, and Acoma, and was ultimately defeated by Vargas (Kessell et al. 1998). Following this defeat, Picuris Pueblo and the current project area was abandoned (Thomas 1935:54; Brown 1979:271), with Picuris people seeking refuge among Apache groups on the Plains until 1706 when they returned to Picuris Pueblo (Thomas 1935:76; Brown 1979:271). The suppression of the 1696 revolt marked the end of the last significant organized resistance by Rio Grande pueblos against Spanish rule. The toll enacted on the population of Picuris Pueblo during the Revolt era was a substantial one. In 1680 the population of Picuris was estimated at 3,000 (Vetancurt 1960:273), making it the largest of the northern Rio Grande Pueblos (Brown 1979:271). By 1706, the Puebloan population in the project area had dwindled to 300 people (Hackett 1923-1937, 3:374).

### *POST-REVOLT PERIOD TO 1821*

Before the Pueblo Revolt of 1680, Spanish settlers generally maintained scattered estates (haciendas) in close proximity to Pueblo villages, which served as sources of labor (Cordell 1978:115), but after the reconquest this shifted to a focus on the greater security afforded by living in villages (ranchos). While the shift to rancho settlement is partly due to decreasing Pueblo population sizes and increasing Spanish population size (Cordell 1978:118), it was also likely a response to both perceived threat of Pueblo action, and to increasingly common raids on both Spanish and Pueblo communities by Apache, Navajo, and Comanche groups. Early in the eighteenth century, these ranchos were still fairly scattered, but increasing need for greater security encouraged the construction of defensible plazas later in the century (Cordell 1978: 118).

The project area had been utilized by inhabitants of Picuris pueblo for some time, but was formally brought under the control of Hispanic settlers with the granting of the Santa Barbara Land grant by the Spanish government. The land had been previously granted, but the first settlers in the valley had abandoned the area sometime in the 1770's, likely due to Comanche raiding (de-Buys 1985:80). Governor Fernando Chacón gave permission for resettlement of the valley on August 3, 1796, and the towns of Llano and Peñasco were founded shortly thereafter (Julyan 1996:205, 262). Although the grant was later partitioned, the project area still falls within a parcel of land called the Llano Santa Barbara Tract.

### **The Mexican Period (AD 1821-1846)**

The nineteenth century saw a series of geopolitical shifts resulting in New Mexico changing hands more than once. The Republic of Mexico was founded in 1821, but Mexican control over New Mexico only lasted a quarter of a century before New Mexico was annexed by the United States in 1846 (Cordell 1978; Weber 1982). Raiding on Pueblo and Hispanic communities by nomadic groups increased during the Mexican period, encouraging further aggregation for defense (Cordell 1978). Anglo settlers began to enter the area as well during this period, a pattern which intensified after annexation. Settlement and livestock grazing expanded into previously unoccupied regions (Pratt et al. 1988: 53), and farming continued to be a central activity.

#### **Acequias and the Acequia de Llano de San Juan Nepomuceño**

Colonial-era remains in the study area include agricultural features such as acequias (irrigation ditches). As described in detail by Ackerly (1996), there is some evidence for irrigation systems

in the Pueblo world before Spanish contact. Fray Marcos de Niza describes irrigated agricultural land in the Rio Grande valley in 1539 (Ackerly 1996:5; Hammond and Rey 1940:69-72).

Spanish settlement of the area began to increase during the 1700s, and acequia systems were a vital component of agriculture during this period. Ackerly (1996:54) presents the temporal distribution of acequia systems in Figure 2.3. The Acequia de Llano de San Juan Nepomuceño, subject of the present survey, has a non-adjudicated priority date of March 19, 1907. Its construction date, however, is noted as 1796 in the declaration of ownership of water rights filed with the County of Taos. While there is no direct evidence the ditch was constructed at this time, it is highly unlikely that settlement of the valley in 1796 would have been feasible without the use of an irrigation ditch for food production. The 1907 priority date, therefore, is likely more an artifact of bureaucratic process than it is an accurate approximation of the ditch's antiquity. A priority date of 1907 would place the Acequia de Llano de San Juan Nepomuceño fairly late, while one of 1796 would make it one of the earliest in the area; Figure 2.3 presents a figure from Ackerly's (1996) acequia study, showing the temporal distribution of acequia systems in the surrounding Santa Fe, Santa Cruz, Taos, and Costilla basins. Ackerly's figure shows the earliest acequias as dating before 1701, with dramatic increase beginning in the period after 1800, particularly the period of 1876-1900 (Figure 2.3). Most of the acequias thus date to the late 1800s, tapering off in the first quarter of the 20<sup>th</sup> century to nearly zero after 1925.

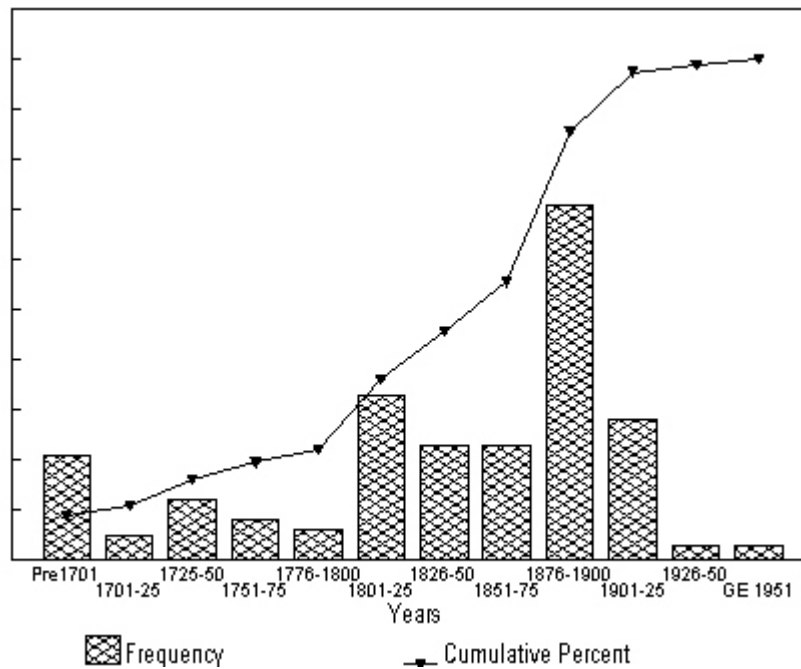


Figure 2.3. Temporal distribution of acequia systems in the nearby Santa Fe, Santa Cruz, Taos, and Costilla basins. Figure reproduced from Ackerly (1996:54, Figure 7).

### The Territorial and Statehood Periods (AD 1846-1912 and AD 1912-Present)

The nineteenth and twentieth centuries saw further economic and political changes affecting New Mexico, including an increase in trade between New Mexico and the United States, mani-

fested in part in the development of the Santa Fe Trail, growth of mining activities, the advent and development of railroad networks and lumber operations; the latter two activities heavily affecting populations in the project area. Annexation by the United States also led to the establishment of American military outposts throughout New Mexico, as well as conflict with and relocation of various indigenous groups, and the creation of Indian reservations. New Mexico became a state in 1912.

For the communities of Llano and Peñasco near the project area, the first three decades of the 20<sup>th</sup> century were a time of prosperity. Small communities in the area, including those of the Las Trampas grant to the west, provided labor for a booming timber operation in the mountains surrounding the project area, with approximately 300 local men employed at the height of cutting operations (deBuys 1985:228). Formed in 1907, the Santa Barbara Tie and Pole Company began timber cutting operations on some 65,000 acres within Santa Barbara Grant lands in 1909 (deBuys 1985:227). Created by A.B. McGaffey, an entrepreneur from Vermont, the lumber operation's primary function was to supply the Atchison, Topeka and Santa Fe (AT&SF) Railway with a supply of railroad ties (deBuys1985:227; Myrick 1970:173). Portable sawmills were constructed throughout the area, and the main sawmill used to process timber into ties was located at Hodges just upstream of the current project area. In order to supply Hodges with timber, two narrow gauge railroads were constructed. One line ran along the north side of the Rio Santa Barbara to Llano Llegua, while the other traveled up Rio Chiquito Canyon (Myrick 1970:173). The grade for the Rio Chiquito line now appears to be the Forest Service road that parallels the project area along the west side of the Acequia.

