Environmental Assessment for Rehabilitation of Los Gonzales Acequia San Miguel County, New Mexico

DRAFT

Prepared for:
U.S. Army Corps of Engineers, Albuquerque District
4101 Jefferson Plaza NE
Albuquerque, NM 87109-3455

Prepared by:
Science Applications International Corporation
2109 Air Park Road SE
Albuquerque, NM 87106

JULY 2004

ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
CFR	Code of Federal Regulations
Corps	United States Army Corps of Engineers, Albuquerque District
CWA	Clean Water Act
dB	decibel
° F	degrees Fahrenheit
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
GPS	Global Positioning System
ITA	Indian Trust Asset
L_{eq}	equivalent sound level
NEPA	National Environmental Policy Act
NMGF	New Mexico Department of Game and Fish
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OSE	Office of the State Engineer
P.L.	Public Law
SFNF	Santa Fe National Forest
U.S.	United States
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WRDA	Water Resources Development Act

FINDING OF NO SIGNIFICANT IMPACT

1.0 NAME OF ACTION

Environmental Assessment for the Rehabilitation of the Los Gonzales Acequia, San Miguel County, New Mexico.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Water Resources Development Act of 1986 (Public Law [P.L.] 99-662) authorized the restoration and rehabilitation of irrigation ditch systems and acequias in New Mexico. Due to the importance of acequias to the preservation of cultural and historic values in the State, the United States (U.S.) Army Corps of Engineers, Albuquerque District (Corps), is providing assistance to the Los Gonzales Acequia to reconstruct the diversion dam that diverts the flows for the system. An Environmental Assessment (EA), required to evaluate the impacts of modifying the acequia, will be prepared for the following project.

2.1 Proposed Action

Los Gonzales Acequia is located approximately 2.5 miles southeast of Pueblo, New Mexico on the south side of the Pecos River, with access from State Route 3 in San Miguel County, New Mexico. The proposed rehabilitation project would construct a new diversion dam with fish passage in order to provide reliable water delivery during the growing season. The original diversion dam was a concrete-capped rock, brush, and wood structure that washed out in July 2001. Irrigation water is currently supplied for a few months each year by a temporary diversion dam that typically washes out during summer high flows.

Under the Proposed Action, a new diversion dam would be constructed in the approximate location of the dam destroyed in 2001. The concrete-capped gabion structure, approximately 141 feet wide, would span the Pecos River. A fish ladder and streambank and channel protection would be installed, along with erosion control measures that would minimize streambank and channel erosion near the dam.

The use of Federal funds to share the cost of the improvements would constitute a Federal action that requires an EA.

2.2 No Action Alternative

Under the No Action alternative, rehabilitation of the existing heading and water control structures would not occur, and maintenance problems caused by flow blockage and erosion would continue. Consequently, efficiency of delivery of irrigation water would continue to decline.

3.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

As required by the National Environmental Policy Act, this EA evaluates the potential environmental impacts associated with the proposed rehabilitation of the Los Gonzales Acequia. The findings for each resource area are described below.

Geology, Soils. Geology and soils would not be significantly affected under the Proposed Action alternative. Temporary surface disturbance would result from earthmoving to install the gabions and other related construction, but soil erosion would be minimized through the use of Best Management Practices (BMP) during construction. Native vegetation would be seeded in some areas after construction is completed. No Prime or Unique Farmlands would be affected. No significant impacts to soils would result from implementation of the Proposed Action.

Water Resources. There would be no negative impacts from implementation of the Proposed Action. Construction of the diversion dam would be conducted during a period of low flows that would be controlled through the installation of cofferdams to divert the river around the construction. This timing

and the installation of BMPs during construction would minimize the potential for impacts to water resources.

Section 404 of the Clean Water Act provides for the protection of waters and wetlands of the U.S. from impacts associated with discharges of dredged or fill material into waters of the U.S. Certain discharges associated with the construction and maintenance of irrigation ditches are exempt from Section 404 permit requirements (33 Code of Federal Regulations [CFR] 323.4[a], Exemption No. 3). No Section 404 permit would be required for the Proposed Action.

Wetlands and Floodplains. There are no wetlands or 100-year floodplains delineated by the Federal Emergency Management Agency along the acequia, so none would be affected by implementation of the Proposed Action.

Land Use. The Los Gonzales Acequia serves 21 irrigators and is used to irrigate 96 acres of cropland, primarily corn, alfalfa, grass for pasture, oats-sudangrass for hay, and field vegetables (cucumbers, squash, chile). The construction would reconstruct the diversion dam and would not negatively affect the land along the acequia. No negative impacts to land use would result from the Proposed Action.

Air Quality. San Miguel County is in attainment for air quality standards as set by the U.S. Environmental Protection Agency. While there would be the potential for minor temporary increases in emissions and dust during construction, these increases would not result in non-attainment of air quality standards. There would be no significant impacts to air quality under the Proposed Action.

Biological Resources. There would be no significant impact to vegetation, wildlife, and aquatic communities because there would be little change to the area as a result of the Proposed Action. Native vegetation would be reseeded in disturbed areas along the acequia once construction is completed.

Threatened and Endangered Species. No impacts to Federal- or State-listed threatened and endangered species would result from the Proposed Action because little disturbance would occur and any disturbance would be short-term.

Cultural Resources. No prehistoric or historic archaeological sites were found during the cultural resources survey or are known to occur within or immediately adjacent to Los Gonzales Acequia. Six archaeological sites are known within ±1.0 mile of the acequia, but none would be affected by the project. The Los Gonzales Acequia is potentially eligible for inclusion on the National Register of Historic Places under criteria a and d of 36 CFR 60.4. However, the proposed rehabilitation would have no adverse effect on the alignment, form, or function of the acequia system.

Indian Trust Assets. The construction or implementation of the proposed project is not anticipated to affect any Indian Trust Assets.

Aesthetics. No adverse effect on aesthetics would result from implementation of the Proposed Action. Exposed soil would be stabilized or reseeded with native vegetation.

Noise. No significant effects on noise levels would result from the Proposed Action. Noise would increase for the short time that construction equipment is working, but no long-term noise increases would occur.

Socioeconomics. There is the potential for positive impacts on the productivity of the irrigated land if water efficiency and delivery are improved. The irrigated land is used as cropland and to feed livestock that could supplement landowners' incomes or ability to trade products, but the impact would be negligible and difficult to measure. There would be no negative impacts resulting from the Proposed Action.

Environmental Justice. The area surrounding the Los Gonzales Acequia has a relatively high percentage of minorities and low-income families who could benefit from the Proposed Action. The Proposed Action alternative would not adversely affect the health or environment of minority or low-income populations.

4.0 CONCLUSION

The planned action has been fully coordinated with the Federal and State agencies with jurisdiction over the biological and cultural resources of the project area. As a result of the EA and the coordination with these agencies, I have determined that the planned action to construct a new diversion dam for the Los Gonzales Acequia will have no significant impact on the human environment. Therefore, an Environmental Impact Statement will not need to be prepared for this project.

_____ _____

Todd Wang Date
Lieutenant Colonel, US Army
District Engineer

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

Figure ***Page***

LIST OF TABLES

Table ***Page***

1.0 INTRODUCTION

1.1 BACKGROUND

Los Gonzales Acequia is located approximately 2.5 miles southeast of Pueblo, New Mexico on the west side of the Pecos River, with access from State Route 3 in San Miguel County, New Mexico (**Figure 1-1)**. The irrigation system consists of one unlined main ditch, which is approximately 3.5 miles long, and outlets into a field near the Pecos River, which ultimately receives the return flows (**Figure 1-2**). The acequia supplies water to approximately 96 acres serving 21 irrigators (Gonzales 2004).

The original diversion dam was a concrete-capped rock, brush, and wood structure that washed out in July 2001. Irrigation water is currently supplied for a few months each year by a temporary diversion dam that typically washes out during summer high flows. The proposed rehabilitation project would construct a new diversion dam with fish passage in the location of previous dam in order to provide reliable water delivery. The use of Federal funds to share the cost of constructing the new diversion dam would constitute a Federal action that requires an Environmental Assessment (EA).

The United States (U.S.) Army Corps of Engineers, Albuquerque District (Corps), at the request of the Los Gonzales Acequia and the New Mexico Office of the State Engineer (OSE), is planning reconstruction of the diversion dam under the Water Resources Development Act (WRDA) of 1986 (Public Law [P.L.] 99-662). The WRDA authorized the Corps to conduct the restoration and rehabilitation of irrigation ditch systems and acequias in New Mexico. Under Section 1113 of the Act, Congress has found that New Mexico's acequias date from the eighteenth century and, due to their significance in the settlement and development of the western U.S., should be restored and preserved for their cultural and historic value to the region. The Secretary of the Army 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 proposed improvements to this acequia satisfy the intent and purpose of this legislation. The non-Federal financial responsibility of any work carried out under this section of WRDA is 25 percent.

The Corps is providing funding, project design, and inspection and is the action agency for this project. The State of New Mexico, through the OSE, is the project sponsor. The Corps also has the authority for review and approval of the environmental impacts of the proposed project, as presented in this EA. Upon successful completion of the project, funds would be made available by the Corps to the OSE to pay for construction of the dam and associated structures.

1.2 PURPOSE AND NEED

Currently, irrigation water is diverted into the conveyance system by an uncontrolled temporary diversion berm composed of dumped soil and gravel that washes out during annual high flows in the Pecos River. The previous diversion dam was a rock and brush structure that washed out about 2 years ago. As a result, irrigation water is supplied for no more than half the growing season. Before the dam washed out, the acequia flowed year-round to water cattle. If the diversion dam were not replaced, the landowners served by the acequia would continue to be without irrigation water for much of the growing season and without a good source of livestock water for the rest of the year. Due to the high maintenance and cost of reconstructing the temporary diversion annually, it is likely that the acequia group would not be able to continue rebuilding the temporary dam in the future, at which time the system would cease to function as a historic acequia.

Consequently, there is a need for construction of a new diversion dam to ensure reliable irrigation water supply. A fish ladder would be installed to ensure that fish can pass the dam that would span the Pecos River. This proposed project would improve water delivery reliability and reduce maintenance costs.

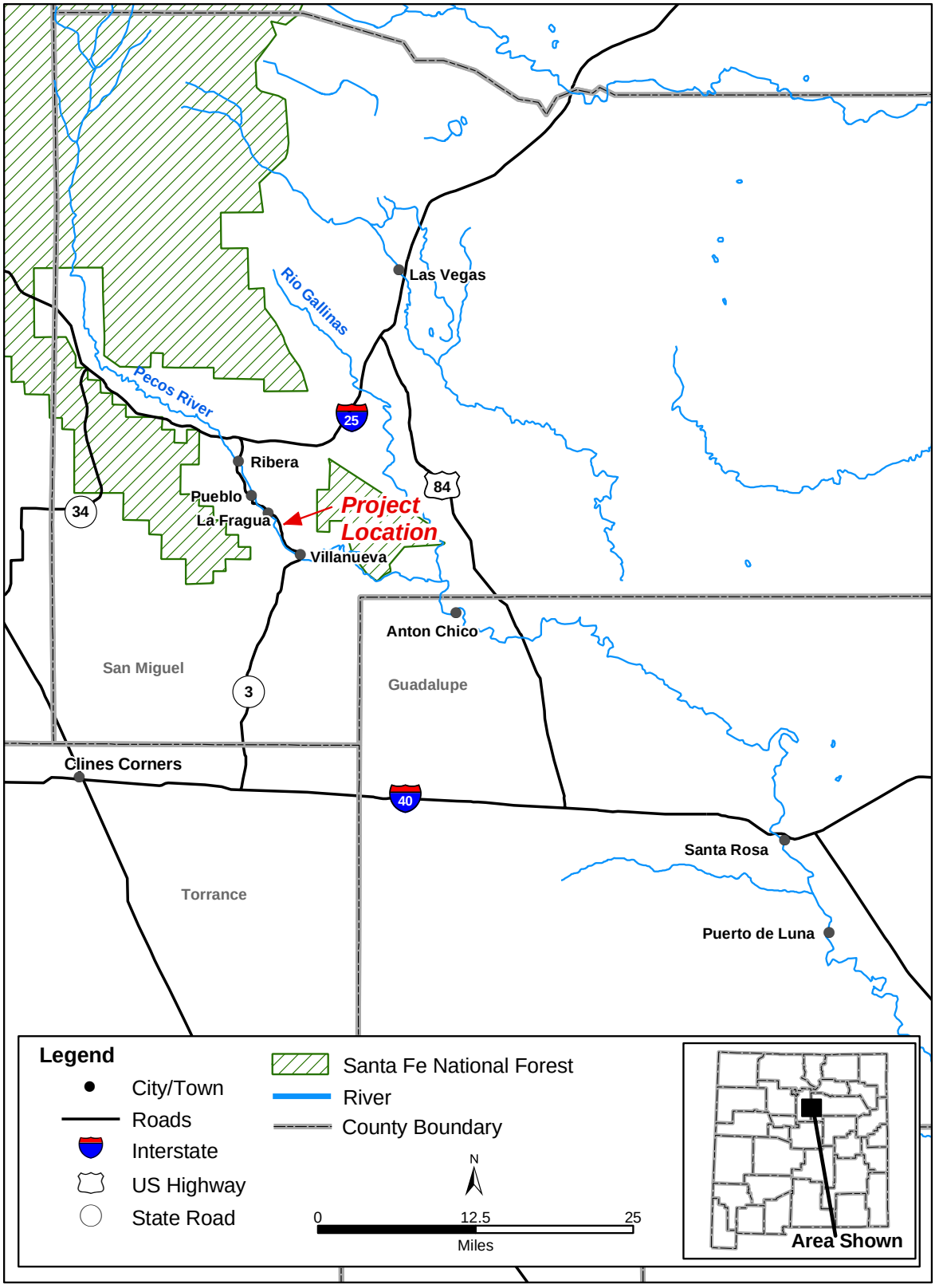


Figure 1-1. Regional Map for Los Gonzales Acequia

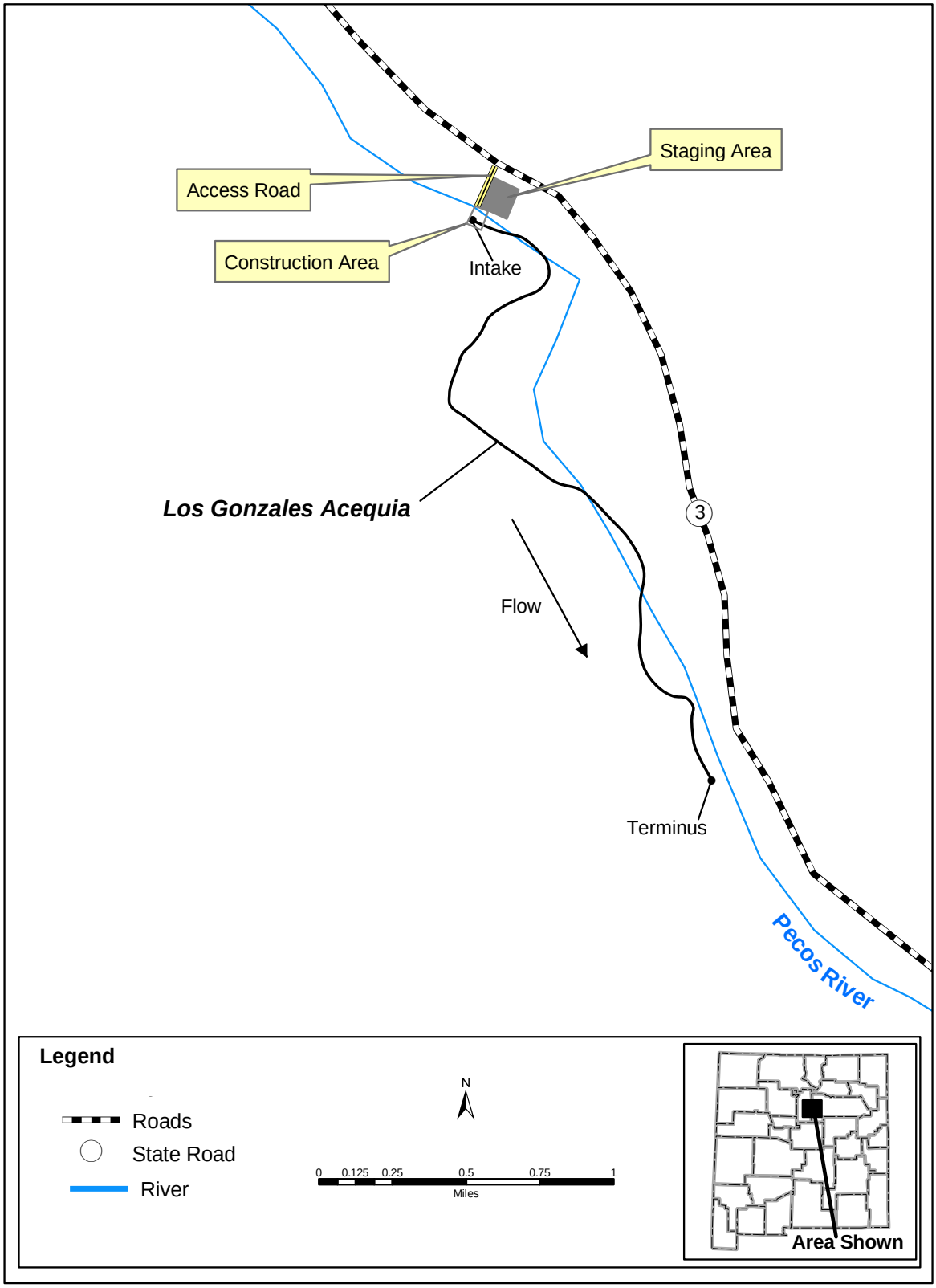


Figure 1-2. Location Map of Los Gonzales Acequia Project Area

1.3 REGULATORY COMPLIANCE

This EA was prepared for the Corps, in compliance with all applicable Federal statutes, regulations and Executive Orders (EO) including, but not limited to the following:

