

Pueblo of Sandia Rio Grande Bosque Rehabilitation Project

Draft Environmental Assessment and Finding of No Significant Impact



Prepared for

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and

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U.S. DEPARTMENT OF THE INTERIOR

**BUREAU OF RECLAMATION
ALBUQUERQUE AREA OFFICE
ALBUQUERQUE, NEW MEXICO**

**DRAFT
FINDING OF NO SIGNIFICANT IMPACT
NUMBER: AAO-07-018**

SANDIA BOSQUE RESTORATION

Manager, Environment Division

Date

Area Manager, Albuquerque Area Office

Date

DRAFT
Finding of No Significant Impact
Sandia Bosque Restoration

BACKGROUND

The Rio Grande bosque (bosque) has been a crucial ecological and cultural component for the Pueblo of Sandia for thousands of years. The river and the vegetation communities it supports are important sources of plants and animals on which the Pueblo of Sandia relies. However, this riparian ecosystem has undergone dramatic degradation in the past century due to flood control, water diversions, drought, and other human-caused and environmental factors. Changes have reduced flows in the river and induced encroachment by non-native saltcedar (*Tamarix ramosissima*), Russian olive (*Elaeagnus angustifolia*), and tree of heaven (*Ailanthus altissima*), leading to a loss of habitat for wildlife, including the endangered Rio Grande silvery minnow (RGSM) (*Hybognathus amarus*) (Sublette et al. 1990; Bestgen and Platania 1991) and Southwestern willow flycatcher (Flycatcher) (*Empidonax trailii extimus*) (Sogge et al. 1997). In 2001 the United States Fish and Wildlife Service (USFWS) issued a Biological Opinion regarding the effects of water management practices on the RGSM, Flycatcher, and several other species. The USFWS concluded that if the Bureau of Reclamation (Reclamation) management practices used at the time were continued, they would likely jeopardize the continued existence of the RGSM and Flycatcher. Therefore, the USFWS developed a Reasonable and Prudent Alternative (RPA) to avoid placing these species in jeopardy in accordance with the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.). The United States Army Corps of Engineers and the Reclamation have initially accepted the general provisions of the RPA.

Several federal documents outline a strategy for habitat restoration that would benefit these species and implement the provisions of the RPA. For example, the Science Subcommittee of the Middle Rio Grande Endangered Species Act Collaborative Program Science Subcommittee (2004) wrote:

Potential for successful survival and recovery of silvery minnow populations along the reaches of the MRG that are subject to drying would increase with additional and larger regularly wetted (irrigated) refuge pools.

In recent years, restoring habitat for the RGSM has become a high priority for several federal, state, and tribal organizations. Reclamation has already implemented several such projects, including one similar in scope and nature to the project proposed herein.

The Pueblo of Sandia has worked with Reclamation since 2000 to improve and restore terrestrial wildlife habitat in the bosque. Most projects to date have involved removing non-native saltcedar and Russian olive. With Reclamation funding, the Pueblo of Sandia proposes to initiate additional aquatic habitat improvements with the creation of either a riverine high-water channel through the bosque, or improvements to the existing Rio Grande shoreline. The goals of these projects are to improve RGSM adult and juvenile over-wintering habitat, egg retention habitat, and rearing habitat.

This Environmental Assessment (EA) has been prepared to evaluate the potential impacts of these riverine habitat restoration techniques and projects on the environmental conditions and natural and resources of the Pueblo of Sandia, in compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. 4331-4335).

SUMMARY OF THE PROPOSED ACTION

The proposed action is to construct a meandering channel through part of the currently abandoned floodplain that connects to surface water of the Rio Grande. The channel would be located in a historical side channel on the abandoned floodplain (riparian areas in the bosque no longer regularly flooded). The Pueblo of Sandia has already cleared non-native vegetation from the restoration area. Some larger woody debris is available nearby to be placed in the channel to provide cover for aquatic species, especially the RGSM. Additional site preparation may include some maintenance for saltcedar re-sprouts, and cutting or mowing weeds prior to channel construction.

The mouth to the channel would be left open, with no mechanical means of closure. Similarly regulated channels have been constructed at the Los Lunas Habitat Restoration Site adjacent to Los Lunas, New Mexico and in the Albuquerque Reach near Central Avenue. The width of the channel is estimated to be 56 feet top width by 8 feet deep, with 3:1 sloped sides. The total length of the channel is approximately 1,680 feet. This would encompass an area of 2.2 acres.