While moving the cut timbers from the rugged mountain terrain down canyon to Hodges was a difficult operation, it was nothing compared to the lengths the Santa Barbara Tie and Pole Co. had to go to in order to move the cut ties to the AT&SF creosoting and fitting plant in Albuquerque. During the winter months, cut ties were stockpiled in several places along the Rio Pueblo and Rio Santa Barbara, including Hodges and Peñasco (deBuys 1985:228). During the two to three weeks of spring runoff, ties were thrown into the swelled Pueblo and Santa Barbara rivers and floated downstream to Embudo, where they were collected and rafted down the Rio Grande nearly to Cochiti Pueblo before being pulled out of the water and hauled to Albuquerque (deBuys 1985:282; Myrick 1970:173). Given the small size of the Rio Santa Barbara, it is difficult to imagine how thousands of railroad ties could be floated downriver. The Santa Barbara Tie and Pole Co., however, did not rely solely on Mother Nature to move the ties, but rather increased the runoff by building numerous crib dams along the river to store water. Once the runoff started, crib dams were dynamited to create a massive and powerful head of water to move the ties (deBuys 1985:229). Operation of the Santa Fe Tie and Pole Co. ceased in 1926 after 17 years of cutting. At the height of timber operations in the area, roughly 400,000 ties were coming down the Rio Grande a year, a number that dipped to 106,000 in 1928 as the need for ties declined (Myrick 1970:174).

*This page was intentionally left blank*

## CHAPTER 3

### FIELD METHODS

Jeremy T. Decker

#### Introduction

---

Areas surveyed included the 4,000 foot portion of the acequia to be piped; and the two proposed staging areas. The following methods were used for the survey.

#### Size of the Survey Crew, Transect Interval(s) and Transect Method

---

The survey crew consisted of two Corps archaeologists, Jeremy Decker and Gregory Everhart. Additional photographs were taken by Corps biologist Sarah Beck during an April field visit and May survey. The area surveyed included (a) the 4,000 foot acequia alignment from the beginning of the proposed piping, upstream to the end of proposed piping, for a total of 3.33 acres; (c) two noncontiguous staging areas on private property owned by Franklin Schwentker and an unknown owner, amounting to 1.73 acre and 1.18 acre, respectively. The total survey acreage is 6.24 acres.

The survey took place on May 23, 2011 with Corps personnel meeting Acequia Llano de San Juan Nepomuceño Association commissioner Bonifacio Vasquez. Pedestrian survey began immediately following this meeting. During survey, archaeologists took photographs of the ditch, and walked along the acequia alignment along the length of the proposed piping project, looking for evidence of archaeological materials and noting details of acequia context and construction. The precise route and alignment of the acequia were recorded via GPS during the fall of 2008 field visit, and verified during the current survey. The staging areas were surveyed during the May 23 survey, with Decker and Everhart walking transects with 10-meter transect intervals. Staging area boundaries were digitized using 2009 aerial imagery. One historic archaeological site, LA170127, and the acequia itself were recorded during survey. No isolated finds were encountered. All locational information, including acequia alignment and feature boundaries, was recorded with a Trimble Geo-XH GPS sub-foot unit.

#### Field Conditions

---

During the May 23, 2011 survey, average temperatures were in the 70s Fahrenheit, with sunny skies. Ground visibility varied widely depending on the location being surveyed. Visibility within the staging areas was fair, with 25-50% of the surface visible through the grass cover. In some areas, particularly around LA170127, rodent burrowing was intense and provided better ground visibility (50-75%). Visibility along the acequia segment was very poor, as a massive, linear pile of rounded cobbles removed from the ditch obscured the eastern bank. Slopes on either side of the ditch ranged from 45-75°, and were littered with additional loose stone. Walking along the eastern bank was treacherous, and walking along the western bank was not possible other than to walk the Forest Service road on the slope above the ditch. Given the slopes in the



area and the heavy disturbance from repeated ditch maintenance, the likelihood of cultural resources being present along the ditch was extremely low.

## Methods of Site Location and Site Recording

A pre-field check of the New Mexico Office of Cultural Affairs Archaeological Records Management Section's (ARMS) database on April 18, 2011 by Jeremy Decker indicated the presence of several archaeological sites within 0.5 miles of the project area, none of which intersect the project area. See Appendix A, Figure A.1 for the results of this ARMS search.

Standard survey methods, such as presence of features and artifacts, were used to identify historic properties. The alignment of the acequia, the locations of individual features, and the boundaries of proposed staging areas, were mapped using a hand-held Trimble Geo-XH sub-foot GPS unit. Site recording at LA170127 consisted of GPS mapping all features and photographing the site. Archaeologists took notes on what artifacts were present, but did not individually plot artifact locations. No datum stake was placed at the site. Site information was recorded on an LA site form.

## Photography and Documentation Methods

Digital photographs were taken at different points during the survey. Some of these photos have been incorporated into this document. Notes, photographs, and copies of the report are stored at the Corps' Albuquerque District office.

## Strategies Employed for Collection or Limited Tests

No artifact collection or testing was conducted as part of this project.

# CHAPTER 4

## RESULTS OF SURVEY

Jeremy T. Decker

### Location of Cultural Properties

---

The public disclosure of the location of archaeological sites on state and private lands is prohibited by Section 18-6-11.1 NMSA 1978. Public disclosure of archaeological site locations is federally prohibited by 16 USC 470hh (36 CFR 296.18). Confidential site location information is provided in Appendix A. Appendix A should be removed prior to public disclosure of this report.

### Acequia de Llano de San Juan Nepomuceño

---

The Acequia de Llano de San Juan Nepomuceño (HCPI 30307), with a non-adjudicated priority date of March 19, 1907, but likely dating back to ca. 1796, is located near the town of Llano, Taos County, New Mexico. The acequia provides irrigation water to approximately 1620 acres of cultivated land for 230 *parsientes*. Cultivated crops include orchards of fruit trees (apples, prunes, etc.), hay, alfalfa, and vegetable gardens (Bonifacio Vasquez, personal communication). The water diversion structure is located on the Rio Santa Barbara near the historic town of Hodges, approximately three quarters of a mile upstream of the project area. From the diversion, the water proceeds into the acequia madre, which extends in a generally northwesterly direction for a total distance of approximately 27,561 feet (5.22 miles) to the desagua at the border of Picuris Pueblo lands (Figure 4.1).

The Acequia de Llano de San Juan Nepomuceño consists of the aforementioned acequia madre and three primary laterals, which are considered as independent acequia systems. The system as originally constructed exhibited a traditional open earthen ditch form, without concrete or piping. Since its original construction, the ditch has seen no major modifications other than those accompanying routine maintenance and use (Bonifacio Vasquez, personal communication). At present, the entire system still operates as an open, earthen ditch.

Corps archaeologists conducted a cultural resources survey on May 23, 2011. The purpose of the survey was to examine staging areas and the segment of the ditch to be piped, and to document the current negative impacts being experienced by the acequia. Survey areas covered by the current project are shown in Figure 4.1.

The acequia's current function is impacted by heavy erosion along a stretch of ditch that winds along a steep slope. The slope is subject to frequent rockslides which deposit rock and sediment into the ditch, and damage the banks of the channel. Due to the volume of rock and the steepness of the adjacent slopes, the Association requires increasing time, labor, and money to repair and maintain this segment. In addition, the location of the problem area threatens the entire system, as no gates or laterals branch off the acequia madre until water is downstream of the project area. If this area were severely damaged, none of the 230 *parsientes* served by the ditch would receive water.