- National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] 4321 *et seq.*)
- Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508)
- Clean Air Act of 1972 (42 U.S.C. 7401-7671, as amended)
- Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 *et seq.*)
- Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544, as amended)
- Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 *et seq.*, as amended)
- Farmland Protection Policy Act, 1981 (7 U.S.C. 4201, as amended)
- National Historic Preservation Act of 1966 (16 U.S.C. 470)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013)
- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Protection of Historic and Cultural Properties (36 CFR 800 *et seq.*)
- EO 11514, Protection and Enhancement of Environment Quality
- EO 11988, Floodplain Management
- EO 11990, Protection of Wetlands
- EO 12898, Environmental Justice
- EO 13007, Indian Sacred Sites
- EO 13084, Consultation and Coordination with Indian Tribal Governments
- EO 11593, Protection and Enhancement of the Cultural Environment

This EA is also in compliance with applicable State of New Mexico regulations and standards.

2.0 DESCRIPTION OF ALTERNATIVES AND PROPOSED ACTION

2.1 ALTERNATIVES

Two alternatives were considered to address the problems of replacing the diversion dam with a permanent structure and the potential for loss of irrigation water.

- No Action Alternative: No rehabilitation work would be performed to address the existing problems. The temporary diversion berm would be reconstructed annually to provide irrigation water for a portion of the growing season.
- Proposed Action Alternative: A new diversion dam would be constructed in the approximate location of the dam that was destroyed in 2001. The concrete-capped gabion structure, approximately 141 feet wide, would span the Pecos River. A fish ladder and streambank and channel protection would be installed.

2.1.1 No Action Alternative

Under the No Action alternative, no rehabilitation work would be done. A temporary diversion berm would continue to be constructed annually to provide irrigation water for part of the growing season, requiring continual high maintenance and expense.

2.1.2 Proposed Action Alternative

Figure 1-2 shows the location of the construction and staging areas under the Proposed Action. The Proposed Action would construct a new concrete-capped diversion dam composed of gabion baskets with a weir length of approximately 141 feet. To control channel erosion immediately downstream from the weir, the gabion baskets would be stepped down, with the downstream edges of the weir and steps protected with 4-inch by 4-inch angle iron. The dam would be flanked on both streambanks, upstream and downstream, with wire-wrapped riprap that has a base installed below the stream channel. Dumped rock riprap would be placed along the downstream end of the apron below the dam. Other features of the proposed structure include a fish ladder on the south side near the streambank, a 24-inch diameter corrugated metal sluice pipe on the south streambank, and handrails at the ends of the dam on both banks. Irrigation flows would be diverted by means of an inlet protected by a trash rack and controlled by a 30-inch headgate that would outlet into approximately 75 feet of 30-inch corrugated metal pipe.

The project area would be accessed from a staging area located adjacent to the south side of the construction site. The construction and staging areas and access road to the staging area comprises 5.7 acres.

2.2 ENVIRONMENTAL PROTECTION

Rehabilitation of the irrigation system would utilize appropriate Best Management Practices (BMP), employed during and after construction to minimize soil erosion and sedimentation in waterways. Construction would occur during low river flows. Water in the Pecos River would be diverted around the construction site in the river by cofferdams temporarily installed across part of the river upstream. Appropriate BMPs to be employed during construction include the use of the cofferdams, rock, and the proper grading and revegetation of slopes. Damage to existing vegetation would be avoided as much as possible. The State of New Mexico, being the project sponsor, would be responsible for assuring operation and maintenance of the project after completion.

To protect soils from wind and water erosion after construction, disturbed areas would be stabilized with appropriate native vegetation. Any woody vegetation lost as a result of the project would be replaced. Plans include avoiding damage to mature trees. However, if any mature trees must be removed during construction, they would be replaced by 4 saplings for every tree lost.

All waste material would be disposed of properly at pre-approved or commercial disposal areas or landfills. Fuel, oil, hydraulic fluids, and other similar substances would be appropriately stored away from the ditch and must have a secondary containment system to prevent spills if the primary storage container leaks.

Prior to construction, all environmental protection measures as expressed by contract clauses, design drawings, or other means would be reviewed with the acequia members and the contractor at a pre-construction conference.

There are no other actions for the Los Gonzales Acequia known to be planned by other Federal, State, county, or municipal agencies.

3.0 EXISTING ENVIRONMENT AND FORESEEABLE EFFECTS OF THE PROPOSED ACTION

3.1 CLIMATE

Average climatic statistics for the project area were determined using the closest weather station at Pecos Ranger Station (296676), Santa Fe National Forest, New Mexico, which is approximately 20 miles upstream from Los Gonzales Acequia. Average annual maximum temperature for the project area is estimated at 66 degrees Fahrenheit (°F), and the average annual minimum temperature is estimated at 33°F (WRCC 2003). Average annual precipitation in this region is 16 inches, occurring as both rain and snow (WRCC 2003). The rainiest months tend to be July and August; the most snow tends to fall in December through February. Moist air generated from the Gulf of Mexico acts as the source of rainfall in the summer months, while the Pacific Ocean affects climatic patterns for the winter months. The average growing season in the project area is approximately 137 days, from mid-May through mid-September (WRCC 2003).

3.2 PHYSIOGRAPHY, GEOLOGY, SOILS

This project is located in the Southern Parks and Ranges Section. Typical landforms of the section are mountains and a few valley plains, with the Sangre de Cristo Mountains the major landforms. Elevations in this section range from 7,500 to 14,000 feet. The geology is dominated by Precambrian igneous and metamorphic rocks and Cenozoic and Paleozoic sedimentary rocks. Cretaceous through Mid-Tertiary volcanism is occasionally present (USFS 1996).

The soil series on the site include Vibo and Ribera. Tuloso-Rock Outcrop Sombordoro Association is found on the steep slopes near the construction area. Vibo-Ribera Association is found at both the diversion dam and the staging area. The Vibo-Ribera Association is a soil map unit on undulating topography, with moderately rapid permeability, moderate susceptibility to water erosion, and slight susceptibility to wind erosion. There are no hydric soils or Prime or Unique Farmlands in the construction or staging areas.

The Proposed Action would minimize soil erosion and sedimentation in the channel and reduce diversion maintenance. The contractor would use BMPs to minimize erosion during construction under the Proposed Action. There would be no significant negative impacts to soils from the implementation of the Proposed Action.

There would be no significant impacts to soils from the No Action alternative because no major construction would take place.

3.3 WATER RESOURCES

The project site is located along the Pecos River in the Pecos Headwaters watershed, a subwatershed of the Pecos Basin. The watershed drains a mountainous area of 4,276 square miles and receives approximately 35 inches of annual precipitation in the mountainous areas to the north (NMWQCC 2002; NMED 1998).

Designated uses identified by the New Mexico Environment Department (NMED) for the reach of the Pecos River receiving the outflow from the Los Gonzales Acequia (Cañon del Oso to Alamitos Canyon) are livestock watering, secondary contact, marginal coldwater fishery, wildlife habitat, and irrigation. In this reach, the marginal coldwater fishery use is only partially supported due to stream bottom deposits. The probable sources of this impairment are identified as removal of riparian vegetation, recreation and tourism activities other than boating, grazing (riparian and/or upland), municipal point sources, habitat modification other than hydromodification, grazing related sources, bank or shoreline modification/destabilization, and agriculture (NMED 2003).

The water in the acequia is diverted from the Pecos River. The Los Gonzales Acequia extends approximately 3.5 miles along the Pecos River before it returns flows into the river.

Section 402(p) of the CWA specifies that stormwater discharge associated with construction activities disturbing one (1) or more total acres of land must be authorized by a National Pollutant Discharge Elimination System (NPDES) Permit. NPDES permit authorization may be required for the Proposed Action. BMPs would be used as necessary to minimize erosion and sedimentation wherever project construction activities occur.

Section 404 of the CWA provides for the protection of wetlands and waters of the U.S. from impacts associated with discharges of dredged or fill material. Certain discharges associated with the construction and maintenance of irrigation ditches is exempt from Section 404 permit requirements (33 CFR 323.4 [a], Exemption No. 3). A Section 404 permit would not be required for the Proposed Action.

Under the No Action alternative, the temporary diversion berm consisting of earth and rock fill would continue to be constructed annually. When the temporary dam washes out during annual high flows, the dam is washed downstream and contributes to river sedimentation and turbidity. The No Action alternative would continue to negatively affect downstream surface water quality.

3.4 WETLANDS AND FLOODPLAINS

Wetlands are protected from development under EO 11990 (Protection of Wetlands). Guidance from the Order requires Federally funded activities associated with wetlands to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural beneficial values of wetlands. No wetlands are present in the construction or staging areas.

EO 11988 (Floodplain Management) provides Federal guidance for activities within floodplains of inland and coastal waters. Preservation of the natural values of floodplains is of critical importance to the nation and to the State of New Mexico. Federal agencies are required to "ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management." No additional development of the Pecos River is likely to result from this project. Flood hazard zones (100-year floodplains), as delineated by the Federal Emergency Management Agency, are not present in the project area. As a result, neither of the alternatives would adversely affect wetlands or floodplains.

3.5 LAND USE

The Los Gonzales Acequia supplies irrigation water to 21 irrigators on a total of 96 acres (Gonzales 2004). Private lands irrigated from the acequia are cultivated for corn, alfalfa, grass for pasture, oats-sudangrass for hay, and vegetables (cucumbers, squash, chile). Before the diversion dam washed out two years ago, the acequia flowed year-round to water cattle and irrigate crops.

Under the Proposed Action alternative, water delivery would be more reliable and the improved design of the diversion dam would allow for the continued productivity of the irrigated land and livestock water. Under the No Action alternative, the diversion berm would require yearly rebuilding for the purposes of temporary irrigation. The dam would continue to be damaged by high flows, potentially resulting in the loss of irrigation water and ongoing maintenance expenses. As a result, it is possible that, over time, the irrigated land would change from cropland to fallow or non-agricultural.

3.6 AIR QUALITY

The project area, in San Miguel County, is in attainment with National Ambient Air Quality Standards set by the U.S. Environmental Protection Agency (USEPA) (Ball 2004). Increased dust and emissions from earthmoving and construction equipment would potentially contribute to temporary elevations in particulate matter. Through the use of BMPs, increased dust would be kept to a minimum, so the

Proposed Action alternative would not produce significant reductions in air quality. No impacts to air quality would result from the No Action alternative.

3.7 BIOLOGICAL RESOURCES

3.7.1 Terrestrial Communities

According to Dick-Peddie (1993), the project area is characterized as Juniper-Savanna (ecotone). The staging area for the construction would be located adjacent to an existing pasture between the Pecos River and State Road 3. The riparian vegetation community associated with the Pecos River in the immediate project area contains widely spaced, mature cottonwood trees (*Populus* spp.). Willow species, sedges, and grasses are distributed along the bank of the Pecos River and the acequia. The northern portion of the staging area is currently utilized for livestock grazing and the southern portion of the staging area (closest to the Pecos River) is a disposal area for discarding old materials such as tires, broken up concrete, and automobiles.

Predominant vegetation found within the project area during a March 31, 2004, pedestrian field survey include willow species (*Salix* spp.), cottonwood species (*Populus* spp.), grama species (*Bouteloua* spp.), sedges (*Carex* spp.), broom snakeweed (*Xanthocephalum sarothrae*), juniper species *(Juniperus spp.)*, oak species (*Quercus spp.*), cholla cacti (*Opuntia spp.*), golden currant (*Ribes aureum*), and speedwell species (*Veronica spp.)*. A mixture of hay, grasses, and alfalfa make up the adjacent fields.

Common animals likely to occur in the proximity of the project area include, but are not limited to, mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), woodrat (*Nestoma fuscipes*), deer mouse (*Peromysus maniculatus*), and pocket gopher (*Thomomys* spp.). Nuthatches (*Sitta* spp.), olive warblers (*Peucedramus taeniatus*), red-faced warblers (*Cardellina rubifrons*), hepatic tanagers (*Piranga flava*), and the mountain bluebird (*Sialia currucoides*) (Bailey 1995). During the March 31, 2004 pedestrian field survey, black-billed magpies (*Pica hudsonia*), turkey vulture (*Piranga ludoviciana*), ravens (*Corvus spp.*), western meadow lark (*Sturnella neglecta*), black-chinned hummingbird (*Archilochus alexandri*), and red-headed woodpecker (*Carduelis tristis*) were observed.

The acequia rehabilitation would take place during the non-irrigation season. Construction would not pose a significant threat to these terrestrial communities due to the localized area of impact and the timing of construction (outside of the breeding season for most species). Disturbed and backfilled ground would be reseeded. Neither the Proposed Action or No Action alternatives would have a significant impact on the terrestrial flora and fauna.

3.7.2 Aquatic Communities

The Pecos River is classified as a coldwater fishery in the headwaters region around the project area. Fish species occurring throughout the Pecos River include, but are not limited to, brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis)*. Non-salmonids likely to occur include the white sucker (*Catostomus commersoni)*. Aquatic invertebrates of mayfly (*Ephemeroptera* spp.) and dragonfly (*Odonanta* spp.) species would likely support the prey base for many of the fish species listed above.

The Pecos River supplies the Los Gonzales Acequia with irrigation water. No water would be diverted to the acequia during construction, and, during in-channel construction activities, water would be temporarily diverted via a cofferdam, minimizing stress to the Pecos River aquatic communities. Construction activities would not impede the passage of aquatic organisms. Temporary increases in turbidity are likely from the in-channel construction but would only result in short-term effects on aquatic species in the project area. The new dam would contain a fish ladder to aid in the navigation of fish around this structure. Neither alternative would significantly affect the aquatic communities of the Pecos River.