Excavation of the restoration site for the channel would begin above the ordinary high water mark (OHWM) and continue to below the OHWM. Final elevations would be determined once the full range of flows has been established, and the objectives for water holding within the channel would be determined. Based on preliminary estimates, approximately 8.5 cubic yards of material would be generated per linear foot of the excavated channel. It is anticipated that some of this material would be placed along the bank of the new channel to strengthen it, and the remainder would be placed along the levee in already disturbed areas on the Pueblo of Sandia. In addition, some material may be stored and used for road improvements. Construction would likely begin in the fall during low flow conditions, and after resident birds had completed nesting.

The high-flow channel option would provide benefits to RGSM by providing a slow-moving habitat into which RGSM eggs could settle out of the current and shallow areas in which the fish could spawn. In addition, riparian birds, mammals, reptiles, and amphibians would find improved habitat along the channel.

Following construction, approximately 5 acres of native plants including coyote willow (*Salix exigua*) and Gooding's willow (*Salix gooddingii*) would be planted in patches along the margins of the channel to reduce erosion. Other native vegetation, including cottonwood (*Populus deltoides*), willow (*Salix* spp.) poles and New Mexico olive (*Forestiera pubescens*), would be planted on disturbed areas (channel margins, access routes, staging areas, etc.). The plantings would stabilize the channel, reduce erosion, and provide habitat for RGSM egg retention. The channel would be lined with native willows and native grasses would be seeded in other disturbed areas with a tractor and grass drill. Cottonwood pole planting or live trees would be planted at a density of 10 trees per acre adjacent to the channel. Holes for the poles would be drilled with an auger powered by a small bobcat tractor. Vegetation would be purchased from local stock to promote genetic compatibility with local native vegetation. Logs would be placed in the channel to provide cover and habitat for aquatic species.

The Pueblo of Sandia would monitor the site for vegetative survival and re-growth, channel characteristics, and the presence of birds (especially the Flycatcher), and other wildlife. Complete site restoration would likely take several years as plants get firmly established. Ultimately, long-term wildlife use (including the RGSM and Flycatcher), habitation, and reproductive success would need to be assessed and quantified. Existing RGSM and Flycatcher monitoring protocols established by the USFWS would be employed at the site. These long-term monitoring efforts would be addressed in detail with the creation of a bosque Monitoring Plan. The Pueblo of Sandia conducts monthly monitoring of the RGSM with the USFWS. This monitoring has been conducted since 2002. The Pueblo of Sandia would explore the possibility of establishing monitoring sites in and around the project area after construction of habitat improvements.

ENVIRONMENTAL IMPACTS RELATED TO THE RESOURCES OF CONCERN

The project is intended to create habitat for the federal-listed endangered RGSM. The project may affect but is not likely to adversely affect this species.

There are no other listed species that likely occur in the project area. The bald eagle has the potential to occur in the project area during the winter, but this species was recently de-listed. Other listed species that occur in Sandoval County are not likely to be present at the project site.

ENVIRONMENTAL COMMITMENTS

All applicable permits would be obtained prior to implementation of the project.

- Section 401 of the CWA (CWA; 33 U.S.C. 1251 et seq., as amended) requires applicants for Section 404 authorization to obtain water quality certification prior to initiating construction. This authority rests with, and would be carried out in the proper sequence by the Pueblo of Sandia. Initial conversations with the Army Corps of Engineers have indicated that a 404 Permit would not be required, as most of the work would take place above the Ordinary High Water Mark. While coordinating closely with contractors, the Pueblo of Sandia would be responsible for meeting the conditions of these permits, and would use best management practices and avoidance by design, to prevent or minimize effects to water resources.
- Minimal disturbance would occur to the bankline, as most of the project would occur outside the Ordinary High Water Mark of the Rio Grande.
- During construction, desirable native vegetation already established on site would be preserved whenever possible.
- ESA compliance would be addressed through consultation with the USFWS regarding potential impacts to threatened and endangered species. Best management practices would be enforced to minimize potential impacts to willow flycatcher or other listed species. Consultation with the USFWS would determine the most effective best management practices.
- The Pueblo of Sandia is committed to monitoring the habitat restoration projects for one year to document changes in site conditions and the presence of various fish species using the habitat. The Pueblo of Sandia would be responsible for notifying the USFWS if they find silvery minnows using the constructed channel or other habitat features, or in the event that isolated habitats form in the channel.
- To protect aquatic habitat from spills or contamination, hydraulic lines would be protected from punctures. In addition, all fueling would take place outside the active floodplain, and all equipment would undergo high-pressure spray cleaning and inspection prior to operation. Equipment would be parked on pre-determined locations on high ground away from the project area overnight.
- The Pueblo of Sandia would seek to avoid impacts to birds protected by the Migratory Bird Treaty Act (16 U.S.C. 703) by scheduling construction outside of the normal bird breeding and nesting season (approximately April 15 to August 15) for most avian species, or conduct preconstruction breeding surveys and monitoring nests during construction. In this case, nests would be marked and those trees protected until after the birds have fledged. Nests would continue to be monitored twice weekly during the time heavy equipment is being operated, and close coordination would occur between the equipment operators and Sandia Environmental Staff to reduce the possibility of destroying nests. The USFWS would be consulted if bird nests were found.