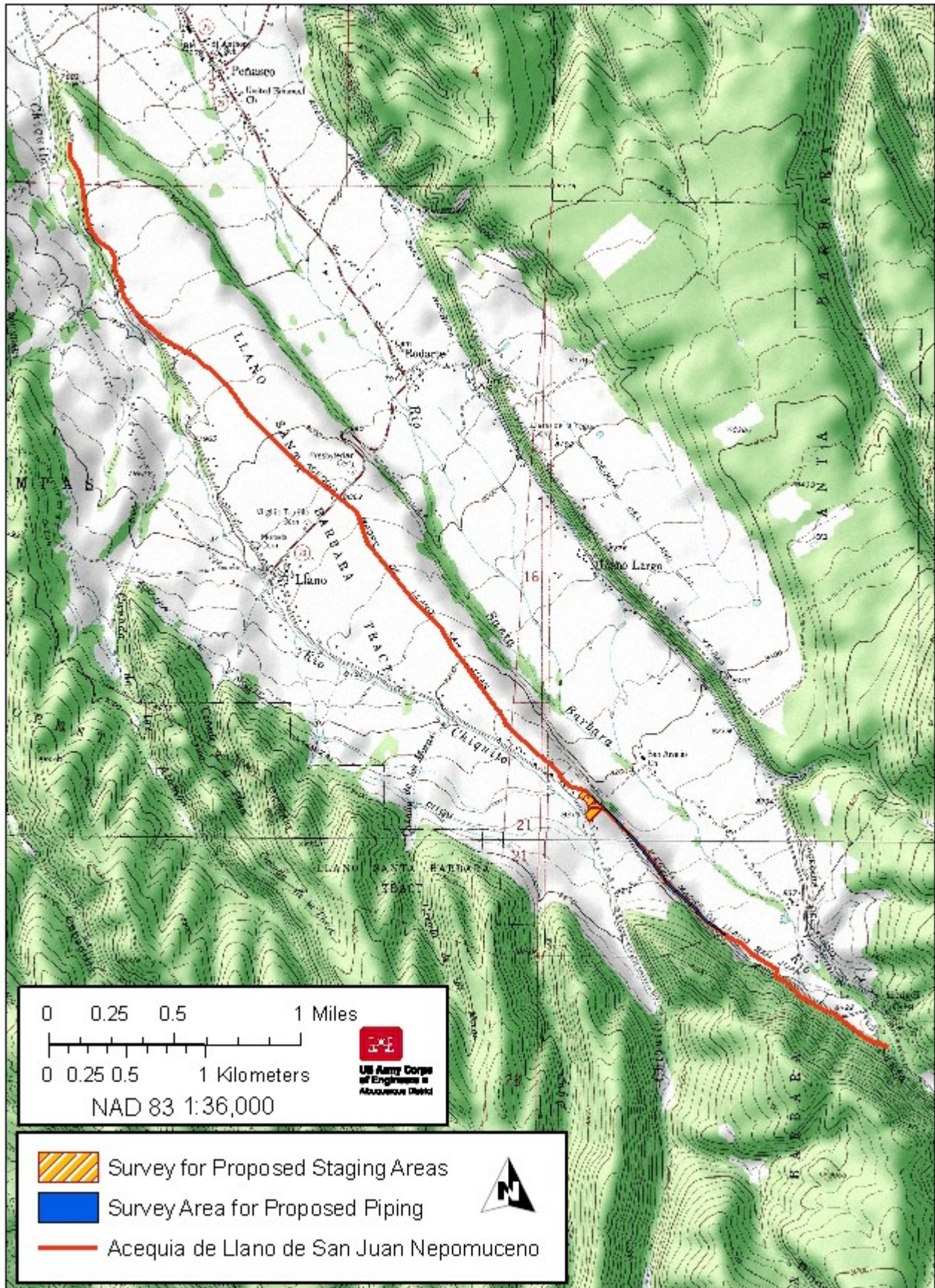


Figure 4.1. Total length of the acequia madre, showing staging areas and construction footprint. USGS 7.5' El Valle (36105-A6) and Peñasco (36105-B6).

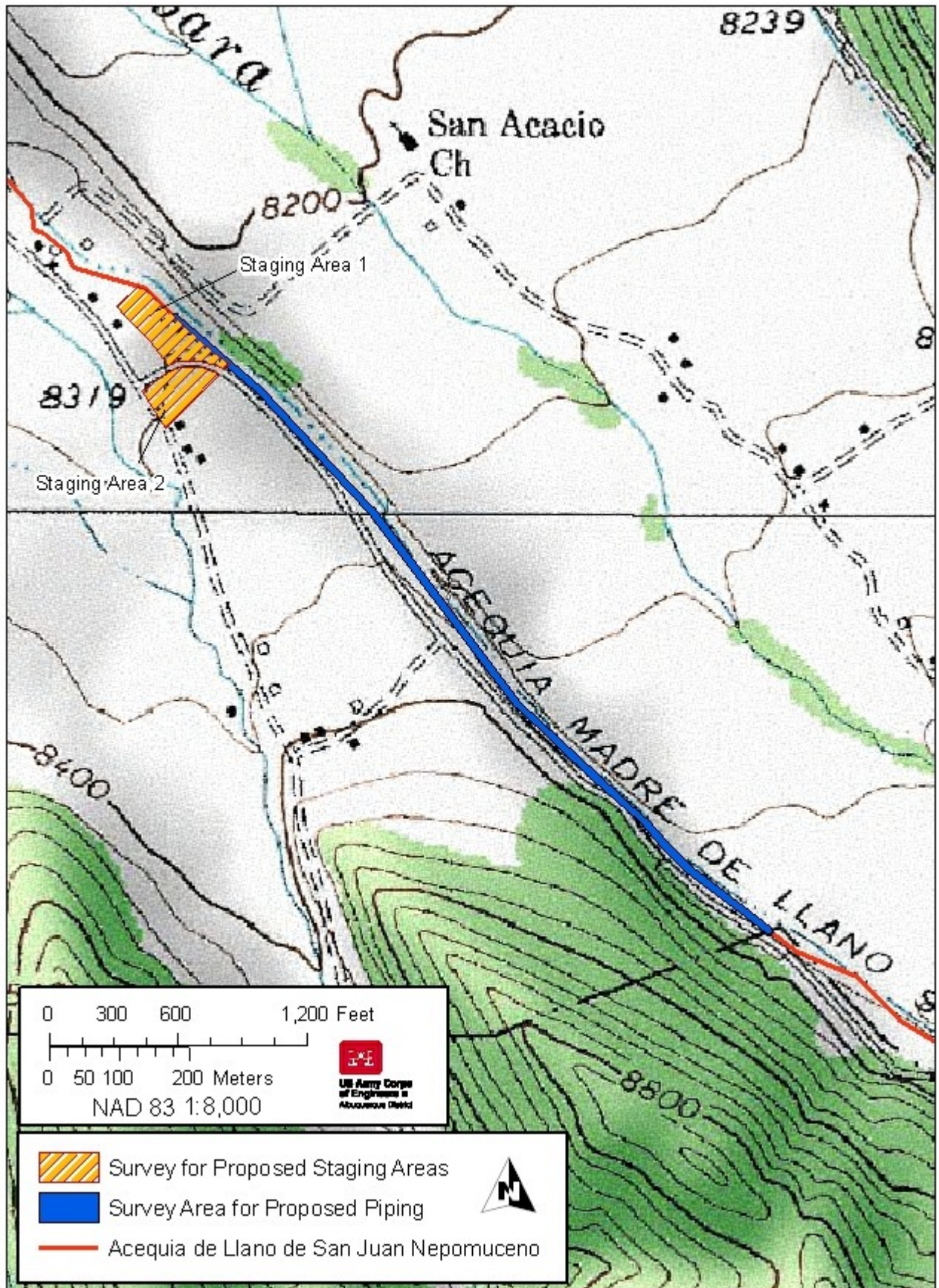


Figure 4.2. Project survey areas. USGS 7.5' El Valle (36105-A6) and Peñasco (35106-B6).



(a)



(b)



(c)



(d)

Figure 4.3. Photographs showing the project area. (a) Overview of the ditch facing downstream. (b) View of the ditch from above. Note the volume of rock stacked on the opposite bank. (c) West bank of the ditch looking upstream. Photo shows the volume of rock continuing to erode from the steep slope above the ditch. In other portions of the project area, the steep western bank is more than twice as high as the bank shown. (d) View down the extremely steep slope below the ditch. A number of rocks were thrown down slope in previous years, but recently landowners located down slope have requested that rocks not be thrown onto their land.

## Proposed Staging Areas and LA170127

---

There are two proposed staging areas for this project: one is an approximately 0.38-acre plot located on land privately owned by Franklin Schwentker, the other is an approximately 0.52-acre area located on land privately owned by an unknown party; both are located at the downstream end of the project area (Figure 4.4). Intensive pedestrian survey showed no cultural materials in the 0.52-acre area, and identified one historic property, LA170127 (see description in the following section), near the other staging area. The smaller staging area is preferred by the project proponents because it is off the county road (Upper Llano Road) and slightly more secure. In addition, because it is on the same side of the road as the acequia it will not be necessary to cross the county road during construction, limiting safety concerns. Both staging areas would be used exclusively for the stockpiling of materials related to construction, and for parking vehicles.

The first staging area, on land owned by Franklin Schwentker, is a patch of land bounded on the north and west by a lateral ditch and small field ditch respectively (Figure 4.5). To the east of the plot is the heavily treed bank of the Acequia Madre, and the area is bounded on the south by the remains of a historic structure, LA170127. This first staging area is a narrow, grassy area accessed by a two track road from the main Upper Llano Road (Figure 4.6). The area is used as a parking area for Acequia Association members accessing this stretch of the ditch, and is also used as an impromptu dump site, particularly within LA170127 (Bonifacio Vasquez, personal communication). Surface visibility was fair, with grass cover being broken up by rodent burrows and disturbance from general use of the area. This staging area is the preferred staging area for the project.

The second proposed staging area is located directly south of the Upper Llano Road across from Staging Area 1; land ownership for this parcel could not be determined (Figure 4.7). Vegetation and visibility is very similar to that of Staging Area 1. The staging area is bounded by the Upper Llano Road on the north and east, by fenced private property on the south, and by a small field ditch on the west. The plot of land has no apparent function at present, but its location on the small field ditch may be an indication that it has been used as an irrigated field or pasture in the past. This staging area, while convenient, is completely open to the county road, and is considered to be a secondary option. Some recent trash was noted in the area, but no historic cultural materials were documented in Staging Area 2. Because ownership of this parcel could not be determined, it will not be used as a staging area for this project.



Figure 4.4. Aerial view of Staging Areas 1 and 2, on property owned by Franklin Schwentker and an unknown owner respectively.



Figure 4.5. Staging Area 1, facing north and looking up the west side of the proposed staging area along a small field ditch.



Figure 4.6. Staging Area 1, facing northwest. The two track road leads to the staging area near the telephone pole.





Figure 4.7. Staging Area 2, facing southeast.