A monitoring plan would be developed as part of the Corps' plan for operation and maintenance to ensure that the fish ladder operates as planned.

3.7.3 Threatened and Endangered Species

Conservation of threatened and endangered flora and fauna are primarily managed by U.S. Fish and Wildlife Service (USFWS) under the ESA, the New Mexico Department of Game and Fish (NMGF) under the Wildlife Conservation Act of 1974, and the New Mexico Energy, Minerals, and Natural Resources Department under the New Mexico Endangered Plant Species Act and Rule Number NMFRCD 91-1. Under the managing authorities, each agency maintains species lists for selected animals and plants deemed to be threatened and/or endangered. The Federal and State protected species of San Miguel County, New Mexico, are listed in **Table 3-1**, with the likelihood of occurrence in the project area.

Table 3-1. Federal and State Protected Species in San Miguel County, New Mexico

Species	*Federal Status[1] (USFWS)*	*State Status[1]*	*Probability of Occurrence in the Project Area*
INVERTEBRATES			
New Mexico Silver Spotted Butterfly *(Speyeria nokomis nitocris)*	SC	–	Not likely to occur due to the lack of alpine meadow habitat and the absence of *Viola nephrophylla*.
BIRDS			
Brown Pelican (*Pelecanus occidentalis carolinensis*)	–	E	Not likely to occur; records indicate this species has occurred within the Pecos drainage, but its inland occurrence is rare.
Bald Eagle (*Haliaeetus leucocephalus*)[2]	T	T	**May Occur**
Common Black-Hawk (*Buteogallus anthracinus anthracinus*)	–	T	Not likely to occur due to the lack of undisturbed riparian habitat.
American Peregrine Falcon (*Falco peregrinus anatum*)	SC	T	Not likely to occur due to the lack of cliff and forest habitat in the immediate project area.
White-tailed Ptarmigan (*Lagopus leucurus altipetens*)	–	E	Not likely to occur due to the lack of alpine habitat.
Mountain Plover (*Charadrius montanus*)	SC	–	**May Occur** (but uncommon in San Miguel County)
Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)	C	–	Not likely to occur due to the lack of dense riparian habitat.
Mexican Spotted Owl (*Strix occidentalis lucida*)	T	–	Not likely to occur due to the lack of mature coniferous forest.
Boreal Owl (*Aegolius funereus*)	–	T	Not likely to occur due to the lack of alpine habitat.
Southwestern Willow Flycatcher (*Empidonax traillii extinus*)	E	E	Not likely to occur due to the lack of dense riparian habitat.

Species	*Federal Status[1] (USFWS)*	*State Status[1]*	*Probability of Occurrence in the Project Area*
Broad-billed Hummingbird (*Cyanthus latirostris magicus*)	–	T	Not likely to occur due to the lack of robust riparian habitat.
White-eared Hummingbird (*Hylocharis leucotis borealis*)	–	T	Not likely to occur due to the lack of montane habitat.
Gray Vireo (*Vireo vicinior*)	–	T	Not likely to occur due to the lack of evergreen shrubland-oak woodland in the immediate project area.
Baird's Sparrow (*Ammodramus bairdii*)	–	T	Not likely to occur due to the lack of short-grass prairie habitat in the immediate project area.
Artic Peregrine Falcon (*Falco peregrinus tundrius)*	SC	–	Not likely to occur due to the lack of cliff and forest habitat in the immediate project area. This species is primarily a migrant in NM.
Black Tern (*Chlidonias niger*)	SC	–	Not likely to occur due to the lack of prairie wetland and grassland habitat in the immediate project area.
Northern Goshawk (*Accipiter gentilis*)	SC	–	Not likely to occur due to the lack of mature, closed-canopy coniferous forest habitat.
Western Burrowing Owl (*Athene cunicularia hypugea*)	SC	–	Not likely to occur due to the lack of abandon prairie-dog habitat in the immediate project area.
MAMMALS			
New Mexican Jumping Mouse (*Zapus hudsonius luteus*)	SC	T	Not likely to occur due to the lack of moist meadow habitat.
Townsend's Big-earned Bat (*Corynorhinus townsendii*)	SC	–	**May Occur.**
Black-Footed Ferret (*Mustela nigripes*)	E	E	Not likely to occur; this species was extirpated from San Miguel County.
Black-tailed Prairie Dog (*Cynomys ludovicianus*)	C	–	Not likely to occur due to the lack of short-grass prairie habitat.
American Marten (*Martes americana origenes*)	–	T	Not likely to occur due to the lack of mature coniferous forest habitat.
Pecos River Muskrat (*Ondatra zibethicus ripensis*)	SC	–	**May Occur.**
Swift Fox (*Vulpes velox*)	SC	–	Not likely to occur due to the lack of grassland/plains habitat and the presence of grazing.
Least Shrew (*Cryptosis parva*)	–	T	Not likely to occur due to the lack of dense, mesic grasslands.

Species	*Federal Status[1] (USFWS)*	*State Status[1]*	*Probability of Occurrence in the Project Area*
		FISH	
Arkansas River Shiner (*Notropis girardi*)	C	E	Not likely to occur; this species was extirpated from San Miguel County.
Suckermouth Minnow (*Phenacobius mirabilis*)	–	T	Not likely to occur; introduced populations are generally south of Sumner Lake.
		MOLLUSK	
Paper Pondshell (*Utterbackia imbecillis*)	–	E	Not Likely to occur; this species is not found in the Pecos River.
Lake Fingernailclam (*Musculium lacustre*)	–	T	Not likely to occur; this species is found above 8,000 feet in elevation in lentic environments.
Long Fingernailclam (*Musculium transversum*)	–	T	Not likely to occur; this species was extirpated from the Pecos River.
		PLANTS	
Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*)	E	–	Not likely to occur due the lack of xeric, conifer forest habitat.
Dwarf Milkweed (*Asclepias uncialis var. uncialis*)	SC	–	Not likely to occur due to lack of semi-arid, lower slope and mesa short-grass prairie habitat.

Notes: (1) E = Endangered, T = Threatened, SC = Species of Concern, C = Candidate.
(2) The bald eagle is proposed for delisting.
Sources: USFWS 2004; NMRPTC 1999; NMGF 2004

Specialized habitat requirements such as vegetation type and cover, elevation, and geographic location for the species listed above comprise the preferred habitat regimes for these flora and fauna (NMGF 2004). Of the species listed in Table 3-1, the bald eagle, mountain plover, Pecos River muskrat, and Townsend's big-eared bat may potentially occur in the project area. There is no documentation of bald eagle nesting or winter roosting near the project area. Perennial water does exist, along with large perching trees, and there is evidence of a prey base suitable for bald eagles (SAIC 2004). If bald eagles are observed in the vicinity before or during construction, the following precautions would be observed to minimize direct disturbance:

- If a bald eagle were present within 0.5 mile (0.4 km) upstream or downstream of the active construction site in the morning before project activity starts, or if it were present following breaks in project activity, the contractor would be required to suspend all activity until the bird leaves of its own volition; or if a Corps biologist, in consultation with the USFWS, determines that the potential for harassment is minimal. However, if a bald eagle arrives during construction activities or if an eagle is greater than 0.5 mile away, construction need not be interrupted.
- If bald eagles were found in the immediate project area during the construction period, the Corps would contact the USFWS to determine whether formal consultation under the ESA is necessary.

The proposed construction would occur in the acequia and Pecos River channel and would mainly involve land that has already been disturbed. Transient bald eagle occurrence may take place in the project area;

however, these species would not be affected by the implementation of the Proposed Action or the No Action alternatives.

There is no documentation of mountain plovers in or near the project area. The mountain plover has been recorded in San Miguel County, where it is reportedly an irregular and uncommon summer migrant. It occurs at the Las Vegas National Wildlife Refuge in particular, northeast of the project area. Preferred habitat of the mountain plover consists of overgrazed pastures, cultivated fields, and prairie dog towns (NMGF 2004). The mountain plover would not be affected by the implementation of either the Proposed Action or the No Action alternatives because it is unlikely to occur.

There is no documentation of Pecos River muskrats near the project area. However, muskrats occur or have the potential to occur in marshes and drainage ditches along the Pecos River, and there are several records of Pecos River muskrat occurrence from San Miguel County. Locally, the potential for the species to occur is enhanced where a fairly constant source of perennial water and emergent vegetation are present (NMGF 2004). In-channel construction activities would be short-term and limited to a small portion of already disturbed riverbank. It is unlikely that the Pecos River muskrat would be affected by the implementation of the Proposed Action. There would be no effect as a result of the No Action alternative.

There is no documentation of Townsend's big-eared bats or roosting sites in the vicinity of the project area. Bats are known to travel up to 40 miles from roosting sites to forage (USFWS 1995). Abandoned mines, buildings, and caves are preferred roosting habitat for Townsend's big-earned bats. Preferred roosting habitat is likely within 40 miles of the project site and thus transient foraging bats may occur in the vicinity of the project area. Transient Townsend's big-eared bat occurrence may take place in the project area; however, these species would not be affected by the implementation of the Proposed Action or the No Action alternatives.

3.8 CULTURAL RESOURCES

3.8.1 Culture History

The archaeological record suggests both prehistoric and historic occupation of the project area. The prehistory of Region 4 in the Santa Fe National Forest (SFNF), which is adjacent to the project area, is divided into seven major periods; the historical occupations include four periods. Each of these is briefly described in the following discussion. Additonal detail can be found in **Appendix A**.

The PaleoIndian Period (9000 B.C. to 5000 B.C.) is characterized by relatively small bands of hunters relying on large, now extinct, Pleistocene animals. PaleoIndian sites (1.3 percent of all known sites in SFNF Region 4) are ephemeral, reflecting periodic movement of camps to follow the animals, with some evidence of reliance on plant resources (Scheick 1996).

The Archaic Period (5000 B.C. to A.D. 500) is signaled by the extinction of earlier Pleistocene animals, due to the combined effects of drought and hunting, and a greater reliance on wild plant resources. As a result, new classes of artifacts, notably ground stone implements used to process plant foods and smaller projectile points consistent with hunting smaller animals, comprise the Archaic Period sites (24 percent of all known sites in SFNF Region 4). Most consist of simple artifact scatters (Scheick 1996).

Early Developmental Period (A.D. 500 to 900) sites generally consist of single residential units, mostly pithouses, and associated refuse deposits (Scheick 1996). Later Developmental Period sites (A.D. 900 to 1200) consist of small rectangular masonry roomblocks, and comprise about 1.3 percent of all known sites in SFNF Region 4.

Coalition Period (A.D. 1100 to 1300) settlements were typified by large above-ground masonry roomblocks, many enclosing a central plaza with subterranean kivas. Most known sites are found in

lowland valleys containing agricultural lands, and comprise about 6 percent of all the known sites in SFNF Region 4 (Scheick 1996).

Archaeological data from the Classic Period suggest that many Developmental Period pueblos were abandoned and the region's inhabitants reordered into larger, more defensible pueblos (Scheick 1996). These larger pueblos became major trading centers for the exchange of locally produced agricultural goods for meat (e.g., bison) brought in by groups residing on the Plains. Classic Period sites comprise about 5.1 percent of all known sites in SFNF Region 4 (Scheick 1996).

The consolidation of populations into larger, multi-storied pueblos, many exhibiting defensive characteristics, accelerated during the Protohistoric Period (A.D. 1450 to 1598) (Scheick 1996). There is evidence of fieldhouses and farmsteads, presumably related to agricultural endeavors, in outlying areas away from large pueblos (Scheick 1996). Protohistoric Period sites comprise 1.9 percent of all known sites in SFNF Region 4 (Scheick 1996).

Occupations dating to the first of the four Historic Periods, the Spanish Colonial Period (A.D. 1598 to 1821), are relatively uncommon in SFNF Region 4. Most of these date to the late eighteenth century following a series of treaties with various Indian groups who once occupied the region. It is during the Spanish Colonial Period that the first documentary evidence regarding the project area specifically begins to emerge.

The Los Gonzales Acequia is situated within the boundary of the San Miguel del Bado (alternatively Vado) Land Grant, which was formally awarded to 52 Spanish settlers (Bullock 1981; Pearce 1965; Westphall 1983) on November 25, 1794.

In 1821, with the opening of the Santa Fe Trail, San Miguel del Bado became a customs house for travelers entering the Republic of Mexico (Bullock 1981; Ebright 1994). By 1831, the immense agricultural productivity of San Miguel del Bado was apparent (Gregg 1954). In 1835, one of the earlier disputes over illegal water diversions rights broke out (Baxter 1997).

In the early 1830s, Indian raids plagued San Miguel del Bado, and it was recommended that a presidio be established at the town (Carroll and Haggard 1942). The customs house at San Miguel del Bado, established earlier to control trade along the Santa Fe Trail, further enhanced the town's importance in the regional economy (Bullock 1981).

The Territorial Period (A.D. 1846 to 1912) refers to the period between the arrival of American troops in New Mexico and when New Mexico became a State, and comprises 10.4 percent of all known historic period occupations (Scheick 1996). Most sites consist of fieldhouses associated with agricultural activities (Scheick 1996). The Los Gonzales Acequia was probably constructed no later than 1860 (Martinez 1990).

During the Territorial Period, the land grant at San Miguel del Bado became a test case of the intent of the United States to honor its obligations under the Treaty of Guadalupe-Hidalgo. In 1879, the U.S. Surveyor General confirmed that the San Miguel del Bado Grant was entitled to the original 300,000 acres originally awarded by the Spanish Crown in 1794. Following a series of appeals, the U.S. Supreme Court in *U.S. vs. Sandoval* decreed in 1896 that commons lands formerly held by the grant's inhabitants were, in fact, property of the United States (Ebright 1987, 1994; Scheick 1996; Westphall 1983). This decision limited the grant to only about 5,024 acres.

In 1879, the New Mexico and Southern Pacific Railroad Company, a construction company for the Atcheson, Topeka, and Santa Fe Railroad, completed construction of a rail line into Las Vegas, New Mexico and San Miguel del Bado lost its importance as a regional trading center (Anonymous 1940; Bullock 1981). San Miguel del Bado's location away from major rail lines, in conjunction with the loss of its commons lands in 1896, signaled its gradual decline in both economic and political importance.

The Statehood Period (A.D. 1912 to 1945) sites comprise 28 percent of all known historic period sites in Region 4 (Scheick 1996). Most consist of cabins and trails/roads consistent with reliance on extractive

activities (e.g., lumbering) and the gradual development of transportation infrastructure in the region (Scheick 1996).

By 1914, many irrigation systems existed along the Pecos River (Fogg 1915). According to a 1924 hydrographic report, the Los Gonzales Acequia irrigated only about 98 acres (OSE 1924). By 1930, Robertson (1934) indicates that San Miguel County's agricultural pursuits had expanded to include the cultivation of corn (9,692 acres), hay (9,393 acres), wheat (2,877 acres), and oats (1,523 acres).

During the same period, there were also over 51,000 head of cattle and almost 54,000 head of sheep (Robertson 1934) in this region. Most of the county's farms were operated by owners; tenant-run farms were uncommon (Robertson 1934). It is likely that agricultural and ranching pursuits in and near San Miguel del Bado mirrored these countywide patterns.

3.8.2 Methodology and Survey Results

The cultural resources survey was preceded by a check of recorded sites at the New Mexico Cultural Resources Information System in Santa Fe. Six sites are situated within two miles of the acequia. The Los Gonzales Acequia (LA 143914) is potentially eligible for the National Register of Historic Places.