- The Pueblo of Sandia would comply with Section 106 of the National Historic Preservation Act as administered by the New Mexico State Historical Preservation Office. Should evidence of possible scientific, prehistorical, historical, or archaeological data be discovered during the course of this action, work shall cease at that location and the Reclamation Albuquerque Area Office Archaeologist shall be notified by telephone immediately with the location and nature of the findings. Care shall be exercised so as not to disturb or damage artifacts or fossils uncovered during operations, and the proponent shall provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the government. TCPs would be evaluated as part of this process.

COORDINATION

Coordination was conducted with the USFWS and the State Historic Preservation Office (SHPO).

CONCLUSION

In accordance with the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321-4347, and based on the analysis in this EA Finding of No Significant Impact (FONSI), Reclamation has determined that implementing the Preferred Plan presented in this document would not result in a significant impact on the human environment and does not require preparation of an Environmental Impact Statement.

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ACRONYMS AND ABBREVIATIONS

AWHC	available water holding capacity
bosque	Rio Grande bosque
cfs	cubic feet per second
cm/sec	centimeters per second
COA	City of Albuquerque
Collaborative Program	Middle Rio Grande Endangered Species Act Collaborative Program
CWA	Clean Water Act
EA	Environmental Assessment
ESA	Endangered Species Act
Flycatcher	Southwestern Willow Flycatcher
FONSI	Finding of No Significant Impact
LIDAR	Light Detection and Ranging
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OHWM	ordinary high water mark
PSD	Prevention of Significant Deterioration
Reclamation	Bureau of Reclamation
RGSM	Rio Grande Silvery Minnow
RPA	Reasonable and Prudent Alternative
Service	United States Fish and Wildlife Service
SHPO	State Historic Preservation Office
TCP	Traditional Cultural Property
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

1. PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION AND BACKGROUND

The Rio Grande bosque (bosque) has been a crucial ecological and cultural component for the Pueblo of Sandia for about one thousand years. The river and the vegetation communities it supports are important sources of plants and animals on which the Pueblo of Sandia relies. However, this riparian ecosystem has undergone dramatic degradation in the past century due to flood control, water diversions, drought, and other human-caused and environmental factors. These changes have reduced flows in the river and induced encroachment by non-native saltcedar (*Tamarix spp.*) and other species and reduced river flows leading to a loss of habitat for wildlife such as the endangered Rio Grande Silvery Minnow (*Hybognathus amarus*) (RGSM) (Sublette et al. 1990; Bestgen and Platania 1991) and Southwestern willow flycatcher (Flycatcher) (*Empidonax trailii extimus*) (Sogge et al. 1997). In 2003, the United States Fish and Wildlife Service (Service) issued a Biological Opinion regarding the effects of water management practices on the RGSM, Flycatcher and several other species. The USFWS developed a Reasonable and Prudent Alternative (RPA) to avoid placing these species in jeopardy in accordance with the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 et seq.). The United States Army Corps of Engineers (USACE) and the Bureau of Reclamation (Reclamation) have accepted and are implementing the general provisions of the RPA.

Several federal documents outline a strategy for habitat restoration that would benefit these species and implement the provisions of the RPA. For example, the Science Subcommittee of the Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program) Science Subcommittee (2004) wrote:

Potentials for successful survival and recovery of silvery minnow populations along the reaches of the Middle Rio Grande that are subject to drying would increase with additional and larger regularly wetted (irrigated) refuge pools.