## LA170127

---

LA170127 is a newly recorded site containing the heavily disturbed remnants of an historic structure with associated features and artifacts, likely dating to the mid-20<sup>th</sup> century. The site measures 62m NW/SE x 40m SW/NE (1920m<sup>2</sup>). The site is located within the survey block for Staging Area 1 at an elevation of 8320ft AMSL. This area contains relatively dense grass cover and several currant bushes. The Acequia de Llano de San Juan Nepomuceño runs adjacent to the eastern boundary of the site. Two other ditches, a small field ditch to the west, and a lateral ditch to the north also run near the site. All of these ditches would have been in existence during occupation of the structure. A site location map for LA170127 is included in Appendix A, Figure A.2.

The site consists of four total features including the main structure (Feature 1), two small, rectangular berms likely representing outbuildings (Features 2 and 3), and a stone alignment (Feature 4). The main structure measures 28x20m at its largest dimensions (Figure 4.8). The structure appears to have been a domestic home, constructed with a concrete pad foundation (Figure 4.9) and a stucco exterior. Wood is scarce on the site, but wooden framing is evident. Nails used in construction are all modern wire nails, and stucco was applied using a typical chicken wire overlay. The chicken wire noted on the site looked almost new, with no indications of rust. Several rooms are evident, but disturbance within the feature makes it difficult to discern interior walls. In general, it appears the structure may have had between 2 and 4 rooms. At the time of fieldwork, the structure was completely collapsed, and vegetation had subsequently grown over much of the remaining mound.



Figure 4.8. Left: mounded remains of the Feature 1 at LA170127, with two track access road in foreground. Staging Area 1 is in the background near the power pole. Right: south end of Feature 1, note the stucco fragments and heavy rodent disturbance.



Figure 4.9. Remnants of concrete foundation at Feature 1.

Features 2 and 3 are located directly north of the main structure (Figure 4.10). Both features are small, rectangular berms with interior depressions. Feature 2 measures 430x310cm, and Feature 3 measures 790x320cm. The function of both features is unknown, but they may be the foundational remains of two outbuildings. No evidence was found to suggest that the features are cisterns, but this is a possibility. The final feature, Feature 4, is a loose alignment of stones measuring 23m in length (Figure 4.11). The stones are the same local quartzitic rock found within the Acequia de Llano de San Juan Nepomuceño. The stone alignment looks very similar to features on nearby properties where occupants have piled stone from fields along fence lines. If this is the case, then this may be an indication that inhabitants of the site were using the immediate area as a garden or field. The alignment may also be the remnants of a stone fence alignment.

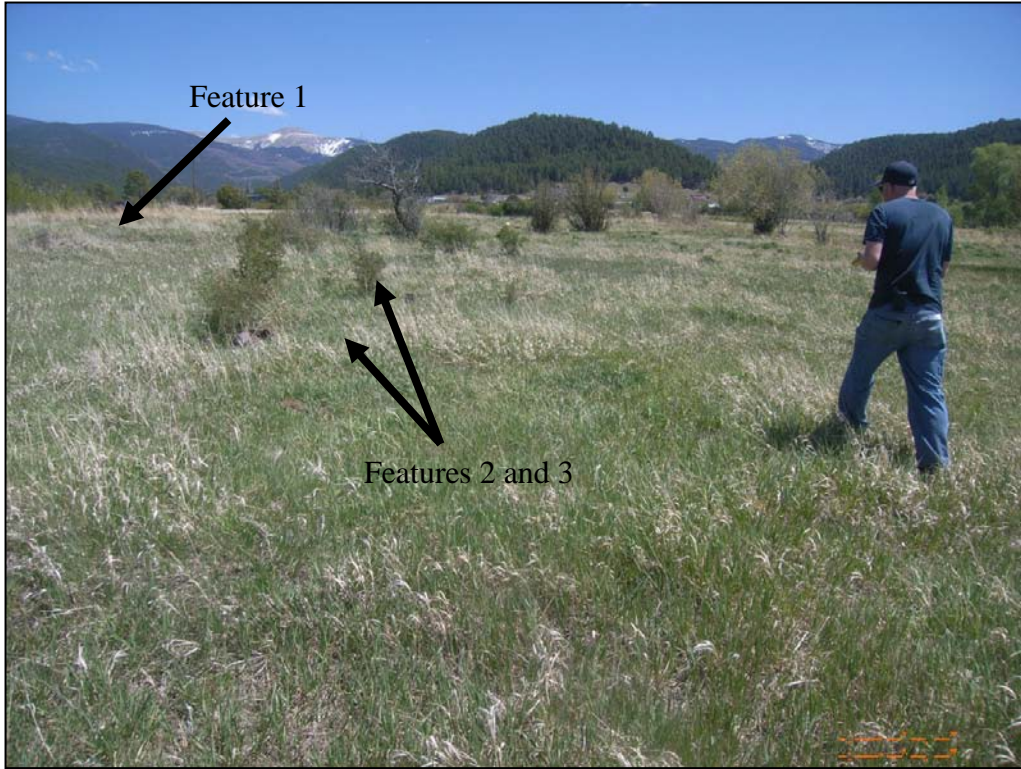


Figure 4.10. Features 2 and 3. Visible from Staging Area 1 by the occurrence of small currants within the features.



Figure 4.11. Feature 4. Loose stone alignment extending southwest from Feature 1.

Artifacts on the site consist mostly of stucco fragments, clear window glass fragments, unidentified metal fragments and wire nails that appear to be modern in age, but could possibly be 50 years old. Modern trash is common on the site as well (beer bottles, wrappers, etc.), with some evidence that local inhabitants have used the area for some limited trash dumping (Bonifacio Vasquez, personal communication). One cast iron stove fragment was recorded. Interestingly, no domestic trash such as cans or crockery was located as one would expect with a domestic structure.

LA170127 is in poor condition. The main structure is completely collapsed, perhaps even bulldozed, and areas within the feature appear hummocky, possibly resulting from excavation. This may be a result of the heavy rodent burrowing within the site, but may also be related to trash dumping activities. A small two-track road cuts through the eastern edge of Feature 1, exposing part of the concrete foundation within the two-track. The area directly to the south of the structure is commonly used as a parking area for people accessing the acequia, and the generally degraded appearance of the area, coupled with the amount of modern trash indicates that this area is heavily used. Given the limited amount of structural material present at the site, it is likely that materials were salvaged from the main structure.

While exact dates for the occupation of the site were not obtained, two lines of evidence provide a rough framing of the dates of occupation for the site. Though unclear when the structure collapsed, the condition of the remaining stucco and chicken wire suggests that new stucco was applied to Feature 1 fairly recently (e.g. within the last 15 years). Review of available historical maps shows that two structures are shown on the 1964 edition USGS 7.5' topographical map (Peñasco) within the boundaries of LA170127, indicating that structures were present there at least in 1964. Because further information about the site's original construction date could not be obtained, the structure was assumed to be 50 years old and was documented as a site. It is clear, however, that the techniques used to construct the main structure at LA170127 are modern in nature, and no evidence was encountered to suggest that the structure has any antiquity beyond a mid- to late 20<sup>th</sup> century occupation.

Subsurface deposits containing additional information that may aid in determining the dates of occupation for the site may be present, but were not observed. The concrete foundation at Feature 1 indicates that subsurface deposits are unlikely within the main structure, but Features 2 and 3 possess good potential for buried materials. Unfortunately, the damage to the site suggests that any information potential the site may have possessed has likely been compromised.

## Interpretive Summary

---

In sum, the survey examined two proposed staging areas, and the portion of the Acequia de Llano de San Juan Nepomuceño to be impacted by the proposed project that would include installation of buried pipe along a 4,000 foot section. The survey identified two historic properties including the acequia itself, and LA170127, a badly dilapidated structural site dating to the latter half of the 20<sup>th</sup> century. No isolated occurrences were identified on survey. Site LA170127 is located directly to the south of, and within the access road to, Staging Area 1. Other than driving through the site on the two-track road, it is the intent of the project proponents to avoid stockpiling within the site, as the remains of the structure make it difficult to stack materials. In addi-

tion, the Association would like to stack materials as far from the main road as possible to increase security, so stockpiling in the area north of the site is preferable to working within the site which is much closer to the county road.

## CHAPTER 5

# SUMMARY AND RECOMMENDATIONS

Jeremy T. Decker

### Evaluation and Statement of Significance

---

The present survey examined the 4,000 foot segment of the Acequia de Llano de San Juan Nepomuceño alignment to be impacted by the proposed piping project, as well as the two proposed staging areas. The project is on private land owned by members of the Acequia San Juan de Nepomuceño Association and within the acequia's right of way.

The Acequia de Llano de San Juan Nepomuceño is located in Taos County, with its headgate on the Rio Santa Barbara near the historic logging town of Hodges. The acequia madre extends approximately northwest for a distance of 27,561 feet until it empties back into the river at the desagua on the boundary of Picuris Pueblo lands. The project will affect a total of 14.5 percent of the ditch. The survey identified one new archaeological site, LA170127, the remnants of a mid-20<sup>th</sup> century house with associated features, in addition to the Acequia de Llano de San Juan Nepomuceño itself. No isolated finds were encountered.