A Class III field inspection of the construction and staging areas and access road consisted of 100 percent coverage on approximately 5.7 acres, and conformed to all State of New Mexico and Federal recording standards. Additional documentation of the acequia included walking the 3.5-mile alignment beginning at the diversion dam/intake and extending downstream to its terminus, and recording the locations of water control structures (e.g., culverts, check structures, taps). The acequia was dry at the time of this inventory and is not lined with concrete, so detailed inspections of the sides and bottom of the ditch alignment were possible.

Class III survey methods conformed to State of New Mexico standards and spacing did not exceed 15 meters. Coordinates of the staging area perimeter, the ditch centerline, and the locations of irrigation structures (e.g., culverts, bridges, checks, and taps) along the acequia were collected using a Garmin 76S 12-channel Global Positioning System (GPS) receiver. In general, positional accuracy during the recording period varied between ± 3 to 5 meters. Photographs of representative examples of irrigation structures were also taken.

Excluding the acequia, no recorded archeological sites are located within the construction and staging areas or the acequia right-of-way. There are no known Traditional Cultural Properties in the project area. Neither the Proposed Action nor the No Action alternatives would significantly affect the form or alignment of the Los Gonzales Acequia. The Proposed Action would improve the functioning of the acequia. There would be no adverse effect to historic properties under either alternative.

3.9 INDIAN TRUST ASSETS

Indian Trust Assets (ITA) are legal interests in property held in trust by the U.S. for Indian tribes or individuals. Examples of trust assets include land, minerals, hunting and fishing rights, and water rights. The U.S. has an Indian Trust Responsibility to protect and maintain rights reserved by or granted to Indian tribes or individuals by treaties, statutes, executive orders, and rights further interpreted by the courts. This trust responsibility requires that all Federal agencies take all actions reasonably necessary to protect such trust assets.

The construction or implementation of the Proposed Action or No Action alternatives are not anticipated to affect any ITAs.

3.10 AESTHETICS

The Los Gonzales Acequia, which flows through pasture and croplands for the majority of its route, has a rural aesthetic character. Construction would take place within the Pecos River and the existing ditch;

exposed soil would be reseeded according to the recommended Corps seed mixtures. There would be no significant effect on aesthetic quality from either alternative.

3.11 NOISE

Current noise levels are typical for rural areas. Earthmoving equipment and trucks generate decibel (dB) levels 15 to 30 units higher (LHH 2001) than the prescribed Federal Highway Administration (FHA) recommended levels for residential areas close to highways. Recommended levels of 67 dB are expressed as equivalent sound level (L_{eq}), the constant average sound level, which contains the same amount of sound energy as the varying levels of the traffic noise (FHA 2000). To be considered significant, noise levels must be elevated over the long term. Construction during the acequia rehabilitation would temporarily elevate noise levels, but these levels would not persist. The Proposed Action alternative would not significantly affect noise levels. The No Action Alternative would have no effects, temporary or permanent, because no construction would occur.

3.12 SOCIOECONOMICS

Los Gonzales Acequia is located approximately 2.5 miles southeast of Pueblo, New Mexico, in San Miguel County. No census data exists for Pueblo or any of the other nearby small towns. However, statistics for San Miguel County are assumed to reflect the concentration of people that live in the rural areas and small towns near the project area. Population statistics for the county, State, and nation are presented in **Table 3-2**.

There are 96 acres cultivated by 21 irrigators using water from the irrigation ditch for which improvements are proposed. Typically, local farmers and ranchers supplement their income from the livestock grazed in the pastures irrigated by the acequia. The Proposed Action would make water delivery more reliable, potentially increasing or ensuring productivity on this land. While locally favorable for the affected families and those with whom they trade, the minor beneficial effects would not be significant regionally.

The No Action alternative may result in the disruption of water delivery if the earthen diversion berm could not be rebuilt annually, or if the flow into the acequia heading pipe is blocked by trash and debris until maintenance could be completed. This could adversely affect the families who irrigate from the acequia, but would not be a significant effect regionally.

Table 3-2. Profile of Ethnic and Racial Demographic Characteristics, Year 2000

Geographic Area	*Total Population*	*Race*								*Hispanic or Latino (of Any Race)*
		One Race							*Two or More Races*	
		Total	*White*	*Black or African American*	*American Indian*	*Asian*	*Native Hawaiian and Other Pacific Islander*	*Some Other Race*		
U.S.	281,421,906	274,595,678 (96%)	75%	12%	<1%	4%	<1%	6%	6,826,228 (2%)	35,305,818 (13%)
New Mexico	1,819,046	1,752,719 (96%)	67%	2%	10%	1%	<1%	17%	66,327 (4%)	765,386 (42%)
San Miguel County	30,126	28,821 (96%)	56%	<1%	2%	<1%	<1%	36%	1,305 (4%)	23,487 (78%)

Note: Totals may not equal 100% due to rounding.

Sources: U.S. Census Bureau 2002a,b,c

3.13 ENVIRONMENTAL JUSTICE

EO 12898, Environmental Justice, and EO 13045, Protection of Children, requires that Federal proponents assess how impacts of a Proposed Action may disproportionately affect minority and low-income persons or children under 18 years of age. Minority populations include all persons identified by the U.S. Bureau of the Census to be either of Hispanic race, regardless of country of origin, or all persons not of Hispanic origin other than White (i.e., Black, American Indian, Eskimo or Aleut, Asian or Pacific Islander, or other national origins). Low-income populations include all persons living below the poverty level, identified as a household income for a family of three of less than $12,802 in 1997 (U.S. Census Bureau 1997).

As shown in Table 3-2, San Miguel County has a higher percentage of Hispanics or Latinos (approximately 78 percent) than do the State or nation (42 and 13 percent, respectively). American Indians comprise 2 percent of San Miguel County's population and 10 percent of New Mexico's population, both higher than the national average of less than 1 percent. Unidentified non-White races comprise 36 and 17 percent of the county and State populations, respectively, both of which are higher than the national average of 6 percent. The only non-White races whose percentages are below the national average in New Mexico are Blacks and Asians.

According to the 2000 census, the age of the population that is under 18 years of age is similar for San Miguel County, New Mexico and the United States (27, 28, and 26 percent, respectively) (U.S. Census Bureau 2002a, b, c). The 1999 poverty estimates from the census for the county, State, and national levels are shown in **Table 3-3**. The percentage of minors below the poverty level in San Miguel County and in New Mexico (23 and 25 percent, respectively) are higher than the national percentage (16 percent).

Table 3-3. Percent of Population Below Poverty, 1999 Estimate

	San Miguel County	*New Mexico*	*U.S.*
All Persons (%)	24	18	12
Minors (%)	23	25	16

Source: U.S. Census Bureau 2002d,e

The No Action alternative could conceivably have a negative impact on the 21 irrigators who use the acequia to grow crops and to water their cattle. If the acequia is left as it is without rehabilitation, it would be likely to continue to degrade until it is no longer usable.

The Proposed Action alternative may have a beneficial impact on the 21 irrigators who use the acequia. Assuming that these owners are comprised of a similar racial and ethic mix as the community as a whole, this could provide a positive effect for minorities. Any primary or supplemental income from trading would also be beneficial. The construction would not disrupt or displace any residential or commercial structures. The work has been reviewed for compliance with EO 12898 and it has been determined that the No Action and the Proposed Action alternatives would not adversely affect the health or environment of minority or low-income populations.

3.14 CUMULATIVE EFFECTS OF THE PROJECT

No other foreseeable actions by Federal, State, tribal, or local officials are known to be planned for the project area. According to the field survey of the Los Gonzales Acequia, approximately 1.6 percent of the entire acequia has been previously modified by structures such as culverts and check dams. The Proposed Action would involve primarily reconstructing previously existing structures, so the acequia would not be modified from its original configuration. Therefore, the potential impacts due to the implementation of the Proposed Action would not significantly affect natural, cultural, or socioeconomic resources.

THIS PAGE INTENTIONALLY LEFT BLANK

4.0 CONCLUSIONS

The No Action alternative was rejected because the annual construction of a temporary diversion dam to supply water to the irrigation system is not adequate to preserve the long-term functioning of the acequia. This alternative would not meet the purpose and need of the project to reduce maintenance and improve the reliability of water delivery, nor would it preserve the cultural and historic values of this acequia to the region, as intended under Section 1113 of WRDA.

The Proposed Action is the preferred alternative because it would be beneficial to the entire acequia and its users. It would involve reconstructing a permanent diversion dam for the purpose of reducing the high maintenance requirements and providing a reliable water supply to the acequia, during the growing season and possibly year-round. It would maintain the beneficial use of the acequia, a property eligible for the National Register of Historic Places, and improve the reliability of water delivery. This alternative satisfies the purpose and need for the project and the intent of Section 1113 of WRDA.

THIS PAGE INTENTIONALLY LEFT BLANK

5.0 LIST OF PREPARERS, CONSULTATION, AND COORDINATION

5.1 LIST OF PREPARERS

- Ben Alanis, Corps, Program Manager for Acequia Rehabilitation Program
- Patricia Phillips, Corps, EA Project Manager
- Gregory Everhart, Corps, Archaeologist
- Robin Brandin, SAIC, QA/QC
- Ellen Dietrich, SAIC, Project Manager
- Neal Ackerly, Dos Rios Consultants, Inc., Archaeologist
- David Dean, SAIC, Biologist
- Heather Gordon, SAIC, Environmental Scientist/GIS Specialist
- Winifred Devlin, SAIC, Environmental Scientist

5.2 COORDINATION

A public scoping letter requesting comments on the Proposed Action was mailed on April 19, 2004 to the agencies and tribes listed below. Comments were received from the USFWS, EPA, and the Hopi Tribe. Copies of these comments are included in Appendix A.

- Comanche Indian Tribe
- Hopi Tribe
- Jicarilla Apache Nation
- Kiowa Tribe of Oklahoma
- Los Gonzales Acequia, Fernin Gonzales
- Mescalero Apache Tribe
- Natural Resources Conservation Service
- Navajo Nation
- New Mexico Department of Energy, Minerals, and Natural Resources
- New Mexico Department of Game and Fish
- New Mexico Environment Department
- New Mexico Office of the State Engineer
- New Mexico State Historic Preservation Office
- Pueblo of Cochiti
- Pueblo of Isleta
- Pueblo of Jemez
- Pueblo of Santo Domingo
- Pueblo of Zuni
- San Miguel County
- Tierra y Montes Soil and Water Conservation District
- U.S. Environmental Protection Agency, Region 6
- U.S. Fish and Wildlife Service
- Witchita and Affiliated Tribes

THIS PAGE INTENTIONALLY LEFT BLANK

6.0 REFERENCES

Anonymous 1940 — Anonymous. 1940. Pecos River Basin Survey of Water Resources Utilization and Development. Unpublished manuscript. Office of State Engineer. Santa Fe, NM.

Bailey 1995 — Bailey, R.B. 1995. *Description of the Ecoregions of the United States.* 2nd edition, revised and expanded (1st edition 1980). Misc. Publication No. 1391 (rev.). U.S. Department of Agriculture, Forest Service. Washington, D.C.

Ball 2004 — Ball, Josephine. New Mexico Environment Department, Air Quality Bureau. 2004. Personal communication with Winnie Devlin, Science Applications International Corporation. Albuquerque, NM. May 6.

Baxter 1997 — Baxter, John O. 1997. *Dividing New Mexico's Waters, 1700–1912.* University of New Mexico Press. Albuquerque, NM.

Bullock 1981 — Bullock, Alice. 1981. *Mountain Villages.* Sunstone Press. Santa Fe, NM.

Carroll and Haggard 1942 — Carroll, H. Bailey and Haggard, J. Villasana. 1942. *Three New Mexico Chronicles: The Exposición of Don Pedro Bautista Pino 1812; The Ojeada of Lic. Antonio Barreiro 1832; and The Additions by Don José Agustín de Escudero 1849*. The Quivira Society. Albuquerque, NM.

Dick-Peddie 1993 — Dick-Peddie, William A. 1993. *New Mexico Vegetation: Past, Present, and Future*. University of New Mexico Press. Albuquerque, NM.

Ebright 1994 — Ebright, Malcolm. 1994. *Land Grants and Lawsuits in Northern New Mexico*. University of New Mexico Press. Albuquerque, NM.

Ebright 1987 — Ebright, Malcolm. 1987. New Mexican Land Grants: The Legal Background. In N. Briggs and Van Ness (eds.) *Land, Water, and Culture: New Perspectives on Hispanic Land Grants.* University of New Mexico Press. Albuquerque, NM.

FHA 2000 — Federal Highway Administration. 2000. Highway Traffic Noise in the United States Problem and Response. U.S. Department of Transportation. http://www.fhwa.dot.gov/environment/probresp.htm#procd. April.

Gonzales 2004 — Gonzales, Fermin. Los Gonzales Acequia representative. Personal communication with Ellen Dietrich, SAIC Project Manager. Albuquerque, NM. March 16

Gregg 1954 — Gregg, Josiah. 1954. *Commerce of the Prairies* (reprint). University of Oklahoma Press. Norman, OK.

LHH 2001 — League for the Hard of Hearing. 2001. New York, NY. http://www.lhh.org/noise/decibel.htm. February 1.

Martinez 1990 — Martinez, Frank. 1990. Mora–San Miguel Regional Water Study and Forty-Year Plan. Mora–San Miguel Water Plan Committee. Manuscript on file at the Office of the State Engineer. Santa Fe, NM.

NMED 1998 — New Mexico Environment Department. 1998. Clean Water Action Plan. Unified Watershed Assessment. New Mexico. http://www.nmenv.state.nm.us/swqb/nps_uwa.pdf. September.

NMED 2003 — New Mexico Environment Department. 2003. 2002-2004 State of New Mexico §303(d) List for Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDLS). Surface Water Quality Bureau. Santa Fe, NM. June.

NMGF 2004 — New Mexico Department of Game and Fish. 2004. "New Mexico Species of Concern- San Miguel County." Biota Information System of New Mexico (BISON-M). http://151.199.74.229/States/nm.htm. May.

NMRPTC 1999 — New Mexico Rare Plant Technical Council. 1999. New Mexico Rare Plants. (Version 15. March 2002) Albuquerque, NM. http://nmrareplants.unm.edu.

NMWQCC 2002 — New Mexico Water Quality Control Commission. 2002. Water Quality and Water Pollution Control in New Mexico. Santa Fe, NM.

NRCS 2002 — Natural Resources Conservation Service. 2002. Field Office Technical Guide: Section II Soil Information. San Miguel County. http://www.nrcs.usda.gov/technical/lfotg.

OSE 1924 — Office of the State Engineer. 1924. Hydrographic Report on the Pecos River System. Unpublished manuscript. Santa Fe, NM.

Pearce 1965 — Pearce, Thomas M. 1965. *New Mexico Place Names: A Geographical Dictionary*. University of New Mexico Press. Albuquerque, NM.

Robertson 1934 — Robertson, Walter Joyce. 1934. *Economic and Social Conditions of Rural San Miguel County*. Unpublished M.A. thesis. New Mexico Highlands University. Las Vegas, NM.

SAIC 2004 — Science Applications International Corporation. 2004. Biological field survey of Los Gonzales Acequia Project Area. Albuquerque, NM. March 31.

Scheick 1996 — Scheick, Cherie (ed.). 1996. *A Study of Pre-Columbian and Historic Uses of the Santa Fe National Forest: Competition and Alliance in the Northern Middle Rio Grande*. Santa Fe National Forest. Santa Fe, NM.

U.S. Census Bureau 1997 — U.S. Census Bureau. 1997. Poverty Thresholds. http://www.census.gov/hhes/poverty/threshld/thresh97.html.

U.S. Census Bureau 2002a — U.S. Census Bureau. 2002. Highlights from the Census 2000 Demographic Profiles for the United States. American FactFinder Fact Sheet. http://factfinder.census.gov/. January 25.