In recent years, restoring habitat for the RGSM has become a high priority for several federal, state, and tribal organizations. Reclamation has already implemented several such projects, including one in the Albuquerque Reach similar in scope and nature to the project proposed herein.

The Pueblo of Sandia has worked with Reclamation since 2000 to improve and restore terrestrial wildlife habitat in the bosque. Most projects to date have involved removing non-native saltcedar and Russian olive (*Elaeagnus angustifolia*). With Collaborative Program funding through Reclamation, the Pueblo of Sandia proposes to initiate additional habitat improvements with the creation of a high-water channel through the bosque. The goal of this project is to improve the RGSM adult and juvenile over-wintering habitat, egg retention habitat, and rearing habitat. This project fits well with the recommendations of Element S of the 2003 Biological Opinion, which calls for the restoration 1,600 acres of habitat for endangered species.

1.2 PROPOSED ACTION

The proposed action is to construct a meandering channel through part of the currently abandoned floodplain that connects to surface water of the Rio Grande. The channel would be located in a historical side channel on the abandoned floodplain (riparian areas in the bosque no longer regularly flooded) as shown in the LIDAR image in Figure 1-2. The Pueblo of Sandia has already cleared non-native vegetation from the restoration area. Some larger

woody debris is available nearby to be placed in the channel to provide cover for aquatic species, especially the RGSM. Additional site preparation may include some maintenance for saltcedar re-sprouts, and cutting or mowing weeds prior to channel construction.

The mouth to the channel would be left open, with no mechanical means of closure. Similarly regulated channels have been constructed at the Los Lunas Habitat Restoration Site adjacent to Los Lunas, New Mexico and in the Albuquerque Reach near Central Avenue. The width of the channel is estimated to be 56 feet top width by 8 feet deep, with 3:1 sloped sides (see Figure C-1 in Appendix C). The total length of the channel is approximately 1,680 feet. This would encompass an area of 2.2 acres.

Excavation of the restoration site for the channel would begin above the ordinary high water mark (OHWM) and continue to below the OHWM. Final elevations would be determined once the full range of flows has been established, and the objectives for water holding within the channel would be determined. Based on preliminary estimates, approximately 8.5 cubic yards of material would be generated per linear foot of the excavated channel. It is anticipated that some of this material would be placed along the bank of the new channel to strengthen it, and the remainder would be placed along the levee in already disturbed areas on the Pueblo of Sandia. In addition, some material may be stored and used for road improvements. Construction would likely begin in the fall during low flow conditions, and after resident birds had completed nesting.

The high-flow channel option would provide benefits to RGSM by providing a slow-moving habitat into which RGSM eggs could settle out of the current and shallow areas in which the fish could spawn. In addition, riparian birds, mammals, reptiles, and amphibians would find improved habitat along the channel.

Following construction, approximately 5 acres of native plants including coyote willow (*Salix exigua*) and Gooding's willow (*Salix gooddingii*) would be planted in patches along the margins of the channel to reduce erosion. Other native vegetation, including cottonwood (*Populus deltoides*), willow (*Salix* spp.) poles and New Mexico olive (*Forestiera pubescens*), would be planted on disturbed areas (channel margins, access routes, staging areas, etc.). The plantings would stabilize the channel, reduce erosion, and provide habitat for RGSM egg retention. The channel would be lined with native willows and native grasses would be seeded in other disturbed areas with a tractor and grass drill. Cottonwood pole planting or live trees would be planted at a density of 10 trees per acre adjacent to the channel. Holes for the poles would be drilled with an auger powered by a small bobcat tractor. Vegetation would be purchased from local stock to promote genetic compatibility with local native vegetation. Logs would be placed in the channel to provide cover and habitat for aquatic species.

The Pueblo of Sandia would monitor the site for vegetative survival and re-growth, channel characteristics, and the presence of birds (especially the Flycatcher), and other wildlife. Complete site restoration would likely take several years as plants get firmly established. Ultimately, long-term wildlife use (including the RGSM and Flycatcher), habitation, and reproductive success would need to be assessed and quantified. Existing RGSM and Flycatcher monitoring protocols established by the USFWS would be employed at the site. These long-term monitoring efforts would be addressed in detail with the creation of a bosque Monitoring Plan. The Pueblo of Sandia conducts monthly monitoring of the RGSM with the USFWS. This monitoring has been conducted since 2002. The Pueblo of Sandia would explore the possibility of establishing monitoring sites in and around the project area after construction of habitat improvements.