The Corps, in cooperation with the Acequia Llano de San Juan Nepomuceño Association, proposes to construct 4,000 feet of new five-foot diameter reinforced concrete piping (RCP) within the existing footprint of the ditch. Once placed, the pipe will be covered by two feet of additional fill to protect the pipe and allow vehicles to drive down the ditch alignment on top of the pipe. Manholes will be spaced every 400 feet along the pipe to allow access for maintenance. A trash rack structure will be placed on the upstream entrance to block large materials from entering the pipe. The proposed project is being undertaken to address and alleviate negative impacts currently being experienced by the acequia system that impair the acequia's function, create increasing damage, and generate labor and maintenance requirements that are beyond the Association's ability to address both economically and logistically. Primary negative impacts include:

- 1) Erosion of numerous rocks down slope from an adjacent hillside into the ditch, resulting in blockage and causing erosion within the earthen ditch.
- 2) The detrimental impacts of severe erosion resulting in rocks being deposited into the ditch endanger the acequia's continued function and jeopardize the continued use of this acequia segment; because this segment is the upstream portion of the acequia, the entire acequia system is impacted. Without some modification to the ditch, it is likely that the rocks will severely limit the efficiency of water delivery to all 230 *parsientes* located downstream of the project area. Piping this extent of the acequia would eliminate the need to continually clean this segment of ditch, resulting in more efficient flows, and decreased labor investment from acequia Association members.

The Corps determines that the Acequia de San Juan de Nepomuceño, which has a non-adjudicated priority date of March 19, 1907, but almost certainly dates to 1796, is eligible for listing on the National Register of Historic Places under Criterion (a) of 36 CFR 60.4, as irrigation features such as this one made possible the settling and farming of the area, and is thus associated with events that have made a significant contribution to the broad patterns of our history.

Also identified in the project area, LA170127 is the remnants of an historic structure in poor condition. The site, dating to the mid-20<sup>th</sup> century, is located directly south of, and within the access road to Staging Area 1. While some information potential may still exist at the site, the heavy use of the area for parking and as a dump, and the fact that artifacts at the site are generally modern suggest that the integrity of the site has been compromised, and that it is unlikely that historically significant materials are present at the site in the first place. For these reasons LA170127 is considered ineligible for inclusion in the National Register of Historic Places, and thus, will not be considered further in this report.

## Effect Determination

---

The Secretary of the Interior's Standards for the treatment of historic properties include four types of treatments: *preservation*, *rehabilitation*, *restoration*, and *reconstruction* (36 CFR 68; see also Weeks and Grimmer 1995). The goal of the proposed project is to *rehabilitate* a portion of the acequia madre so that it may continue to be used effectively for its historic function, taking into account the realities of present technical and economic challenges. The following section considers first the definition of "rehabilitation" in relation to the Secretary of Interior's standards; it will then assess adverse effects specifically in relation to the proposed project.

## Standards for Rehabilitation

"Rehabilitation" is defined as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving *those portions and features of the property which are significant* to its historic, architectural, and cultural values" (36 CFR 68.2[b], emphasis added). This definition specifically targets the treatment of those existing elements of a property that are significant. The Secretary of the Interior's standards for rehabilitation ("Standards") under Department of Interior regulations listed as follows, "are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility" (36 CFR 67.7).

The central theme underlying these standards is that historically significant materials and elements which remain a part of the structure must not be damaged, destroyed or removed. In addition, permissible additions to the system must be reversible, such that the property could be returned to its historic configuration at some future date. The full set of Secretary's standards is presented below, with language relating to treatment of currently-existing historic elements in bold:

1. A property shall be used for its historic purpose or be placed in a new use that requires **minimal change to the defining characteristics** of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The **removal of historic materials or alteration of features and spaces that characterize a property** shall be avoided.
3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.
4. Most properties change over time; those changes **that have acquired historic significance in their own right** shall be retained and preserved.
5. **Distinctive** features, finishes, and construction techniques or examples of craftsmanship **that characterize a property** shall be preserved.
6. Deteriorated **historic** features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a **distinctive** feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.
7. Chemical or physical treatments, such as sandblasting, that cause **damage to historic materials** shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.
8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.
9. New additions, exterior alterations, or related new construction **shall not destroy historic materials** that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.
10. New additions and adjacent or related new construction shall be undertaken in such a manner that **if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.**

## Assessment of Adverse Effects

Under 36 CFR 800.5, Assessment of Adverse Effects, examples are provided in subsection (2) and include seven examples of adverse effects to historic properties. This project has the potential to affect the Acequia de Llano de San Juan Nepomuceño. The criteria of adverse effect pursuant to the seven examples of types of adverse effects as listed in 36 CFR 800.5 (a)(2) are applied below.

- (i) *Physical destruction of or damage to all or part of the property;*

The proposed construction would be confined to approximately 4,000 feet of the acequia itself, which will not destroy the property but will alter this segment from open ditch to buried pipe and associated maintenance structures accessed by manhole covers. No water control structures (field gates, culverts, etc.) exist within this segment of the ditch, and thus, none will be damaged,



destroyed or otherwise altered. The ditch itself, though altered, will still reside in the same location, and can be returned to its original state.

The two staging areas will be used only for stockpiling and storing equipment and materials, and will not involve any earth moving, ground disturbance, or excavation of sediments in those areas. Use of the staging areas will not affect the ditch itself in any way.

*(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines;*

The purpose of this project is to rehabilitate the acequia so that it may continue to function well in its current cultural context (per definition of "rehabilitation" above). The proposed project would affect one element, the current "open earthen ditch" form of the Acequia de Llano de San Juan Nepomuceño. 4,000 feet of piping constitutes 14.5 percent of the total length of the acequia madre. While this is a significant portion of the acequia that will experience major alteration for the first time, other parts of the acequia madre *not* impacted by this project do retain the original historic "open earthen ditch" form, currently constituting 85.5 percent of the acequia madre. In addition, the overall acequia system continues to operate as an open earthen ditch, including all three major laterals and all field ditches served by the acequia madre. These improvements would provide for the efficient, timely and equitable delivery of irrigation water to downstream portions of the ditch during critical irrigation times of the growing season. With rehabilitation, the acequia system will function as intended, as well as reducing the high costs of maintenance.

At no time during the project will the function or alignment/location of the ditch be altered. All parts of the system outside the project area that currently retain the earlier "open earthen ditch" form will retain that historic form and will not be altered by the current project. All portions of the ditch outside the area to be piped would remain eligible. Further, the addition of piping is reversible; if removed in the future, the ditch could be returned to its historic open-ditch form and **the essential form and integrity of the property would be unimpaired** (Standard #10). It is the belief of the Corps that the alterations made to the ditch as a result of this project, because they are reversible, will not represent destruction, damage, or removal of any currently-existing historic material or element from the acequia.

Overall, the rehabilitation of this section of ditch is consistent with Standard 1, as the acequia system will cease to function without rehabilitation, of which piping is the most economically and technically viable. It is of critical importance to reiterate that the project area is located *upstream of all gates, laterals and ditches* served by the acequia madre, and thus, without rehabilitation will hinder water service to all *parsientes* served by the system, and will no longer function in its historic capacity.

*(iii) Removal of the property from its historic location;*

This category does not apply to this project. The acequia will remain in its current location and will retain its alignment.

*(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;*

The proposed project will alter the open ditch form of 4,000 feet of this segment of the acequia. This extent constitutes only 14.5 percent of the current acequia madre (and an even smaller percentage of the total system), and all other portions of the ditch system that currently retain the historic "open earthen ditch" form will remain unchanged by the proposed project. This includes the remaining 23,561 feet of the acequia madre, all three major laterals stemming from the acequia madre and all field ditches currently in use. In addition, in contrast to other areas of the ditch, the segment to be piped is located in an area that is very difficult to see, and even more difficult to access. This means that while piping of other areas of the ditch might introduce visual elements that would adversely alter the character of the ditch, changing this section to a covered pipe design will be very difficult to see, and thus will have less of an impact on the character of the acequia.

Overall, the area to be piped is small in relation to the total size of the acequia system, and is located along a slope that inhibits the ability to see the changes to that section of ditch. While the project will change a small portion of the ditch, the proposed project will not change the character and purpose of the acequia's use as a conveyance for irrigation water. The ditch will be altered, but the original alignment will be preserved, and if the Association so desired, the piping could be removed and the ditch returned to its original open earth form.

*(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;*

The acequia alignment traverses private land consisting of active agricultural fields owned largely by acequia Association members, the project proponents. The land through which the acequia runs consists of active agricultural fields. As stated above, the ditch segment to be piped occurs on a very steep slope that is obscured from the casual observer. In general, only Association members would see, or have access to the piped area. The visual aesthetics of the open ditch would be preserved in other areas, and only affected where they cannot contribute to the overall system in the first place.