U.S. Census Bureau 2002b — U.S. Census Bureau. 2002. Highlights from the Census 2000 Demographic Profiles for New Mexico. American FactFinder Fact Sheet. http://factfinder.census.gov/. January 25.

U.S. Census Bureau 2002c — U.S. Census Bureau. 2002. Highlights from the Census 2000 Demographic Profiles for Rio Arriba County, New Mexico. American FactFinder Fact Sheet. http://factfinder.census.gov/. January 25.

U.S. Census Bureau 2002d — U.S. Census Bureau. 2002. Highlights from the Census 2000 Demographic Profiles for Chama village, New Mexico. American FactFinder Fact Sheet. http://factfinder.census.gov/. January 25.

U.S. Census Bureau 2002d — U.S. Census Bureau. 2002. Income and Poverty in 1999: 2000 for the United States and New Mexico. American FactFinder Census 2000 Summary File 3 Data. http://quickfacts.census.gov/qfd/states/35/35039.html. May.

U.S. Census Bureau 2002e — U.S. Census Bureau. 2002. Income and Poverty in 1999: 2000 for San Miguel County, New Mexico. American FactFinder Census 2000 Summary File 3 Data. http://factfinder.census.gov/. May.

USFS 1996 — U.S. Forest Service. 1996. Section M331F--Southern Parks and Rocky Mountain Ranges. Chapter 43 in *Ecological Subregions of the United States*. USDA Forest Service. http://www.fs.fed.us/land/pubs/ecoregions/ch41.html. October.

USFWS 1995 — U.S. Fish and Wildlife Service. 1995. Lesser Long-nosed Bat Recovery Plan. U.S. Fish and Wildlife Service. Albuquerque, NM.

USFWS 2004 — U. S. Fish and Wildlife Service, Ecological Services. 2004. San Miguel County New Mexico Federally Listed Species List 2003. Albuquerque, NM.

Westphall 1983 — Westphall, Victor. 1983. *Mercedes Reales: Hispanic Land Grants of the Upper Rio Grande Region.* University of New Mexico Press. Albuquerque, NM.

WRCC 2003 — Western Regional Climate Center. 2003. Western U.S. Historical Climate Summaries: New Mexico Chama Station Number 291664. Desert Research Institute. Reno, Nevada. http://www.wrcc.dri.edu/cgi-bin/cliRECtm.pl?nmchat. September.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A
TRIBAL AND PUBLIC SCOPING COMMENTS

SAIC
An Employee-Owned Company

April 19, 2004

U.S. Environmental Protection Agency
Region 6
Office of Planning & Coordination (EM-XP)
1445 Ross Avenue
Dallas, Texas 75202-2733

EPA has reviewed this document and has no comments.

Reviewer: _____ Date: 04/26/04

Mr. Rob Lawrence
U.S. Environmental Protection Agency, Region 6
Office of Planning and Coordination (6EN-XP)
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Mr. Lawrence:

The U.S. Army Corps of Engineers, Albuquerque District (Corps), is preparing an environmental assessment (EA) to evaluate the proposed reconstruction of the diversion dam that regulates the flows for the Los Gonzales Acequia in San Miguel County, New Mexico. The Water Resources Development Act (WRDA) of 1986 (P.L. 99-662) authorized the restoration and rehabilitation of irrigation ditch systems and acequias in New Mexico. Under Section 1113 of WRDA, the Corps, at the request of the State Engineer and Los Gonzales Acequia, is providing assistance through Science Applications International Corporation (SAIC) to prepare the EA. The environmental analysis is being conducted in accordance with the Council on Environmental Quality (CEQ) guidelines pursuant to the National Environmental Policy Act (NEPA) of 1969.

As shown on the attached map, the Los Gonzales Acequia is located approximately 2.5 miles southeast of Pueblo, New Mexico close to State Route 3 along the Pecos River. The original diversion dam was a concrete-capped rock, brush, and wood structure that washed out in July 2001. The acequia ditch, approximately 4 to 5 miles long, is located on the south side of the river, with the proposed new concrete-capped gabion dam spanning the river. Irrigation water is currently supplied for a few months each year by a temporary diversion dam that typically washes out during high flows in July. The proposed action would construct a new diversion dam with fish passage in the location of previous dam to ensure a more reliable water supply for the members of the acequia.

With this letter, the Corps is initiating the public scoping process, as outlined in the CEQ regulations implementing NEPA. It is the goal of this scoping process to gather public comments on the proposed action and alternative, and to identify any concerns or issues relating to the implementation of that action that should be considered in the EA.

During the scoping period, the Corps will be accepting comments from all interested and concerned parties. Please forward your written comments to Ellen Dietrich, Science Applications International Corporation (SAIC), 2109 Air Park Road SE, Albuquerque, NM 87106, or by e-mail to ellen.dietrich@saic.com. All comments must be postmarked by **Thursday, May 20, 2004** to be considered in the environmental impact analysis process.

Thank you for your assistance.

Sincerely,
Science Applications International Corporation

Ellen Dietrich

Ellen Dietrich
SAIC Project Manager
Enc: Location map of Los Gonzales Acequia

THE HOPI TRIBE

Wayne Taylor, Jr.
CHAIRMAN

May 11, 2004

Julie A. Hall, Chief, Environmental Resources Section
Department of the Army, Albuquerque District, Corps of Engineers
4101 Jefferson Plaza, NE
Albuquerque, New Mexico 87109-3435

Recd 6-1-2004
GDE

Dear Ms. Hall,

This letter is in response to your two correspondences to Chairman Taylor dated April 27, 2004, and May 6, 2004, and a correspondence from Science Applications International Corporation dated April 19, 2004, regarding the U.S. Army Corps of Engineers preparing environmental assessments for the proposed (1) rehabilitation of an irrigation flume on the Gurule-Gonzales Acequia system in Gallina, (2) rehabilitation of an irrigation diversion/sluicing structure on the Tierra Amarilla acequia system, and (3) the diversion dam that regulates the flows for the Los Gonzales Acequia in San Miguel County.

The Hopi Tribe claims cultural affiliation to prehistoric cultural groups in New Mexico, and the Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites and Traditional Cultural Properties. Therefore, we appreciate your solicitation of our input and your efforts to address our concerns

The Hopi Cultural Preservation Office is not aware of any Hopi Traditional Cultural Properties in these project areas. However, if the State Historic Preservation Office requests a cultural resources survey or overview of the project areas, please provide us with a copy for review and comment. In addition, we recommend that if any cultural features or deposits are encountered during project activities, these activities must be discontinued in the immediate area of the remains, and the State Historic Preservation Office must be consulted to evaluate their nature and significance. If any Native American human remains or funerary objects are discovered during construction they shall be immediately reported as required by law.

Should you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office at 928-734-3619. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: New Mexico State Historic Preservation Office

Rec'd 5/14/04

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

May 11, 2004

Cons. # 2-22-04-I-458

Ellen Dietrich, Project Manager
SAIC
2109 Air Park Road SE
Albuquerque, New Mexico 87106

Dear Ms. Dietrich:

Thank you for your April 19, 2004, letter requesting information on threatened or endangered species or important wildlife habitats that could be affected by the proposed reconstruction of Los Gonzales Acequia Diversion Dam. The original diversion dam was a concrete-capped rock, brush, and wood structure that washed out in July 2001. The 5-mile acequia has since been supplied by a temporary diversion dam that typically washes out during high flows. The U.S. Army Corps of Engineers proposes to replace the structure by constructing a new concrete-capped gabion diversion dam that spans the river. A fish passage facility would be incorporated into the new structure. The proposed dam would be constructed along the Pecos River, approximately 2.5 miles southeast of Pueblo, San Miguel County, New Mexico.

We have enclosed a current list of federally endangered, threatened, proposed, and candidate species, and species of concern that may be found in San Miguel County, New Mexico.[1] Under the Endangered Species Act, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened.

---

[1] Additional information about these species is available on the internet at <http://nmrareplants.unm.edu, <http://nmnhp.unm.edu/bisonm/bisonquery.php>, and <http://ifw2es.fws.gov/endangeredspecies>.

Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

The proposed dam would consist of rock-filled gabion baskets (gabions) covered by concrete. Gabion structures have been commonly used to control erosion and water flow in and adjacent to streams and rivers. Unfortunately, these structures frequently cause severe habitat damage and exacerbate problems they were intended to repair. This is evidenced by the fact that the former concrete-capped gabion diversion structure for the Los Gonzales Acequia washed-out during high flows in 2001. We, therefore, recommend against the use of gabion and concrete structures wherever possible.

For this project, we recommend using bio-engineered structures constructed of materials predominating the project site (i.e., logs and boulders). These structures should be installed in a manner, and at locations, which facilitate the river's natural dimension, pattern, and profile. To meet grade requirements, several small structures may need to be installed over a reach of stream extending up- and downstream of the diversion site. Mechanical grading of the river channel may be necessary to achieve the proper stream gradient. Structures which should be considered for this project include "V" or "W" weirs, cross-veins, or other similar structures. Vein and weir designs are available which incorporate inlet works for the acequia and sluicing features for sediment and debris control.

Advantages of using bio-engineered structures include: cost savings, reduced maintenance, increased durability, increased stream stability, and habitat improvement in and adjacent to the project site. Bio-engineered structures, if properly installed, would also facilitate up- and downstream passage for all fish species. Artificial structures such as fish ladders are often designed for fish species with relatively fast burst speeds and high levels of swimming endurance (i.e., salmonids). As a result, these structures often preclude fish passage for species with lower burst speeds and swimming endurance (i.e., *Chasmistes* spp.).
With regard to fish and wildlife resources, the environmental assessment (EA) should assess the impacts of the proposed action and its alternatives on species populations and their habitats, with

an emphasis on wetlands, waters of the United States, and native fish, wildlife, and plants. The EA should clearly state the purpose and need of the project, and should include a thorough description of the project area. We also recommend that mitigation for short- and long-term project related impacts be included in the EA. The EA should also include a long-term monitoring and maintenance plan to ensure that the fish passage facility operates according to design.

We also recommend that the acequia inlet be screened to minimize entrainment of fish or eggs in the ditch. If fish entrainment occurs, then mitigation should be developed to offset the resultant impacts to fish populations in and adjacent to the project area.

Construction related disturbances to woody riparian vegetation should also be mitigated. We recommend that woody vegetation (i.e., willows) lost as a result of the project be replaced by establishing 2 acres of native vegetation for every acre impacted. If trees are removed, we recommend a minimum ratio of ten saplings be planted for each mature tree lost. Planting of willow and cottonwood poles should be dense and in a location where adequate water is available to ensure that mitigation is successful. Mitigation should cover the direct removal of vegetation during construction, as well as induced mortality that may occur in future years.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. We appreciate the opportunity to comment early in the planning process for this project. We look forward to providing any information or technical assistance we can to ensure that a bio-engineered diversion structure is constructed for this project. We also look forward to reviewing draft EA for this project when it is available. In future correspondence regarding this project, please refer to consultation # 2-22-04-I-458. If you have any questions about the information in this letter, please contact John Branstetter at the letterhead address or at (505) 346-2525, ext. 4753.

Sincerely,

Susan MacMullin

Susan MacMullin
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

FEDERAL ENDANGERED, THREATENED,
PROPOSED, AND CANDIDATE SPECIES
AND SPECIES OF CONCERN IN NEW MEXICO
Consultation Number 2-22-04-I-458
May 11, 2004

San Miguel County

ENDANGERED

- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Holy Ghost ipomopsis (*Ipomopsis sancti-spiritus*)

THREATENED

- Bald eagle (*Haliaeetus leucocephalus*)
- Mexican spotted owl (*Strix occidentalis lucida*)

CANDIDATE

- Black-tailed prairie dog (*Cynomys ludovicianus*)
- Yellow-billed cuckoo (*Coccyzus americanus*)
- Arkansas River shiner (*Notropis girardi*)***

SPECIES OF CONCERN

- New Mexican meadow jumping mouse (*Zapus hudsonius luteus*)
- Townsend's big-eared bat (*Corynorhinus townsendii*)
- Pecos River muskrat (*Ondatra zibethicus ripensis*)
- Swift fox (*Vulpes velox*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Arctic peregrine falcon (*Falco peregrinus tundrius*)
- Baird's sparrow (*Ammodramus bairdii*)
- Black tern (*Chlidonias niger*)
- Mountain plover (*Charadrius montanus*)
- Northern goshawk (*Accipiter gentilis*)
- Western burrowing owl (*Athene cunicularia hypugea*)
- New Mexico silverspot butterfly (*Speyeria nokomis nitocris*)
- Dwarf milkweed (*Asclepias uncialis* var. *uncialis*)

Index

Endangered	=	Any species which is in danger of extinction throughout all or a significant portion of its range.
Threatened	=	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Candidate	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
Species of Concern	=	Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies. Species of Concern are included for planning purposes only.
***	=	Extirpated in this county

APPENDIX B
CULTURAL RESOURCES SURVEY REPORT

Cultural Resources Survey Report for the Los Gonzales Acequia San Miguel County, New Mexico

By

Neal W. Ackerly, Ph.D.

Prepared by
Dos Rios Consultants, Inc.
P.O. Box 1247
Silver City, NM 88062

under subcontract to

Science Applications International Corporation

for the

U.S. Army Corps of Engineers, Albuquerque District

July 2004

New Mexico Cultural Resources Information System No. 88287

ACRONYM LIST

Corps	U. S. Army Corps of Engineers, Albuquerque District
DOQQ	Digital Ortho Quarter Quad
GPS	Global Positioning System
OSE	Office of the State Engineer
SFNF	Santa Fe National Forest
U.S.	United States
UTM	Universal Transverse Mercator

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 ABSTRACT

On March 30, 2004, archaeologists from Dos Rios Consultants, Inc., subcontractor to Science Applications International Corporation, under contract to the United States (U.S.) Army Corps of Engineers, Albuquerque District (Corps), conducted a cultural resources survey of the proposed project area along the Los Gonzales Acequia in San Miguel County, New Mexico. A Class III field inspection of the construction and staging areas and access road consisted of 100 percent coverage using 15-meter transects on approximately 5.7 acres, and conformed to all State of New Mexico and Federal recording standards. The 3.5 miles of the acequia alignment were also walked to document the acequia and any modifications. The survey was conducted in anticipation of construction of a new diversion dam at the intake of the Los Gonzales Acequia to replace the previous dam that was destroyed by high water two years ago. Since then, the farmers relying on the acequia have had access to irrigation water for only part of the growing season through the use of a temporary diversion berm, which must be reconstructed annually.

No prehistoric or historic archaeological sites, other than the acequia itself (LA143914) were found or are known within or immediately adjacent to the Los Gonzales Acequia. A total of 6 archaeological sites are recorded within ±1.0 miles of the acequia, but none would be affected by the project. The Los Gonzales Acequia is potentially eligible for inclusion on the National Register of Historic Places under criteria (a) and (d) of 36 CFR 60.4. The proposed rehabilitation would have no negative effect on the alignment, form, or function of the acequia system. It is recommended, based on the proposed work and the findings of this cultural resources survey, that a clearance be provided for this proposed rehabilitation project. There would be no adverse effect to historic properties resulting from the proposed rehabilitation project.

2.0 INTRODUCTION

The Corps, in cooperation with the New Mexico State Engineer and Los Gonzales Acequia, is planning a project that would rehabilitate the system's diversion dam. Work would be conducted under the Water Resources Development Act of 1986 (P.L. 99-662), which authorized the Corps to conduct the restoration and rehabilitation of irrigation ditch systems and acequias in New Mexico. Under Section 1113 of the Act, Congress found that New Mexico's acequias date from the eighteenth century and, due to their significance in the settlement and development of the western U.S., should be restored and preserved for their cultural and historic value to the region. The Secretary of the Army 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 proposed improvements to this acequia satisfy the intent and purpose of this legislation. The non-federal financial responsibility of any work carried out under this section of the Act is 25 percent, which is the responsibility of the Acequia.