1.3 PURPOSE AND NEED FOR ACTION

The bosque has been a crucial ecological and cultural component for the Pueblo of Sandia for about one thousand years. The river and the vegetation communities it supports are important sources of plants and animals on which the Pueblo of Sandia relies. However, this riparian ecosystem has undergone dramatic degradation in the past century due to flood control, water diversions, drought, and other human-caused and environmental factors. These changes have reduced flows in the Rio Grande, eliminated floods that used to occur in the bosque that created important wildlife habitat, and facilitated encroachment by non-native plants such as saltcedar, Russian olive, and other non-native vegetation. In order to restore native species and native wildlife habitat, the Pueblo of Sandia has undertaken a series of measures aimed at reducing non-native vegetation and restoring native species. Implementation of the Proposed Action would satisfy the Pueblo of Sandia's management goals to reestablish a relict river channel.

This project is funded by the Collaborative Program through Reclamation. The purpose of the project is to create a high-water flow channel that would serve as spawning and rearing habitat for the RGSM and potentially provide habitat for the Flycatcher, and other riparian wildlife—an important component of the stated goals of the Collaborative Program. The need for the Proposed Action is to satisfy federal requirements under the Biological Opinion (USFWS 2003) for Reclamation's Water and River Maintenance Operations, the USACE's Flood Control Operations, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico 2003 (USFWS 2003). Specifically, there is a need to fulfill Element S in the Biological Opinion to establish 1,600 acres of habitat for the RGSM and the flycatcher.

1.4 RELEVANT STATUTES, REGULATIONS, AND OTHER PLANS

The proposed action would be required to conform to the provisions of following regulations and associated federal and state agencies:

- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Clean Air Act of 1972, as amended (42 U.S.C. 7401 et seq.)
- Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.)
- Endangered Species Act of 1973 (ESA) as amended (16 U.S.C. 1531 et seq.)
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, 1994
- Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661 et seq.)
- Floodplain Management (Executive Order 11988)
- National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.)
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 et seq.)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.)
- National Pollutant Discharge Elimination System (NPDES), as amended (33 U.S.C. 1251 et seq.)

- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 et seq.)
- Protection and Enhancement of the Cultural Environment (Executive Order 11593)
- Protection of Wetlands (Executive Order 11990)
- Procedures for Implementing NEPA (33 CFR 230; ER 200-2-2)
- Secretarial Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act.

This EA also reflects compliance with applicable tribal regulations and statutes.

1.5 PUBLIC SCOPING ISSUES

The proposed site has been designated as a natural area by the Pueblo of Sandia. There is no development there, and there are no major public uses that are incompatible with the Proposed Action. It has been intentionally left in a natural, undeveloped state, and there is no grazing, hunting, or gathering that takes place in area. The Pueblo of Sandia Tribal Council and the tribal general public have expressed their support. The Pueblo of Sandia does not anticipate any controversy surrounding this project. The Pueblo of Sandia would hold at least one public meeting to inform local residents and stakeholders about the details of the project. In addition, the Finding of No Significant Impact (FONSI) would be published in the local newspaper and posted at the local post office. A draft FONSI is provided with this environmental assessment. Comments would be collected by the Sandia Department of Natural Resources and, if appropriate, responses would be prepared.