*(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and*

This category does not apply to this project.

*(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.*

This category does not apply to this project.

## Summary and Recommendations

---

The Acequia de Llano de San Juan Nepomuceño system is eligible for nomination to the National Register of Historic Places and the New Mexico Register of Cultural Properties. The proposed project seeks to rehabilitate the acequia so that it may continue to function in its current context providing agricultural irrigation. While the preferred method of dealing with the issues facing the Association may be to continue to find ways to manually clean the ditch, thus preserving its open ditch configuration, continuing with the current maintenance activities would not address the serious maintenance issues impacting the acequia, and as such would not be feasible technically or economically (cf. 36 CFR 67.7), given the realities of an aging and shrinking acequia association membership. Realistically, this rehabilitation is necessary in order to ensure that the acequia can continue to function as it historically has, providing irrigation water to some 230 *parsientes* across 1620 acres.

Piping the ditch will affect it. However, in relation to Section 106 of the NRHP, the Corps is of the opinion that the proposed project will result in **no adverse effect to historic properties** for the following reasons:

- The current detrimental impacts of severe erosion resulting in frequent rock fall, include numerous rocks falling into the ditch and decreasing its ability to move water efficiently downstream, as well as those same rocks causing damage to the banks of the ditch. Rock fall within this section severely hinders adequate function of the acequia and jeopardizes the continued use of this segment. This would be severely detrimental to the overall system, as this segment of ditch is located upstream of all potential outlets, meaning that a failure here would cut off water delivery to the entire system.
- The project will alter a single element of the acequia: its form. While this section of ditch will cease to operate as an open earth ditch, the section to be piped represents only 14.5 percent of the acequia madre, and an even smaller percentage of the total system. The remainder of the system will continue to operate as an open earth ditch. The trade off is that a small portion of the ditch will be altered in a manner that remains reversible, and the total system will benefit in that maintenance needs for this section will be drastically reduced, along with the likelihood of total system failure.
- The acequia segment does retain integrity of alignment and function, both of which are active contributing elements to the ditch's eligibility. Neither of these elements will be changed or adversely affected by the proposed project.
- This project satisfies the Secretary's standards for rehabilitation of historic structures. The installation of buried pipe in place of the current concrete lining is reversible such that "if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired," as specified in the Secretary's standards (36 CFR 67.7). Future removal of the pipe would allow a return to the historic open earthen ditch form. It is the belief of the Corps that the alterations made to the ditch as a result of this project, because they are reversible, will not represent destruction, damage, or removal of any currently-existing historic material or element from the acequia.

- While the project will alter the acequia's form, it will preserve other factors relevant to its eligibility for the NRHP. The proposed project is thus a means of preserving the continued use of the acequia in its historic cultural context by preserving its alignment and function in a manner that is economically and technically feasible (cf. 36 CFR 67.7). All portions of the acequia system that do retain the earlier historic "open earthen ditch" form will remain unaltered by this project, and will retain their eligibility for the NRHP.

The Corps therefore is of the opinion that the proposed Acequia de Llano de San Juan Nepomuceno project will have **no adverse effect to historic properties**. Should previously undiscovered artifacts or features be unearthed during construction, work will be stopped in the immediate vicinity of the find, a determination of significance made, and further consultation conducted in coordination with the New Mexico State Historic Preservation Officer and with Native American groups that may have concerns in the project area to determine the best course of action.

*This page was intentionally left blank*

## REFERENCES

- Ackerly, Neal W.  
1996 *A Review of the Historic Significance of and Management Recommendations for Preserving New Mexico's Acequia Systems*. Report prepared for the Historic Preservation Division. Dos Rios Consultants, Inc., Silver City, NM.
- Allen, J. W. and C. H. McNutt  
1955 A Pithouse Site near Santa Ana Pueblo, New Mexico. *American Antiquity* 20(3):241–255.
- Anschuetz, K.F.  
1984 *Prehistoric Change in Tijeras Canyon, New Mexico*. Master's thesis, Department of Anthropology, University of New Mexico, Albuquerque.
- Brown, David E.  
1982 *Desert Plants: Biotic Communities of the American Southwest-United States and Mexico*. University of Arizona, Superior, Arizona.
- Brown, Donald N.  
1979 Picuris Pueblo. In *Handbook of North American Indians, Vol. 9: Southwest*. Edited by Alfonso Ortiz. Pp. 268-277.
- Castano de Sosa, Gaspar  
1965 *A Colony on the Move: Gaspar Castano de Sosa's Journal, 1590-1591*. Edited and translated by Albert H. Schroeder and Dan S. Matson. The School of American Research, Santa Fe.
- City.com 2011. <http://www.city-data.com/city/Peñasco-New-Mexico.html>
- Cordell, Linda S  
1978 *A Cultural Resources Overview of the Middle Rio Grande Valley, New Mexico*. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque and United States Department of the Interior, Bureau of Land Management, New Mexico State Office, Santa Fe.
- 1979 Prehistory: Eastern Anasazi. In: *Handbook of North American Indians, Vol. 9, Southwest*. Edited by Alfonso Ortiz. Pp. 131-151.
- Crown, Patricia L., Janet D. Orcutt, and Timothy A. Kohler  
1996 Pueblo Cultures in Transition: The Northern Rio Grande. In *The Prehistoric Pueblo World, AD 1150-1350*, edited by Michael A. Adler, pp. 188-204. University of Arizona Press, Tucson.

- deBuys, William  
 1985 *Enchantment and Exploitation: The Life and Hard Times of a New Mexico Mountain Range*. University of New Mexico Press, Albuquerque.
- Edelman, Sandra A  
 1979 San Ildefonso Pueblo. In *The Handbook of North American Indians, Volume 9: Southwest*, edited by Alfonso Ortiz, pp. 308-316. Smithsonian Institution, Washington.
- Espinosa, J. Manuel  
 1988 *The Pueblo Indian Revolt of 1696 and the Franciscan Missions in New Mexico*. University of Oklahoma Press, Norman and London.
- Feidel, Stuart J.  
 1999 Older than We Thought: Implications of Corrected Dates for Paleoindians. *American Antiquity* 64:95–115.
- Fenneman, N. M. and D. W. Johnson  
 1946 *Physical Divisions of the United States*. Special map, 1:7,000,000 scale, U.S. Geological Survey, Washington, D.C.
- Hackett, Charles W., editor  
 1923-1937 Historical Documents Relating to New Mexico, Nueva Vizcaya and Approaches Thereto, to 1773. Adolph F.A. Bandelier and Fanny Bandelier, colls. 3 vols. *Carnegie Institution of Washington Publication* 330. Washington.
- Hammond, John F. and Agapito Rey (eds)  
 1940 *Narratives of the Coronado Expedition, 1540-1542*. University of New Mexico Press, Albuquerque.
- Irwin-Williams, Cynthia  
 1973 *The Oshara Tradition: Origins of Anasazi Culture*. Eastern New Mexico University Contributions in Anthropology No. 5, Vol. 1. Portales.
- Jenkins, Myra E.  
 1966 Taos Pueblo and its Neighbors, 1540-1847. *New Mexico Historical Review* 41(2):85-114.
- Julyan, Robert  
 1996 *The Place Names of New Mexico*. University of New Mexico Press, Albuquerque.
- Kelson, K. I. and S. S. Olig  
 1995 Estimated rates of Quaternary crustal extension in the Rio Grande rift, northern New Mexico. Pages 9-12 in: Bauer, P. W., B. S. Kues, N. W. Dunbar, K. E. Karlstrom, and B. Harrison (eds.). *Geology of the Santa Fe Region, New Mexico*. New Mexico Geological Society Guidebook, 46th Field Conference, September 27-30, 1995.

- Kessell, John L., Rick Hendricks, and Meredith Dodge, editors  
1998 *Blood on the Boulders: The Journals of Don Diego de Vargas, New Mexico, 1694-97*.  
Two volumes. University of New Mexico Press, Albuquerque.
- Kidder, A. V.  
1924 *An Introduction to the Study of Southwestern Archaeology, with a Preliminary Account of the Excavations at Pecos*. Papers of the Southwest Expedition I (reprinted in 1962 by Yale University Press, New Haven).
- Knaut, Andrew L.  
1995 *The Pueblo Revolt of 1680: Conquest and Resistance in Seventeenth-Century New Mexico*. University of Oklahoma Press, Norman and London.
- Kulisheck, Jeremy R.  
2002 Mobility as Resistance: Pueblo Responses to Spanish Colonialization in Seventeenth Century New Mexico, USA. Paper presented at the the 67th Annual Meeting of the Society for American Archaeology, Denver.
- Myrick, David F.  
1970 *New Mexico's Railroads: An Historical Survey*. Colorado Railroad Museum (Colorado Railroad Historical Foundation, Inc.), Golden CO.
- Natural Resources Conservation Service  
2011 Online Soil Survey for Taos County. <http://websoilsurvey.nrcs.usda.gov/app/>
- Pratt, Boyd C., Charles D. Biebel, and Dan Scurlock  
1988 *Trails, Rails, and Roads: The Central New Mexico East-West Transportation Corridor Regional Overview*. New Mexico Historic Preservation Division, Santa Fe.
- Reed, Erik K.  
1943 The Problem of Protohistoric Picuris. *El Palacio* 50(3):65-68.
- Sando, Joe S.  
1979 The Pueblo Revolt. In *The Handbook of North American Indians, Volume 9: Southwest*, edited by Alfonso Ortiz, pp. 194-197. Smithsonian Institution, Washington.
- Schmader, Matthew F.  
1994 *Early Puebloan Site Structure and Technological Organization in the Middle Rio Grande Valley, New Mexico*. Unpublished Ph.D. dissertation, University of New Mexico, Albuquerque.
- Shepard, Anna O.  
1942 *Rio Grande Glaze Paint Ware: A Study Illustrating the Place of Ceramic Technological Analysis in Archaeological Research*. Contributions to American Anthropology and History, No. 39. Carnegie Institution of Washington Publication 526, Washington, D.C.