3.0 DESCRIPTION

The Los Gonzales (also known as Lovato) Acequia is located in San Miguel County (**Figure 1**) and is situated in Township 13N, Range 14E in the SE¼ of Section 36, extending southward through the NE¼ of Section 1 in Township 12N, Range 14E; the W½ of Section 6 of Township 12N, Range 15E; the NW¼ and SE¼ of Section 7 of Township 12N, Range 15E (USGS Sena, NM, 7.5' Quadrangle [1989]; 35105-C4). The Los Gonzales Acequia obtains water from the Pecos River and the system as a whole provides water to 21 irrigators and 96 acres of cultivated land (Gonzales 2004). Farm size averages 4.6 acres, varying between 0.1 and 4.7 acres (OSE 1987:104). Alfalfa is the main crop produced along this acequia.

The Los Gonzales Acequia extends approximately 3.5 miles along the west bank of the Pecos River downstream of the hamlet of La Fragua, New Mexico, with a nominal right-of-way width of 25 feet. Field laterals extending from this main ditch are maintained by individual landowners and are not part of the Los Gonzales Acequia as it is administratively defined. The Los Gonzales Acequia is completely unlined and earthen. Proposed rehabilitation activities include construction of a new diversion dam.

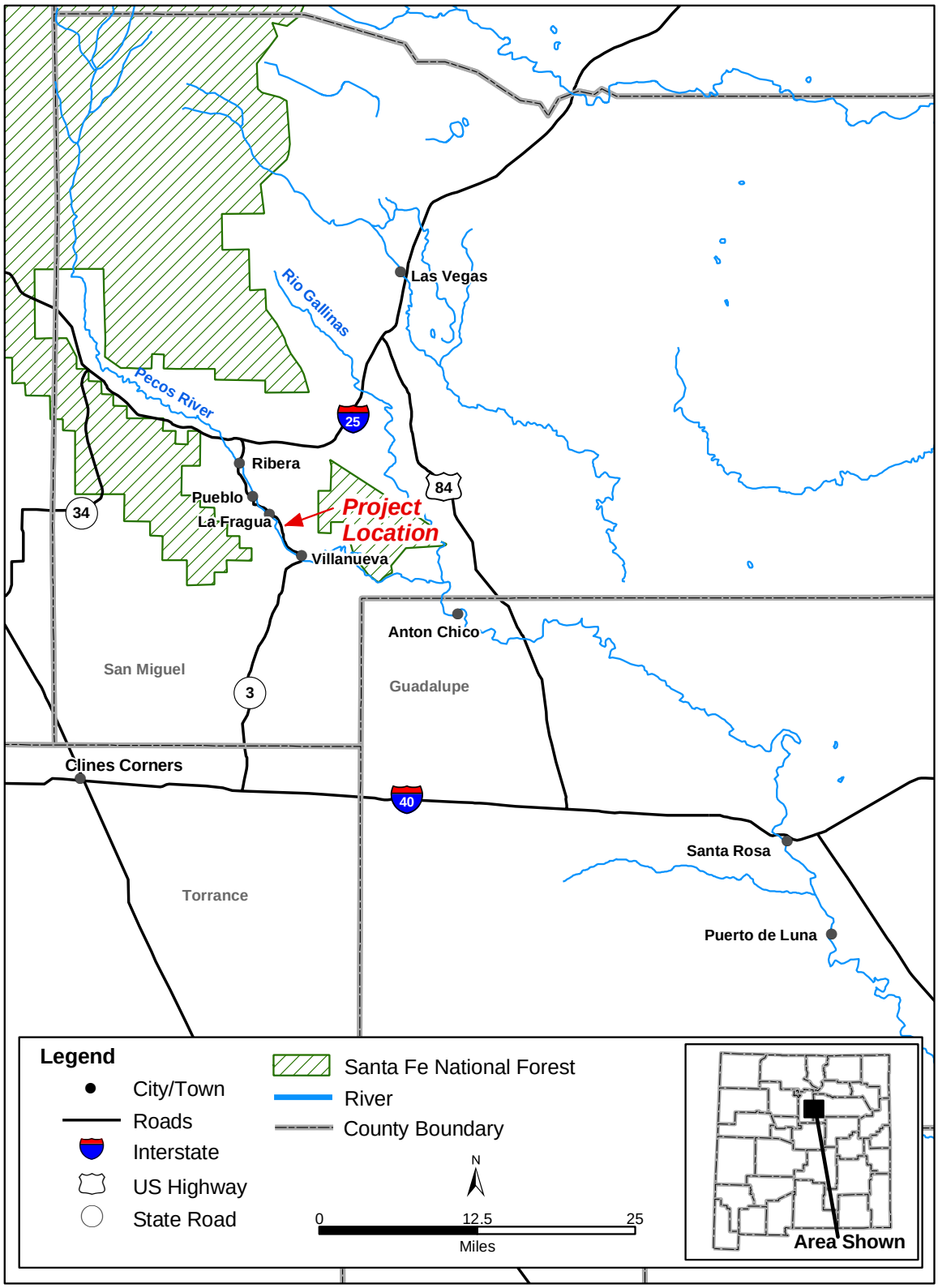


Figure 1. Regional Map of the Los Gonzales Acequia

4.0 CULTURE HISTORY

Much of what is known about the prehistory of the project area derives from archaeological research conducted on adjoining portions of the Santa Fe National Forest (Scheick's Region 4). There are fewer than 200 known sites in Region 4 (Scheick 1996:93), most consisting of limited activity sites.

In general, the prehistory of the Santa Fe National Forest and surrounding region is divided into seven major periods (**Table 1**). The earliest evidence of human occupations in the region is termed PaleoIndian. This is followed by the Archaic Period during which the beginnings of agriculture emerge in the archaeological record. Subsequent prehistoric developments are divided into the Developmental (A.D. 500–1100), Coalition (A.D. 1100–1300), Classic (A.D. 1300–1450), and Protohistoric (A.D. 1450–1598) Periods. The final period, the Historic Period (A.D. 1598–present), encompasses the remainder of cultural manifestations in the planning area. Each of these periods is discussed in more detail below.

Table 1. Alternate Culture History Periodization Schemes

Age	*Pecos (Kidder 1927)*	*Period (Scheick 1996)*	*Periods (Santa Fe NF)*
9000–5000 B.C.	PaleoIndian	PaleoIndian	PaleoIndian
5000–3000 B.C.	Archaic	Early Archaic	Archaic
3000–1800 B.C.		Early-Middle Archaic	
1800 B.C.–A.D. 1		Middle-Late Archaic	
A.D. 1–500	Basketmaker II	Late Archaic	
A.D. 500–700	Basketmaker III	Developmental	Developmental
A.D. 700–900	Pueblo I		
A.D. 900–1100	Pueblo II		
A.D. 1100–1300	Pueblo III	Coalition	Coalition
A.D. 1300–1600	Pueblo IV	Classic	Classic (A.D. 1300-1450)
A.D. 1600–1700	Pueblo V	Protohistoric (A.D. 1450-1598)	Protohistoric
A.D. 1598–1821		Spanish Colonial	Spanish Colonial
A.D. 1821–1846		Mexican	Mexican
A.D. 1846–1912		Territorial	Territorial
A.D. 1912–1945		Statehood	Statehood
A.D. 1945–Present		Atomic	Atomic

Prehistoric Period

PaleoIndian Period (pre-9000 B.C. to 5000 B.C.)

The PaleoIndian Period was characterized by relatively small bands of hunters relying on large, now extinct, Pleistocene megafauna. There is controversy concerning when these peoples first arrived in North America, with progressively earlier dates from sites of this period appearing almost every year. The earliest evidence in New Mexico conforms to the date range indicated above, although earlier sites will likely be found.

The New Mexico sites are consistent with a seemingly primary focus on large game animals such as mammoth and bison, many of which were migratory. PaleoIndian sites are ephemeral, reflecting periodic movement of camps to areas where animals might be found. At the same time, there is some evidence of reliance on plant resources. Sites dating to PaleoIndian times total only 1.3 percent of all known sites (Scheick 1996:134, 238).

PaleoIndian sites are scarce over much of the region perhaps due to the rugged terrain adverse to large animals (Scheick 1996:192). According to Scheick, most PaleoIndian sites are found in lower elevations along the edge of the Plains (1996:238). Sites of this period consist of chipped stone scatters.

Archaic Period (circa 5000 B.C. to A.D. 500)

The Archaic Period is signaled by the extinction of earlier Pleistocene fauna, due to the combined effects of drought and hunting by PaleoIndian peoples. Although hunting continued to be important throughout the Archaic Period, there was greater reliance on gathering of wild plant resources. Consonant with this subsistence shift is the appearance of new classes of artifacts, notably ground stone implements used to process plant foods for consumption. Projectile points decrease in size consistent with hunting of smaller animals.

As in the PaleoIndian Period, Archaic hunting-and-gathering groups seem to have remained small in size, probably consisting of no more than a few co-residential, extended families. Archaic sites are more visible than PaleoIndian sites, but, with some exceptions, remain relatively ephemeral. This is again consistent with high mobility when groups continually move to take advantage of geographic and seasonal variations in the availability of plant and animal resources.

General trends in the number of Archaic sites in the region suggest progressively greater use of the area during this period (Scheick 1996:193, 238). Scheick (1996:134) indicate that Archaic Period sites comprise 23.7 percent of all known sites in Region 4 and most date to late Archaic times (Scheick 1996:238). Of the sites for which information is available, most consist of simple artifact scatters, mostly consisting of stone tool manufacturing localities, without visible evidence of features (Scheick 1996:135, 238).

There are relatively few early Archaic Jay Phase (ca. 5500 to 4800 B.C.) or Bajada Phase (ca. 4800 to 3200 B.C.) sites. There appears to be a progressive increase in site numbers through the middle to late Archaic, including the San Jose (ca. 3000 to 1800 B.C.), Armijo (ca. 1800 to 800 B.C.) and En Medio (800 B.C. to A.D. 400) phases. This implies progressively greater use of the Santa Fe National Forest region throughout the Archaic Period, perhaps in response to population growth.

The earliest evidence of domesticated crops, notably maize, appears at sites nominally associated with En Medio Phase deposits. Direct dates on corn remains suggest that cultigens began to appear in the broader region between 710 B.C. and A.D. 830 (Scheick 1996:194, 241). This presages the much greater reliance on domesticated crops that characterizes the later prehistory of the region.

Developmental Period (A.D. 500 to 1100)

The Developmental Period saw the advent of settled villages dependent on the cultivation of domesticated crops (Scheick 1996:195). Sites dating to the Developmental Period have been interpreted by some as reflecting population in-migration from the northeastern part of New Mexico (Scheick 1996:243–244).

However, of the overall number of known sites in Region 4, only about 1.3 percent are dated to the Developmental Period (Scheick 1996:134, 242). Moreover, the transition to sites containing remains typical of Developmental Period occupations seems to lag behind developments elsewhere by 100–200 years (Scheick 1996:243).

Of the sites for which information is available, early Developmental Period sites generally consist of single residential units, mostly pithouses, and associated refuse deposits (Scheick 1996:242, 244). Later

Developmental Period sites, dating to circa A.D. 900–1200, consist of small rectangular masonry roomblocks (Scheick 1996:244).

Coalition Period (A.D. 1100 to 1300)

The Coalition Period as manifested in Region 4 of the Santa Fe National Forest varies markedly from patterns observed in northern New Mexico. During this period, populations in Chaco Canyon in northern New Mexico and Mesa Verde to the northwest experienced substantial declines accompanied by the wholesale abandonment of sites. During this same period, occupations in the upper reaches of the Pecos River increased substantially, perhaps reflecting in-migration from areas to the west (Scheick 1996:245, 247–248). However, of the overall number of known sites in the region, only about 5.8 percent are dated to the Coalition Period (Scheick 196:134, 245).

Coalition Period settlements, including Pecos Pueblo and the Forked Lightning Ruin, were typified by large above-ground masonry roomblocks, many enclosing a central plaza with subterranean kivas. These settlement patterns are consistent with a very intensive but short-lived occupation of the Santa Fe National Forest lasting approximately two centuries. Most known sites are found in lowland valleys containing agricultural lands (Scheick 1996:245).

Whatever the processes leading to the appearance of Coalition Period settlements, subsequent developments suggest nascent interactions between the region's residents and groups residing in the Plains, most involving the exchange of exotic goods (Scheick 1996:248).

Classic Period (A.D. 1300 to 1450)

Information about the Classic Period derives from archaeological evidence, augmented by the chronicles of early Spanish explorers (Scheick 1996:249) written after the fact. Archaeological data suggest that many Developmental Period pueblos were abandoned and the region's inhabitants reordered into larger, more defensible pueblos (Scheick 1996:252). During this same period, there is evidence that these larger pueblos became major trading centers for the exchange of locally produced agricultural goods for meat (e.g., bison) brought in by groups residing on the Plains (Scheick 1996:252). At the same time, the overall number of known Classic Period sites in Region 4 constitutes only about 5.1 percent of all known sites (Scheick 196:134, 249).

Protohistoric Period (A.D. 1450 to 1598)

The Protohistoric Period encompasses a relatively short interval between initial Spanish contact and the establishment of the first Spanish settlement near San Juan Pueblo to the west in A.D. 1598. In Scheick's Region 4 specifically, Spanish use of the area lagged until circa 1619 (Scheick 1996:253) when the first Spanish settlers, probably grazing livestock on a seasonal basis, appeared in the region.

The character and distribution of sites from this period is not well-known; Protohistoric Period sites comprise only 1.9 percent of all known sites in this region (Scheick 196:134). Current evidence suggests that the consolidation of populations into larger, multi-storied pueblos, many exhibiting defensive characteristics, accelerated during this period (Scheick 1996:253). At the same time, there is evidence of fieldhouses and farmsteads, presumably related to agricultural endeavors, in outlying areas away from large pueblos (Scheick 1996:256). Spanish chroniclers document the presence of intensive Pueblo-Plains trading activities during this period (Scheick 1996:257–259). Pecos Pueblo at this time was rectangular in form, enclosing an internal plaza, and upwards of four to five stories in height. Ground floor storerooms reportedly held agricultural surpluses sufficient for three years and were used as part of food exchanges between the pueblo and groups from the Plains (Scheick 1996:259).

Historic Period

Spanish Colonial Period (A.D. 1598 to 1821)

The Spanish Colonial Period refers to the 218-year period between the establishment of the first Spanish settlement near San Juan Pueblo and Mexican independence in 1821. Occupations dating to this period are relatively uncommon in the region. Of these, most date to the late eighteenth century following a series of treaties with various Indian groups who once occupied the region, which allowed Spanish settlements to be established. It is during the Spanish Colonial Period that the first documentary evidence regarding the acequia specifically begins to emerge.

Archaeological and documentary evidence suggests that the upper reaches of the Pecos River were well-populated by American Indians at the time of Spanish contact in 1540. According to some accounts, Coronado found irrigation systems along the Pecos River as far east as Puerto de Luna, some 5 miles east of Anton Chico and southeast of Las Vegas (Anonymous 1940:50). However, previous archaeological research in Region 4 of the Santa Fe National Forest has found no evidence of occupations dating to this period (Scheick 1996:145).

The Los Gonzales Acequia is situated within the boundary of the San Miguel del Bado (oral Vado) Land Grant. Some have suggested that settlements first appeared in the region that eventually became the San Miguel del Bado Grant as early as 1636 (Ebright 1994:173; Pearce 1965:147; Hayter 2004). Most of this initial settlement was by genizaros, Indians captured or ransomed from various tribes and raised as Christians. Unable or unwilling to return to their home villages, they settled near the headwaters of the Pecos River.