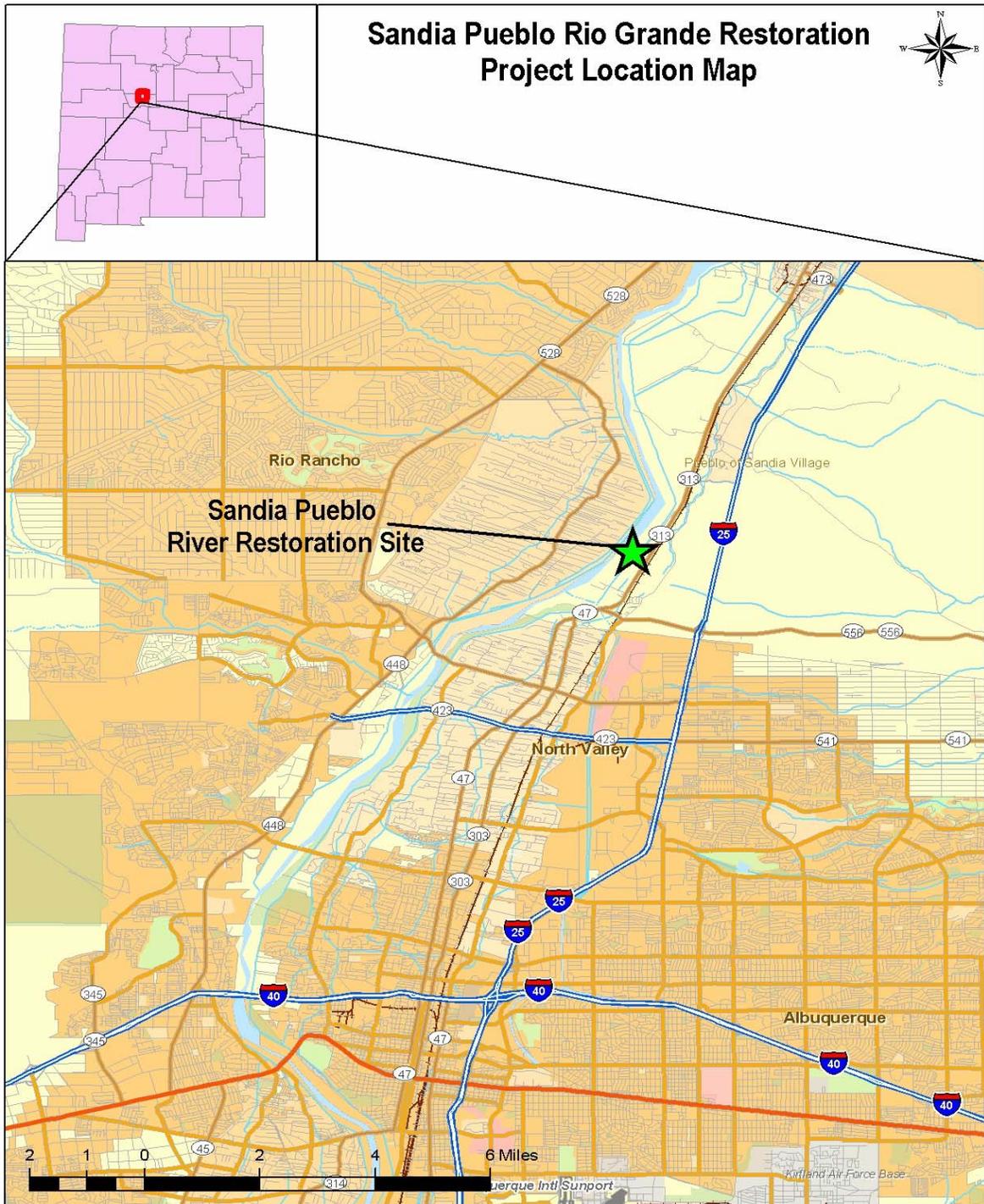
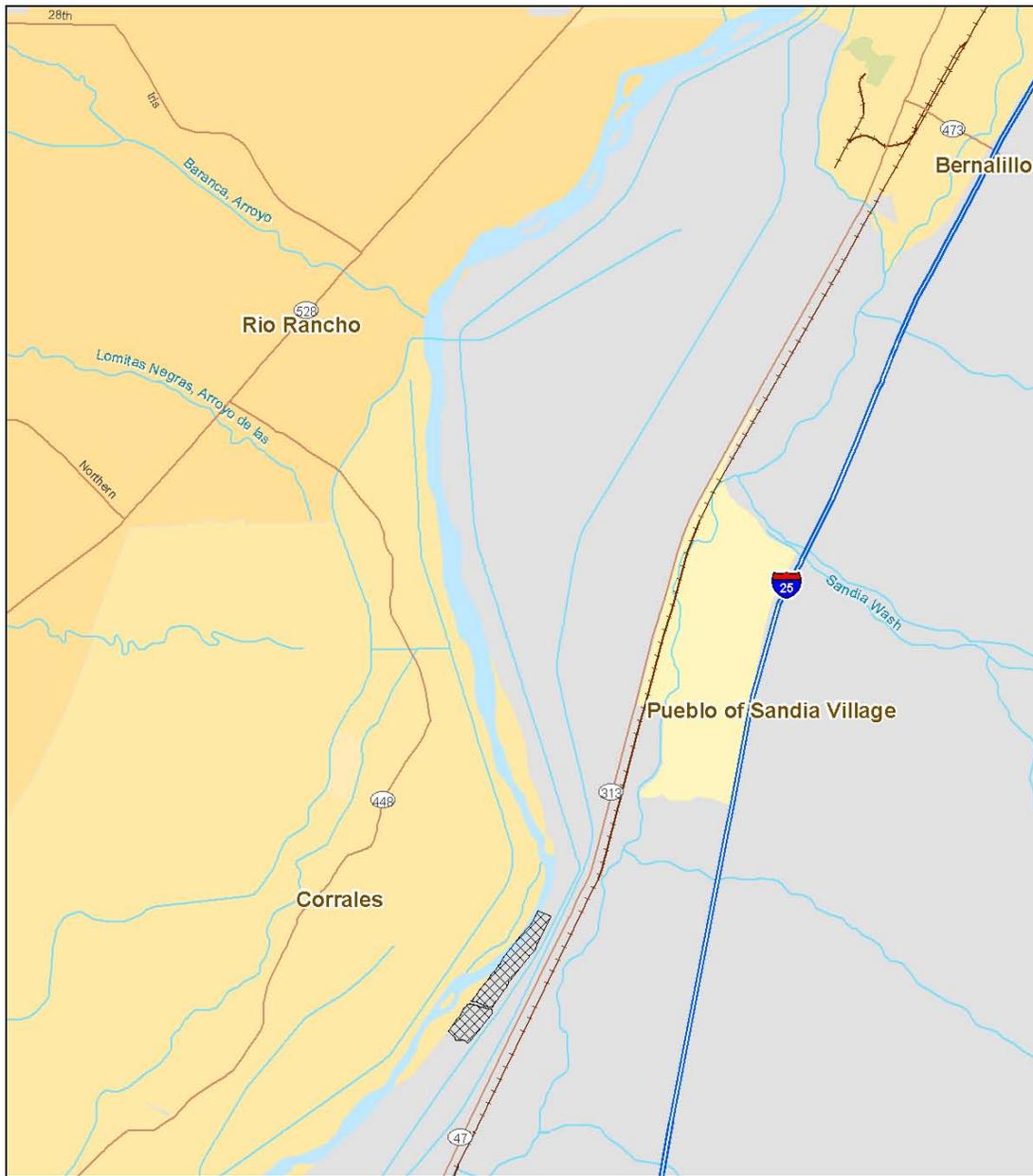