- Schroeder, Albert H.  
1979. Pueblos Abandoned in Historic Times. In *The Handbook of North American Indians, Volume 9: Southwest*, edited by Alfonso Ortiz, pp. 236-254. Smithsonian Institution, Washington.
- Simmons, Marc  
1979 History of Pueblo-Spanish Relations to 1821. In *The Handbook of North American Indians, Volume 9: Southwest*, edited by Alfonso Ortiz, pp. 178-193. Smithsonian Institution, Washington.
- Spicer, Edward H.  
1962 *Cycles of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the Southwest, 1533-1960*. University of Arizona Press, Tucson.
- Stuart, David E. and Rory P. Gauthier  
1988 *Prehistoric New Mexico: Background for Survey*. University of New Mexico Press, Albuquerque.
- Tainter, J. A.  
1987 The Development and Collapse of Prehistoric Societies: A Perspective from Central New Mexico. In *Secrets of a City: Papers on Albuquerque Archaeology, In Honor of Richard A. Bice*, edited by A. V. Poore and J. Montgomery, pp. 116–147. The Archaeological Society of New Mexico: 13, Ancient City Press, Santa Fe.
- Thomas, Alfred B., editor and translator  
1935 *After Coronado: Spanish Exploration Northeast of New Mexico, 1696-1927; Documents from the Archives of Spain, Mexico and New Mexico*. University of Oklahoma Press, Norman.
- U.S. Geological Survey  
2011 Real-time water data for Embudo Creek at Dixon, NM.  
[http://waterdata.usgs.gov/nm/nwis/uv/?site\\_no=08279000&PARAMeter\\_cd=00065,00060](http://waterdata.usgs.gov/nm/nwis/uv/?site_no=08279000&PARAMeter_cd=00065,00060).
- Vetancurt, Augustin de  
1960 *Teatro mexicano. ( Colección Chimalistac de libros y documentos acerca de la Nueva Espana, 8-11)*. J. Porrúa Turanzas, Madrid.
- Weber, David J.  
1982 *The Mexican Frontier, 1821-1846: The American Southwest Under Mexico*. University of New Mexico Press, Albuquerque.
- Weeks, Kay D. and Anne E. Grimmer  
1995 *The Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Build-*

*ings*. U.S. Department of the Interior, National Park Service Cultural Resource Stewardship and Partnerships Heritage Preservation Series, Washington.

Wendorf, Fred and Erik K. Reed

1955 An Alternate Reconstruction of Northern Rio Grande Prehistory. *El Palacio* 62:131–173.

Western Regional Climate Center

2011 *New Mexico Climate Summaries for Cooperator Stations*. <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm6705>.

July 12, 2011

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

Ms. Jan Biella  
Interim State Historic Preservation Officer  
New Mexico Department of Cultural Affairs  
Historic Preservation Division  
Bataan Memorial Building  
407 Galisteo Street, Suite 236  
Santa Fe, New Mexico 87501

Dear Ms. Biella:

Pursuant to 36 CFR Part 800, the U.S. Army Corps of Engineers (Corps), Albuquerque District, is seeking your concurrence in our determinations of eligibility, and our finding of no adverse effect to historic properties for a proposed rehabilitation of the Acequia de Llano de San Juan Nepomuceño (Acequia), Taos County, New Mexico. The Corps, at the request of the New Mexico Office of the State Engineer/Interstate Stream Commission and the Acequia Llano de San Juan Nepomuceño Association (Association), is planning a construction project that would rehabilitate the Acequia. The proposed project would replace approximately 4,000 feet of open earthen ditch with underground concrete reinforced piping. The project is authorized under Section 1113 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662; 33 U.S.C. 2201 et. seq.), as amended. The Act authorizes the Corps' Acequia Rehabilitation Program for the restoration and rehabilitation of irrigation ditch systems (acequias) in New Mexico.

The project area is located along the Rio Santa Barbara, a tributary of Embudo Creek, and work will take place approximately 1.5 miles southeast of the community of Llano (see enclosed Figure 1). Llano is located 2 miles south of Peñasco, and approximately 20 miles south of Taos. The project area is located on unplatted lands within the Llano Santa Barbara Tract of the Santa Barbara land grant. The project area is found in part on both the El Valle (36105-A6) and Peñasco (36105-B6) UGSG 7.5' topographic quadrangle maps (1964 edition).

The Nepomuceño acequia has a non-adjudicated priority date of March 19, 1907, but almost certainly was constructed ca. 1796 concurrent with the founding of Llano. To date, the ditch system has remained essentially unaltered other than years of routine maintenance and operation. The acequia continues to operate as an open earthen ditch along its entire length. Irrigation water flows

are diverted from the Rio Santa Barbara into two primary irrigation ditches, the other being the Acequia del Llano de la Yegua (Yegua). The Yegua acequia irrigates the east side of the valley, while the Nepomuceño Acequia serves the west side. The Acequia measures about 27,561 feet (5.22 miles) in length that generally flows in a northwesterly direction from its diversion point near the historic town of Hodges, to the desagua at the boundary of Picuris Pueblo lands. Nepomuceño is an acequia madre, and delivers irrigation water to three primary lateral ditches. Nepomuceño itself serves 230 *parsientes*, and irrigates approximately 1620 acres of cultivated land and pasture.

The purpose of the project is to rehabilitate approximately 4,000 lineal feet of the acequia located in an extremely steep area that is subject to frequent rock slides. The project area is too steep to safely and practically bring in mechanical equipment for annual cleaning, and in recent years it has been impossible to locate a trained horse team to pull out the large boulders that fall from the steep gravelly slopes. In addition, the land owners downhill from the acequia in the problem area are not acequia members, and object to large rocks being rolled out of the acequia and into their property. The boulders are particularly detrimental to the system in that they impede flows within the ditch, and cause damage to the ditch banks as they erode down slope.

Rehabilitation includes constructing 4,000 feet of new five-foot diameter reinforced concrete piping (RCP) within the existing alignment of the segment of the ditch that is located on the steep slope. Once placed, the pipe will be covered by two feet of additional fill to protect the pipe and allow vehicles to drive down the ditch alignment on top of the pipe. Manholes will be spaced every 400 feet along the pipe to allow access for maintenance. A trash rack structure will be placed on the upstream entrance to block large materials from entering the pipe. Piping will affect 14.5 percent of the total length of the acequia. The proposed project would have no effect to the ditch alignment or function. Project construction would be scheduled during the non-irrigation season, with an expected duration of about four months. The Association would be responsible for operation and maintenance upon project completion. Piping will alleviate the need to annually clean this segment of the ditch, and will allow the ditch to continue to function properly, providing efficient water delivery to all 230 *parsientes*, and three primary lateral ditches located downstream from this segment.

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) for this project is considered to a relatively narrow corridor totaling 3.33 acres along the segment of the ditch to be piped. The width of the APE is limited to the Association's 36-foot

right-of-way (ROW). Steep slopes above and below the ditch limit ensure that work will only occur within a narrow corridor. In addition, a 1.73-acre area will be used as a staging area for materials and vehicles. The staging area is located immediately adjacent to the downstream end of the project area. The total APE for this project is 5.06 acres.

Pursuant to 36 CFR 800.4(b), Corps archaeologists Jeremy Decker and Gregory Everhart surveyed the project area on May 23, 2011 (see Enclosure 2). Enclosed for your review is the report titled "A 6.24-Acre Cultural Resources Inventory for the Acequia Llano de San Juan Nepomuceño, Taos County, New Mexico", by Jeremy T. Decker (NMCRIS 120895, Corps Report No. USACE-ABQ-2011-003). Two historic archaeological resources were observed during the survey, including the acequia system itself, and the remnants of a stucco home (LA170127) that was occupied in the mid-1900's (see enclosed Figure 2). No isolated occurrences were encountered.