On November 25, 1794, the San Miguel del Bado Grant was formally awarded 52 Spanish settlers (Bullock 1981:59; Pearce 1965:147; Westphall 1983:23), although the grant probably was not actually settled until 1798 (Ebright 1994:173). The grant originally encompassed more than 315,300 acres (Ebright 1987:46). The initial settlement and those that budded off within the boundaries of the original grant (i.e., San José, Las Mulas, Puerticito, Gusano, Bernal, La Cuesta, and Pueblo) were intended to act as a buffer against marauders, primarily Comanches, entering New Mexico from the Plains (Baxter 1997:12).

With the opening of the Santa Fe Trail by Captain William Becknell in 1821, San Miguel del Bado became a customs house for travelers entering the Republic of Mexico (Bullock 1981:60; Ebright 1994:178–179). The 1827 census reported in detail by Barreiro stated that the population of San Miguel del Bado was 2,893 inhabitants (Carroll and Haggard 1942:88; Julyan 1996:319; Eller 2004). Acequias, although not necessarily the Los Gonzales Acequia, were constructed sometime between the initial appearance of settlers in 1798 and the first court records shows lawsuits over acequias in 1827 (Baxter 1997:42).

Mexican Period (A.D. 1821 to 1846)

The Mexican Period encompasses a 25-year period beginning in 1821 and ending with the American occupation of the territory in 1846.

During this period, numerous land grants were awarded in the region, including the Anton Chico Grant (1822) and Town of Mora Grant (1835). These grants, as well as the San Miguel del Bado and Las Vegas Grants, indicate that the region was occupied during this period. Despite this documentary evidence, archaeological research has found no evidence of occupations dating to the Mexican Period in Region 4 of the Santa Fe National Forest (Scheick 1996:Table 4.145). However, documentary evidence provides a relatively detailed outline of developments in the project area.

At the beginning of the Mexican Period, population pressure at San Miguel del Bado, together with general scarcity of agricultural land and irrigation water, led to a petition for some of the same land originally awarded as part of the 1821 Baca Grant (Ebright 1994:179). About thirty families, pleading that

they needed farming lands to support themselves, argued that lands around modern-day Las Vegas were public domain (terreno baldío), requesting that they be awarded the same (Ebright 1994:181; Knowlton 1980:13). In 1835, in response to this request, Governor Francisco Sarracino awarded the Las Vegas community land grant to the petitioners and anyone else who lacked farming lands near San Miguel del Bado (Ebright 1994:180; Ebright 2002). Ebright (1994:182) observed that the actual settlement of Las Vegas was delayed for three years, the first settlers not arriving until 1838.

By the early 1830s, because Indian raids continued to plague San Miguel del Bado, along with other outlying settlements in the Galisteo, Mora, and Pecos basins, it was recommended that a presidio be established at the town (Carroll and Haggard 1942:71, 78). Also in 1835, one of the earlier disputes over illegal water diversion rights broke out in San Miguel (Baxter 1997: 42). The accused, upon insulting the local magistrate during the hearing that followed, was briefly jailed before being released upon order of the governor.

Referring to his travels during the period 1831–1840, Josiah Gregg, in *Commerce of the Prairies* (1954:77), described his first entry into San Miguel del Bado in 1831 as follows:

> Some twenty miles from this place [Gallinas Creek] we entered San Miguel, the first settlement of any note upon our route. This consisted of irregular clusters of mud-wall huts, and is situated in the fertile valley of the Rio Pecos, a silvery little river which ripples from the snowy mountains of Santa Fé—from which city this frontier village is nearly fifty miles to the southeast.

He later added (1954:316):

> On the 13th of February we set out from Santa Fé [to return to the East]; but owing to some delays, we did not leave San Miguel till [sic] the 1st of March. As the pasturage was yet insufficient for our animals, we here provided ourselves with over six hundred bushels of corn, to feed them on the way. This time our caravan consisted of twenty-eight wagons, two small cannons, and forty-seven men, including sixteen Mexicans and a Comanche Indian who acted in the capacity of guide. We also had a caballada of more than two hundred mules, with nearly three hundred sheep and goats.

Notable in Gregg's account is the apparent productivity of agriculture in the vicinity of San Miguel del Bado. Using contemporary conversion factors of 56 pounds/bushel for shelled corn, his purchase of 600 bushels of corn would roughly equal 33,600 pounds or 16.8 tons. This is a staggering amount to be procured from a region with less than 1500 inhabitants!

A customs house at San Miguel del Bado, established in 1830 to control trade along the Santa Fe Trail, further enhanced the town's importance in the regional economy (Bullock 1981:62). Yet, after only five years, the customs house was relocated to Santa Fe in 1835, signaling a gradual decline in the importance of San Miguel del Bado.

According to an 1841 census, the San Miguel del Bado district contained upwards of 319 families averaging 4 individuals per household (Vigil 1959). The total population of the town was 1,296 people. In 1845, another Mexican census showed that the town contained 1,519 inhabitants (Olmstead 1975:262).

Territorial Period (A.D. 1846 to 1912)

The Territorial Period refers to the period between the 1846 arrival of American troops in New Mexico and when New Mexico became a state in 1912. Previous archaeological research in Region 4 of the Santa Fe National Forest has found that Territorial Period occupations comprise 10.4 percent of all known historic period occupations (Scheick 1996:145). Of these, the majority consists of fieldhouses nominally associated with agricultural activities (Scheick 1996:148).

Documentary sources considerably amplify developments in the project area during the Territorial Period. Many of these narratives originate from the memoirs of individuals accompanying General Stephen Kearny's Army of the West. At the time Kearny entered New Mexico in 1846, Lt. James Abert found that San Miguel del Bado was little changed from Gregg's earlier description of the 1830s (Keleher 1962:41):

> This town [San Miguel] is embosomed by high rocky ridges, that rise up in succession, until lost in aerial mists of distance. In the center of the town there is a large church, whose front is flanked by square towers, each containing several bells, and crowned with crosses. On the north side of the town flows the beautiful "Rio Pecos." As I passed the river I noticed the women passing and repassing with immense ollas or jars for carrying water, these they balanced upon their heads, and this custom causes them to walk with great diginity. Many of the young women had their faces hidden under a thick coat of whitewash, and many had bedizened their faces with the juice of the poke berry. The river is three feet in depth and from 16 to 20 in width; there is a rude bridge constructed here for the convenience of foot passengers. As there was [sic] no pasture grounds near the village, I was forced to buy "zacate" [hay, fodder] for my mules.

San Miguel del Bado's importance is further underscored by its role under the Kearny decree of 1846 in which San Miguel del Bado was accorded the same importance as Santa Fe, Rio Arriba, and Taos:

> SEC. 7. Until the legislative power shall otherwise direct, the territory of New Mexico shall retain the division of counties and districts established by the decree of the department of New Mexico, of June 17, 1844, and they shall be represented as follows: In the house of representatives, the county of Santa Fe shall have three members; the county of San Miguel del Bado, three; the county of Rio Arriva [sic], three; the county of Valencia, five; the county of Taos, three; the county of Santa Anna, two; and the county of Bernalillo, two. In the legislative council, the central district shall have three members; in the northern district two members; and the southeastern districts two members; which apportionment shall continue until otherwise directed by law.

In 1846, Adolph Wislizenus, traveling with Doniphan's detachment, passed through San Miguel del Bado, commenting (1969:18):

> Passed this morning through San Miguel, or Rio Pecos. The place seems somewhat larger and wealthier than las Vegas [sic]. A church, built of adobe, is the prominent building in town. San Miguel is the most southern point on the Santa Fe road, and from here our mountain road takes a northwestern direction.

San Miguel del Bado ranked fourth in size in population in New Mexico in the early 1800s. Documentary studies have later found that the Los Gonzales Acequia was probably constructed no later than 1860 (Martinez 1990:32). This was likely due, in some measure, to the demand for agricultural commodities at Ft. Union.

Throughout the Territorial Period, the church and San Miguel del Bado continued to play an important role in the community. In 1859, Rev. J. B. Guerin was the priest for the village and surrounding communities (Salpointe 1967:219, 223). The arrival of the priest was always a time for celebration, as Salpointe's first-person account so vividly demonstrates (1967:239–240):

> When a priest was appointed to a parish, he was, at his first appearance in it, given a reception, not very brilliant in every case, but always cordial, and as good as circumstances would afford. In the country places, the ceremony took place generally in front of the chapel on the first occasion the priest had to say mass in it. The principal actors were the fiddlers, the guitar players, the drummer, some men with firearms and poet whose duty it was to extemporize some crude complimentary verses which did not always bear the stamp of novelty. After this performance, the priest might return the

> compliment on the spot, and then proceed into the chapel for the celebration of mass. The Mexican people have always distinguished themselves by their hospitality, not only to their priests, but to any stranger who might come to their houses, even if they had to beg from their neighbors to accommodate their guests.

In 1866, Bishop Lamy assigned Rev. J. B. Fayet to the parish in San Miguel del Bado (Salpointe 1967:209). Upon his arrival, he added two towers (still present) to the edifice of the church and built both the girls' and boys' schools in the town (Salpointe 1967:209).

The following year, in 1867, John Chisum established his ranch headquarters near Four Mile Bend, some 31 miles north of Roswell, New Mexico. Driving cattle northward on the "Chisum Trail" to supply beef to the soldiers at Ft. Union contributed substantially to the development of ranching and farming along the margins of the Pecos River (Anonymous 1940:51).

During the Territorial Period, the land grant at San Miguel del Bado became an inadvertent test case of the intent of the United States to honor its obligations under the Treaty of Guadalupe–Hidalgo. In 1879, the U.S. Surveyor General confirmed that the San Miguel del Bado Grant was entitled to the original 300,000 acres originally awarded by the Spanish Crown in 1794.

Following a series of appeals, the U.S. Supreme Court in *U.S. vs. Sandoval* decreed in 1896 that commons lands formerly held by the grant's inhabitants were, in fact, property of the United States (Ebright 1987:46, 1994:48; Scheick 1996:317; Westphall 1983:265). This decision limited the grant to only about 5,024 acres. The loss of community lands contributed substantially to the rapid decline in the importance of San Miguel del Bado (Westphall 1983:256). Some of the town's residents then made use of the Homestead Act in an effort to eventually recover some portion of their original "commons" holdings (Ebright 1994:268; Rosenbaum and Larson 1987:293); the rest became part of the National Forest System.

In 1879, the New Mexico and Southern Pacific Railroad Company, a construction company for the Atcheson, Topeka, and Santa Fe Railroad, completed construction of a rail line into Las Vegas (Robertson 1986:216), and San Miguel del Bado lost its importance as a regional trading center (Anonymous 1940:51; Bullock 1981:62; Mitchell 2003). San Miguel del Bado's location away from major rail lines, in conjunction with the loss of its common lands in 1896, signaled its gradual decline in both economic and political importance. Instead, its former role was assumed by Las Vegas.

Statehood Period (A.D. 1912 to 1945)

The Statehood Period refers to the interval between 1912 and the culmination of World War II. Previous archaeological research in Region 4 of the Santa Fe National Forest has found that Statehood Period sites comprise 27.6 percent of all known historic period sites (Scheick 1996:145). Of these, the majority consists of cabins and trails/roads consistent with reliance on extractive activities (e.g., lumbering) and the gradual development of transportation infrastructure in the region (Scheick 1996:148).

By 1914, a general overview of irrigation development along the Pecos River noted many irrigation systems, with general descriptions of diversion dams and irrigation systems as described below (Fogg 1915:19):

> There is no record of the age of these works; doubtless many are quite recent, but it is known that for about 300 years these valleys have been farmed and perhaps their cultivation antedates that time, so that some of the canal systems are undoubtedly very old. The construction is, in all cases very crude. The diversion dams are constructed of logs and brush, with boulders to create stability; these dams are usually 6 to 8 feet in height, and from 75 to 200 feet long. The crest forms the spillway for the river's flow, and the Mexicans have encountered considerably difficulty in combatting [sic] the floods

> which annually course down this river, and damage their structures. The headworks are of very crude type, and the canals, in most instances, are but a few miles in length.

According to a 1924 hydrographic report by the Office of the State Engineer (OSE), the Los Gonzales Acequia at this time irrigated only 97.88 acres (OSE 1924:Summary of Diversions, Section 5). The acequia had a capacity of 1.5 cubic feet per second and, between 1920 and 1922, farmers had diverted between 1500 and 2113 acre-feet of irrigation water. Assuming an average supply of 3.5 acre-feet of water, the estimated water needed to cultivate the 97.88 acres was about 342 acre-feet. The OSE (1924) noted that: "A great deal of this flow is carried during flood periods and, with no storage facilities, is available only to a limited extent at the different diversions." Most of the diversion structures consisted of brush-and-rock dams that had to be rebuilt annually due to flood damage.

By 1930, Robertson (1934:5) indicates that San Miguel County's agricultural pursuits focused, in order of declining frequency, on the cultivation of corn (9,692 acres), hay (9,393 acres), wheat (2,877 acres), and oats (1,523 acres). Crop yields averaged 13.9 bushel per acre (bu/ac), 1.3 tons per acre, 13.8 bu/ac, and 17.2 bu/ac, respectively (Robertson 1934:5). There were, as well, over 51,000 head of cattle and almost 54,000 head of sheep (Robertson 1934:6). Most of the county's farms were operated by owners, and tenant-run farms were uncommon (Robertson 1934:8). It is likely that agricultural and ranching pursuits in and near San Miguel del Bado mirrored these county-wide patterns.

5.0 METHODOLOGY AND SURVEY RESULTS

5.1 Methodology

The cultural resources survey of the proposed project area and the Los Gonzales Acequia alignment was preceded by a check of the sites files at the New Mexico Cultural Resources Information System (NMCRIS) in Santa Fe.

A Class III field inspection of the construction and project areas and access road consisted of 100 percent coverage on approximately 5.7 acres, and conformed to all State of New Mexico and Federal recording standards. Additional documentation of the acequia included walking the alignment beginning at the diversion dam/intake and extending downstream to its terminus, and recording the locations of water control structures (e.g., culverts, check structures, taps) in addition to an on-the-ground inspection of the entire acequia. The acequia was dry at the time of this inventory since the diversion structure was damaged two years ago. The acequia is not lined with concrete, so that detailed inspections of the sides and bottom of the earthen (unlined) portions of the ditch alignment were possible.

Survey methods conformed to State of New Mexico and Federal standards, with a crew spacing that did not exceed 15 meters. Coordinates of the construction and staging area perimeters, the ditch centerline, and any structures along the acequia were collected using a Garmin 76S 12-channel Global Positioning System (GPS) receiver. In general, positional accuracy during the recording period conformed to intrinsic GPS receiver standards of ± 3 to 5 meters.

5.2 Previous Archeological Studies

A total of 23 prehistoric and historic archaeological sites have been recorded within a 3-mile radius of the acequia. These surveys were conducted as part of fiber optic projects, prior acequia rehabilitation projects, and other proposed construction in the area (Swan 1995; Harlan, 2002). Of these, five are prehistoric occupations dating between A.D. 1 and 1450, most of which are prehistoric sites consisting of sherd-and-chipped stone scatters.

Six recorded archaeological sites are directly related to historic occupations in the vicinity. These include the San Miguel Historic District proper (LA2734), the Ribera (LA100560) and Garambullo Acequias (LA109295), historic roads/trails (LA127490), and the gallows that once served the town of San Miguel (LA134849) (Kneebone 1995).

The remaining 12 sites contain artifacts and features indicating occupations during both the prehistoric and historic periods. The prehistoric components present at these sites date between 9500 B.C. and A.D. 1450, while the historic components date between A.D. 1600 and 1999. The majority of the historic components, however, are related to mid to late nineteenth-century activities in or near San Miguel.