Figure 1-1a. Project Location Map



 Proposed project site

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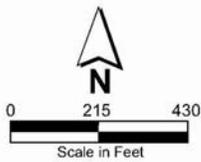
Parametrix

Figure 1-1b. Sandia Project Site



Parametrix Sandia Pueblo 575-4730-002/02(05) 8/07 (B)

Source: Simulated Land surface derived from LIDAR flight flown December 2006.
Sandia Environment Department



 Proposed side channel

Figure 1-2. Proposed Project Site

2. ALTERNATIVES

Two alternatives are analyzed in detail in this EA FONSI: The No Action Alternative and the Proposed Action. The Proposed Action is the re-excavation of a partially filled and abandoned river channel through the Sandia bosque in an abandoned floodplain that connects to the Rio Grande. The channel would mimic water distribution during high flows when the river overbanked. This action is intended to provide habitat for the RGSM. Projects of similar construction and scope have been constructed elsewhere along the Middle Rio Grande and have shown success in providing minnow habitat.

2.1 ALTERNATIVES CONSIDERED

2.1.1 No Action Alternative

The No Action Alternative assumes that no human-caused changes would occur in the project area. No channel would be constructed and the bosque would be allowed to continue to develop without interference. Under this alternative, vegetation succession would be allowed to proceed untreated.

2.1.2 Preferred Alternative: The Proposed Action

The proposed action is to construct a meandering channel through part of the currently abandoned floodplain that connects to surface water of the Rio Grande. The channel would be located in a historical side channel on the abandoned floodplain (riparian areas in the bosque no longer regularly flooded) as shown in the LIDAR image in Figure 1-2. The Pueblo of Sandia has already cleared non-native vegetation from the restoration area. Some larger woody debris is available nearby to be placed in the channel to provide cover for aquatic species, especially the RGSM. Additional site preparation may include some maintenance for saltcedar re-sprouts, and cutting or mowing weeds prior to channel construction.