LA170127 is a newly recorded site containing the heavily disturbed remnants of an historic structure with associated features and artifacts, likely dating to the mid-20th century (see Enclosure 3). The site consists of four total features including the main structure, two small, rectangular berms likely representing outbuildings, and a stone alignment. Artifacts on the site consist mostly of stucco fragments, clear window glass fragments, unidentified metal fragments and wire nails. All artifacts appear to be modern in age, but could possibly be 50 years old. Modern trash is common on the site as well (beer bottles, wrappers, etc.), with some evidence that local inhabitants have used the area for some limited trash dumping (Bonifacio Vasquez, personal communication). While exact dates for the occupation of the site were not obtained, it is clear that the techniques used to construct the main structure at LA170127 are modern in nature, and no evidence was encountered to suggest that the structure has any antiquity beyond a mid- to late 20th century occupation.

Consistent with the Department of Defense's American Indian and Alaska Native Policy, signed by Secretary of Defense William S. Cohen on October 20, 1998, and based on the State of New Mexico Indian Affairs Department's 2011 Native American Consultations List, American Indian tribes that have indicated they have concerns in Taos County were sent scoping letters regarding the proposed project. To date, the Corps has received no indication of tribal concerns that would impact this project; responses were received from the Hopi Tribe, the Navajo Nation, and the pueblo of Isleta, all of which indicate no tribal concerns at this time. No Traditional Cultural Properties are known by the Corps to occur within or adjacent to the project area.

The Corps considers the Acequia to be eligible for listing on the National Register of Historic Places (NRHP) under Criterion (a) of 36 CFR 60.4, as irrigation systems such as this one made possible the settling and farming of the area, and is thus associated with events that have made a significant contribution to the broad patterns of our history. Also identified in the project area, LA170127 is the remnants of an historic structure in poor condition. The site, dating to the mid-20th century, is located directly south of, and within the access road to the proposed staging area. While some information potential may still exist at the site, the heavy use of the area for parking and as a dump, and the fact that artifacts at the site are generally modern suggest that the integrity of the site has been compromised, and that it is unlikely that historically significant materials are present at the site in the first place. For these reasons LA170127 is considered ineligible for inclusion in the NRHP. We seek your concurrence in our eligibility determinations.

The purpose of this project is to rehabilitate the acequia so that it may continue to function well in its current cultural context. The proposed project would affect one element, the current "open earthen ditch" form of the Acequia de Llano de San Juan Nepomuceño. 4,000 feet of piping constitutes 14.5 percent of the total length of the acequia madre. While this is a significant portion of the acequia that will experience major alteration for the first time, other parts of the acequia madre not impacted by this project do retain the original historic "open earthen ditch" form, currently constituting 85.5 percent of the acequia madre. In addition, the overall acequia system continues to operate as an open earthen ditch, including all three major laterals and all field ditches served by the acequia madre. These improvements would provide for the efficient, timely and equitable delivery of irrigation water to downstream portions of the ditch during critical irrigation times of the growing season. With rehabilitation, the acequia system will function as intended, as well as reducing the high costs of maintenance. It is of critical importance to note that the project area is located *upstream of all gates, laterals and ditches* served by the acequia madre, and thus, without rehabilitation will hinder water service to all *parsientes* served by the system.

The Corps considers the effects to the acequia system not to be adverse. While the Corps recognizes that the placement of concrete piping will alter the form of this 4,000 foot segment of the acequia, the placement of pipe will only affect 14.5 percent of the total length of the acequia, and is a reversible condition that can be altered at any time to restore the system to its original open ditch design. Even with piping, the segment of ditch in the

project area will retain integrity of alignment and function. We seek your concurrence on this determination of no adverse effect to historic properties. Should previously undiscovered artifacts or features be discovered during construction, work will stop in the immediate vicinity of the find, a determination of significance made, and consultation would take place with your office and with Native American groups that may have concerns in the project area, to determine the best course of action.

In sum, we seek your concurrence in our eligibility determinations and in our determination of no adverse effect to historic properties by this project. If you have questions or concerns, or require additional information regarding the Acequia de Llano de San Juan Nepomuceño Rehabilitation Project, please contact Jeremy Decker, archaeologist, at (505) 342-3671, or me at (505) 342-3281.

Sincerely:

Julie A. Alcon  
Chief, Environmental Resources  
Section

\_\_\_\_\_  
Date

I concur

\_\_\_\_\_  
Jan Biella  
Interim New Mexico State  
Historic Preservation Officer

Enclosures











## **Appendix B**

### List of Plants Observed along the Acequia de Llano de San Juan Nepomuceño

Family	Scientific name	Common name
<b>Apiaceae</b> (Carrot Family)	<i>Heracleum maximum</i>	cow parsnip
<b>Asteraceae</b> (Aster Family)	<i>Achillea millefolium</i> <i>Antennaria</i> sp. <i>Artemisia franseroides</i> <i>Artemisia ludoviciana</i> <i>Heterotheca villosa</i> <i>Taraxicum officinale</i> * <i>Tragopogon dubius</i> *	yarrow pussytoes ragweed sagebrush white sage hairy golden-aster dandelion salsify
<b>Betulaceae</b> (Birch Family)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	thinleaf alder
<b>Boraginaceae</b> Borage Family	<i>Cynoglossum officinale</i> *	hound's tongue
<b>Brassicaceae</b> Mustard Family	<i>Cardamine cordifolia</i> <i>Cardaria</i> sp.*	bittercress whitetop, hoary cress
<b>Caprifoliaceae</b> Honeysuckle Family	<i>Symphoricarpos</i> sp.	snowberry
<b>Cupressaceae</b> Cypress Family	<i>Juniperus communis</i> <i>Juniperus monosperma</i> <i>Juniperus scopulorum</i>	spreading juniper one-seed juniper Rocky Mt. juniper
<b>Cyperaceae</b> Sedge Family	<i>Carex</i> sp.	sedge
<b>Dennstaedtiaceae</b> Family	<i>Pteridium aquilinum</i>	bracken fern
<b>Juncaceae</b> Rush Family	<i>Juncus arcicus</i> var. <i>balticus</i>	Baltic rush
<b>Fabaceae</b> Legume Family	<i>Lupinus</i> sp. <i>Thermopsis rhombifolia</i> var. <i>montana</i> <i>Vicia</i> sp.	lupine (2 species) golden pea vetch
<b>Fagaceae</b> Oak Family	<i>Quercus gambellii</i>	Gambel oak
<b>Fumariaceae</b> Fumewort Family	<i>Corydalis aurea</i>	golden smoke
<b>Geraniaceae</b> Geranium Family	<i>Geranium</i> sp.	geranium
<b>Iridaceae</b> Iris Family	<i>Iris missouriensis</i>	wild iris
<b>Onagraceae</b> Evening Primrose Family	<i>Epilobium angustifolium</i>	fireweed
<b>Pinaceae</b> Pine family	<i>Abies concolor</i> <i>Pinus ponderosa</i> <i>Pseudotsuga menziesii</i>	white fir ponderosa pine Douglas fir
<b>Poaceae</b> Grass Family	<i>Bromus inermis</i> * <i>Bromus tectorum</i> * <i>Elymus smithii</i> <i>Poa</i> sp.	smooth brome cheatgrass western wheatgrass bluegrass

<b>Family</b>	<b>Scientific name</b>	<b>Common name</b>
<b>Polemoniaceae</b> Phlox Family	<i>Ipomopsis aggregate</i>	scarlet gilia
<b>Ranunculaceae</b> Buttercup Family	<i>Ranunculus sp.</i> <i>Thalictrum fendleri</i>	buttercup Fendler meadowrue
<b>Rhamnaceae</b> Buckthorn Family	<i>Ceanothus fendleri</i>	buckbrush, mountain lilac
<b>Rosaceae</b> Rose Family	<i>Amelanchier alnifolia</i> <i>Fragaria vesca</i> <i>Malus pumila*</i> <i>Potentilla hippiana</i> <i>Prunus virginiana</i> <i>Rubus idaeus</i>	serviceberry woodland strawberry apple wooly cinquefoil chokecherry red raspberry
<b>Salicaceae</b> Willow Family	<i>Populus angustifolia</i> <i>Populus tremuloides</i> <i>Salix bebbiana</i> <i>Salix boothii</i> <i>Salix exigua</i> <i>Salix sp.</i>	narrowleaf cottonwood aspen Bebb willow Booth's willow coyote willow willow
<b>Scrophulariaceae</b> Snapdragon family	<i>Pedicularis procera</i> <i>Penstemon barbatus</i> <i>Verbascum thapsus*</i>	fernleaf lousewort scarlet penstemon mullein
<b>Violaceae</b> Violet Family	<i>Viola adunca</i> <i>Viola Canadensis</i>	mountain blue violet Canada violet (white)

## **Appendix C**

### **Agency Coordination Review Letter and Notice of Availability**

## **Appendix D**

### Agency Review and Public Comment Letters



Agency review and public comment letters will be placed here following review of  
this Draft Environmental Assessment