5.3 Survey Results

Six archaeological sites have been recorded in NMCRIS within 1 mile of the acequia. These include 2 Anasazi sites, one a large pueblo (LA1761) and one isolated room (LA138662); 2 artifact scatters (LA109591 and LA134876); a possible Protohistoric Plains site (LA138661); and the Garambullo Acequia (LA109295). The Los Gonzales Acequia has been recorded as LA143914. There are no known Traditional Cultural Properties within the construction and staging areas.

None of the recorded sites are within the area of proposed effect for the Los Gonzales Acequia rehabilitation. Accordingly, none would be affected by this proposed undertaking.

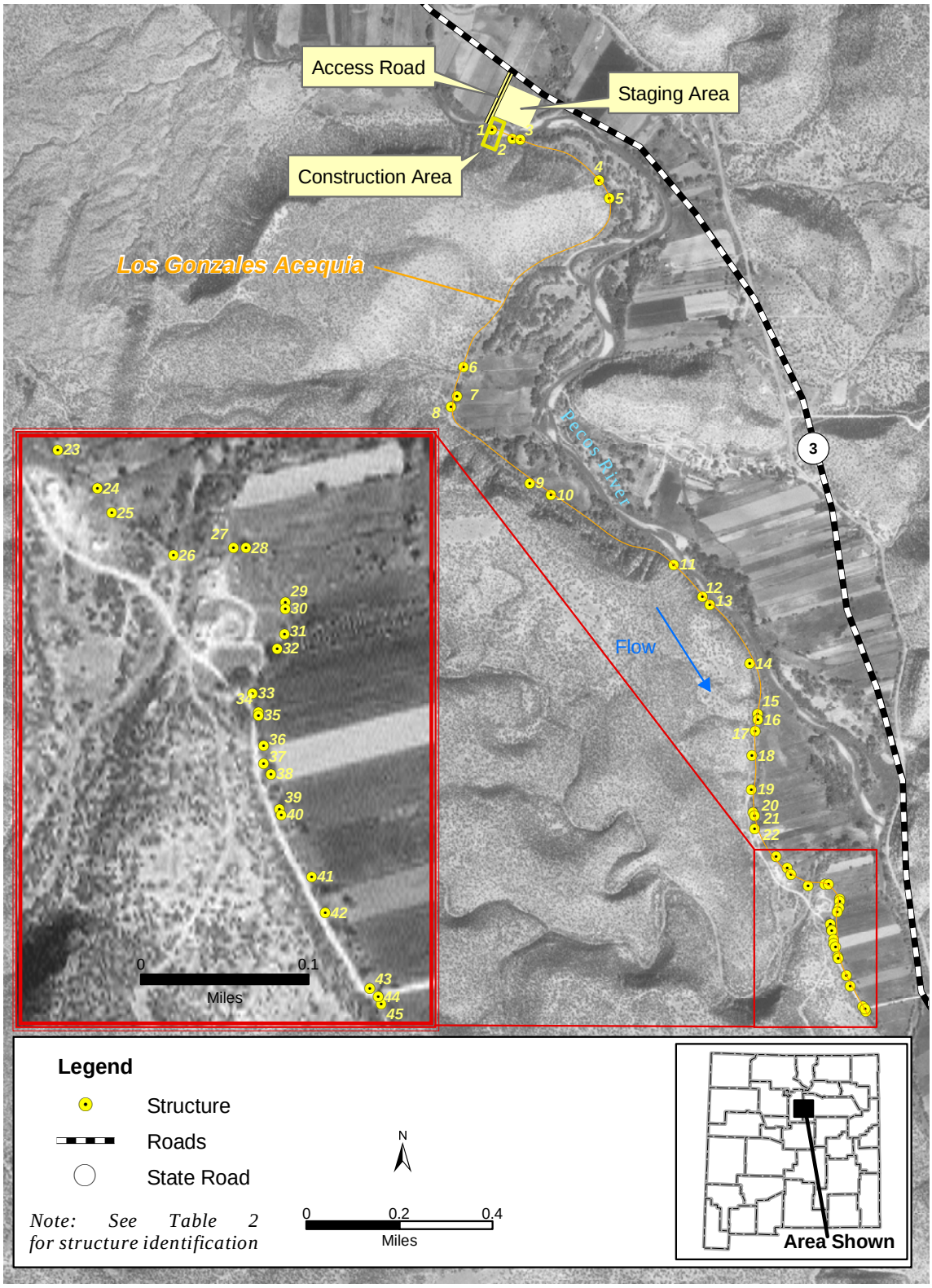
Locations of irrigation structures (e.g., culverts, bridges, checks, and taps) within the acequia were recorded using the GPS receiver discussed above. Photographs of representative examples of irrigation structures were also taken. **Table 2** lists the locations and attributes of water control and related structures along the acequia alignment, shown in **Figure 2.** Representative examples of water control structures are presented in **Photographs 1** through **10**.

Table 2. Locations of Structures and Key Points in the Los Gonzales Acequia

Point #	*UTM*		*Structures*
	Easting	*Northing*	
1	463474	3907176	Intake
2	463544	3907144	Gate
3	463571	3907142	Sluice
4	463843	3907003	Photograph 4
5	463878	3906940	Photograph 5
6	463374	3906362	Culvert
7	463352	3906261	Tap
8	463332	3906223	Check/Tap
9	463603	3905962	Tap
10	463677	3905922	Tap
11	464101	3905681	Culvert
12	464200	3905572	Culvert
13	464225	3905545	Culvert
14	464363	3905343	Check/Tap
15	464390	3905169	Culvert
16	464392	3905147	Retaining Wall
17	464383	3905110	Tap

Point #	*UTM*		*Structures*
	Easting	*Northing*	
18	464371	3905026	Check/Tap
19	464370	3904910	Culvert
20	464375	3904830	Culvert
21	464380	3904820	Tap
22	464381	3904773	Culvert
23	464454	3904678	Check/Tap
24	464492	3904641	Culvert/Tap
25	464506	3904618	Culvert
26	464565	3904577	Culvert/Tap
27	464623	3904584	Culvert
28	464635	3904584	Check/Tap
29	464673	3904532	Check/Tap
30	464673	3904526	Bridge
31	464672	3904502	Check/Tap
32	464665	3904488	Culvert
33	464641	3904445	Tap
34	464647	3904427	Tap
35	464647	3904424	Bridge
36	464652	3904395	Tap
37	464652	3904378	Culvert
38	464659	3904368	Check/Tap
39	464667	3904334	Check/Tap
40	464669	3904329	Check
41	464698	3904270	Check/Tap
42	464711	3904235	Culvert
43	464754	3904163	Culvert
44	464762	3904155	Culvert
45	464765	3904148	Check/Tap

Notes: UTM - Universal Transverse Mercator
Coordinates are in UTM Zone 13, North American Datum of 1927, collected using a GPS with ± 3 to 5 meter accuracy.



Source: Adapted from USGS Digital Ortho Quarter Quad (DOQQ): Sena SE, NM; 1996-1998 (RGIS 2004)

Figure 2. Los Gonzales Acequia Key Points and Structures

Photograph 1. Intake of the Los Gonzales Acequia (Point #1)
(Taken in summer of 2002)

Photograph 2. Regulating Gate of the Los Gonzales Acequia (Point #2)

Photograph 3. Sluice Gate of the Los Gonzales Acequia (Point #3)

Photograph 4. The Los Gonzales Acequia Ditch Configuration (Point #4)

Photograph 5. Combined Check/Tap Structure; Los Gonzales Acequia (Point #5)

Photograph 6. Combined Check/Tap Structure; Los Gonzales Acequia (Point #18)

Photograph 7. Culvert to Prevent In-filling from Side Slope Erosion (Point #11)

Photograph 8. Dry-laid Stone Retaining Wall to Prevent Erosion (Point #16)

Photograph 9. Tap on the Los Gonzales Acequia (Point #36)

Photograph 10. Tap on the Los Gonzales Acequia (Point #9)

6.0 CONCLUSIONS

No prehistoric or historic archaeological sites were found or are known within or immediately adjacent to the Los Gonzales Acequia. A total of 6 archaeological sites are recorded within 1 mile of the acequia, but none would be affected by the proposed project. The Los Gonzales Acequia (LA143914) is potentially eligible for inclusion on the National Register of Historic Places under criteria (a) and (d) of 36 CFR 60.4. Documentary studies suggest that the Los Gonzales Acequia was probably constructed no later than 1860 (Martinez 1990:32), although a priority date has not yet been adjudicated.

It is likely that the Los Gonzales Acequia was successively modified many times during its more than 140 years of operation. None of the acequia is lined and little disturbance of the system has occurred, other than annual ditch cleaning. There are 20 structures, including culverts, a retaining wall, and a check dam, that comprise the most significant disturbance to the ditch. If each of these 20 structures identified in Table 2 averages 15 feet along the acequia, this would total 300 feet, or approximately 1.6 percent of the total 3.5 miles, currently modified by structures. Because the proposed construction would replace the previously washed out diversion dam, it would add little to the total modification of the acequia system.

The Los Gonzales Acequia obtains water from the Pecos River and the system as a whole provides water for 21 irrigators cultivating approximately 96 acres of pasture. It remains pivotal to the economy and cultural characteristics of the local area.

The proposed rehabilitation would have no effect on the alignment, form, or function of the acequia system. It is recommended, based on the proposed work and the findings of this cultural resource survey, that a clearance be provided for this proposed rehabilitation project. There would be “No adverse effect to historic properties” resulting from the proposed rehabilitation project.

THIS PAGE INTENTIONALLY LEFT BLANK

7.0 REFERENCES

Anonymous

1940 Pecos River Basin Survey of Water Resources Utilization and Development. Unpublished manuscript. Office of State Engineer. Santa Fe, NM.

Baxter, John O.

1997 *Dividing New Mexico's Waters, 1700–1912.* University of New Mexico Press. Albuquerque, NM.

Briggs, Charles L. and John R. Van Ness

1987 *Land, Water, and Culture: New Perspectives on Hispanic Land Grants*. University of New Mexico Press. Albuquerque, NM.

Bullock, Alice

1981 *Mountain Villages*. Sunstone Press. Santa Fe, NM.

Carroll, H. Bailey and J. Villasana Haggard

1942 *Three New Mexico Chronicles: The Exposición of Don Pedro Bautista Pino 1812; the Ojeada of Lic. Antonio Barreiro 1832; and the additions by Don José Agustín de Escudero 1849*. The Quivira Society. Albuquerque, NM.

Ebright, Malcolm

1987 New Mexican Land Grants: The Legal Background. In N. Briggs and Van Ness (eds.) *Land, Water, and Culture: New Perspectives on Hispanic Land Grants.* University of New Mexico Press. Albuquerque, NM.

1994 *Land Grants and Lawsuits in Northern New Mexico*. University of New Mexico Press. Albuquerque, NM.

2002 Land Grant History of the Valles Caldera, or Baca Location No. 1. http://www.lajicarita.org/02feb.htm

Eller, Peter

2004 *Restoration of the Church Statue in the New Mexico Village of San Miguel del Vado*. http://nmsantos.com/cgi-local/shop.pl/page%3DEller52.htm

Fogg, P. M.

1915 Report on an Investigation of the Pecos River Valley in New Mexico. U.S. Reclamation Service, National Archives and Records Administration (NARA), RG 115, BOR, Engineering and Research Center. Project Report. Federal Records Center. Denver, CO.

Gonzales, Fermin

2004 Los Gonzales Acequia representative. Personal communication with Ellen Dietrich, SAIC Project Manager. Albuquerque, NM. March 16.

Gregg, Josiah

1954 *Commerce of the Prairies* (reprint). University of Oklahoma Press. Norman, OK.

Harlan, Mark E.

2002 Testing Plan for LA134876 for the ENMR Plateau El Valle Route Fiber Optic Route Near La Fragua, San Miguel County, New Mexico. Lone Mountain Archaeological Services.

Hayter, Delmar

2004 *Handbook of Texas On-line, Pecos River.* http://www.tsha.utexas.edu/handbook/online/articles/view/PP/rnp2.html

Julyan, Robert

1996 *The Place Names of New Mexico*. University of New Mexico Press. Albuquerque, NM.

Keleher, William A. (ed.)

1962 *Abert's New Mexico Report, 1846–'47.* Horn and Wallace Publishers. Albuquerque, NM.

Kidder, Alfred V.

1927 Southwestern Archaeological Conference. *Science* 66 (17160:489-491).

Kneebone, Ronald

1963 A Cultural Resources Inventory of the Garambullo Acequia, San Miguel County, New Mexico. U.S. Army Corps of Engineers, Albuquerque District. Albuquerque, NM.

Knowlton, Clark S.

1980 The Town of Las Vegas Community Land Grant: An Anglo-American Coup D'Etat. In John R. Van Ness and Christine M. Van Ness (eds.) *Spanish and Mexican Land Grants in New Mexico and Colorado*, pp. 12–21. Sunflower University Press. Manhattan, KS.

Martinez, Frank

1990 Mora–San Miguel Regional Water Study and Forty-Year Plan. Mora–San Miguel Water Plan Committee. MS on file at the Office of the State Engineer. Santa Fe, NM.

Mitchell, Karen

2003 History of the Dominguez Family. http://www.kmitch.com/Taos/dominguez.html

Olmstead, Virginia L.

1975 New Mexico Spanish and Mexican Colonial Censuses, 1970, 1823, 1845. New Mexico Genealogical Society. Albuquerque, NM.

Office of the State Engineer (OSE)

1987 Surface Water Irrigation Organizations in New Mexico. Office of the State Engineer. Santa Fe, NM.

1924 Hydrographic Report on the Pecos River System. Unpublished manuscript. Office of the State Engineer. Santa Fe, NM.

Pearce, Thomas M.

1965 *New Mexico Place Names: A Geographical Dictionary*. University of New Mexico Press. Albuquerque, NM.

Resource Geographic Information System (RGIS) Program

2004 USGS Sena SE, DOQQ, GeoTIFF, 1.0 Meter resolution, UTM, NAD83, Flown: 1996-1998. Earth Data Analysis Center, University of New Mexico, Albuquerque, NM. http://rgis.unm.edu

Robertson, Donald B.

1986 *The Encyclopedia of Western Railroad History, The Desert States: Arizona, Nevada, New Mexico and Utah*. Caxton Printers. Caldwell, ID.

Robertson, Walter Joyce

1934 Economic and Social Conditions of Rural San Miguel County. Unpublished M.A. thesis. New Mexico Highlands University. Las Vegas, NM.

Rosenbaum, Robert J. and Robert W. Larson

1987 Mexicana Resistance to the Expropriation of Grant Lands in New Mexico. In N. Briggs and Van Ness (eds.) *Land, Water, and Culture: New Perspectives on Hispanic Land Grants.* University of New Mexico Press. Albuquerque, NM.

Salpointe, Rev. John Baptist

1967 *Soldiers of the Cross*. Calvin Horn Publisher. Albuquerque, NM.

Scheick, Cherie (ed.)

1996 A Study of Pre-Columbian and Historic Uses of the Santa Fe National Forest: Competition and Alliance in the Northern Middle Rio Grande. Santa Fe National Forest, Contract No. 53-8379-0-06. Santa Fe, NM.

Swan, Susan

1995 Cultural Resources Survey of Alternative Routes for ENMR Telephone Cooperative's Fiber Optic Cable Project. Northern Research Group.

Vigil, Julián Josué

1959 San Miguel del Bado 1841 Census. Unpublished manuscript. New Mexico Highlands University. Las Vegas, NM.

Westphall, Victor

1983 *Mercedes Reales: Hispanic Land Grants of the Upper Rio Grande Region.* University of New Mexico Press. Albuquerque, NM.

Wislizenus, Adolph

1969 Memoir of a Tour to Northern Mexico Connected with Colonel Doniphan's Expedition in 1846 and 1847. Calvin Horn Publisher, Inc. Albuquerque, NM.