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2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED

In 2003, the Pueblo of Sandia commissioned several conceptual designs for improvement of RGSM habitat (Table 2-2). These alternatives were based on conceptual drawings prepared for the Pueblo in 2003 and included bankline modifications such as coves and terraces. However, recent projects for RGSM habitat improvements have indicated that these modifications are short-lived, and do not always provide all of the expected benefits. At sites that incorporated similar alterations, the modifications tended to last only 2-3 years before losing much of their habitat value. In addition, the permitting issues would have been considerably more cumbersome with these alternatives. Finally, these alternatives would have led to the loss of Pueblo of Sandia land, as bankline was removed for the alterations.

Another alternative that was considered was a different channel alignment at the same site. However, after several site visits and an examination of LIDAR photography, it was determined that the best use of resources would be to utilize an abandoned floodplain channel that was still visible on the site. This would also minimize ground disturbance and the need for disposal of fill.

Table 2-1. Summary of Tasks Considered for the Proposed Action

Technique	Description	Benefits
Surveying	Site survey to determine final engineering design of channel	Maximizes potential for water to enter channel at desired levels and during desired timeframes for silvery minnow
Baseline Wildlife Surveys	Seasonal surveys for birds, reptiles, and other fauna	Minimize disturbance to wildlife; maximize habitat benefits for wildlife present
Removal of Weeds	Control of weeds prior to construction, most likely mechanically	Cleans site and makes construction easier and more precise
Channel Excavation	Excavation of channel with heavy equipment	Most cost-effective and precise method of channel development
Replanting Native Vegetation	Replant site with native vegetation	Provides habitat, stabilizes soil, and reduces erosion from rain impact
Monitoring	Continued monitoring of site for presence of silvery minnows, willow flycatchers, other wildlife, natural revegetation, and weeds	Enables accurate and quantitative depiction of success (or failure) of the project

Table 2-2. Alternatives Eliminated from Consideration

Technique	Description	Benefits of Technique	Reason for Elimination
Bankline Alterations: Coves	“Scalloped” indentations in bank to allow slack water areas for minnow development	Has been shown to provide short-term refugia for minnows	Elimination of terrestrial habitat; benefits very short term (often 2 to 3 years).
Bankline Alterations: Terraces	Layered “terraces” formed to allow for different depths of water for slack water for minnows under different water levels	Allows water at different levels to provide minnow habitat	Elimination of terrestrial habitat; benefit very short term (only 2 to 3 years); sloughing of banks.
Alternative Alignment at Same Site	A different alignment for the channel was initially considered at the site	Convenience, ease of construction	Site was altered to allow incorporation of abandoned channel to minimize site disturbance and incorporate channel feature.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the environmental consequences of the proposed action on various resources, including geology and soils; hydrology, water resources, and water balance; air quality and noise; vegetation and noxious weeds; threatened, endangered, and special status species; other wildlife; cultural resources; Indian Trust Assets; socioeconomic considerations; land use; and environmental justice.

The project would take place in the bosque, the deciduous riparian forest that borders the east bank of the Rio Grande. This area was once subject to frequent over-bank flooding from the Rio Grande, and several old channels still exist. These would be utilized to the greatest extent possible. Because of changes in the river’s hydrology, surface water is rarely present. This has led to an increase in non-native vegetation, and a loss of biological and hydrological diversity. The environment of the bosque consists of physical and biological resources described below.

3.1 GEOLOGY AND SOILS

The project area is located in the Rio Grande subsection of the Basin and Range Physiographic Province (Williams 1986). The land flanking the Rio Grande Basin on the east is predominantly mountainous, with colluvial-alluvial fans and stream terraces sloping westward toward the Rio Grande. West of the river, the ancestral Rio Grande deposited deep alluvium among uplifted isolated mountains and volcanoes. The river channel flows in a wide valley with a fertile but narrow floodplain (two to three miles wide) that has been cultivated for centuries.

Historically, the Rio Grande continuously changed its course, redistributing sediments in the floodplain. However, since the mid-twentieth century, constriction and channel stabilization projects have altered the course of the river. Dams, levees, and jetty jacks have been used to control the channel, preventing flows from reaching the historical floodplain and changing the patterns of deposition and scouring. The present-day channel consists of clay, silt, sand, and gravel, much of which is contributed by tributaries. The project site lies at an elevation of approximately 5,025 feet above sea level.

The proposed project site is located in an area of highly stratified soils, consisting of either sandy or clay-rich over-bank deposits, ranging from poorly to well-drained soils. Nine soil map units are present in the Sandia bosque, encompassing the three most common classifications (Table 3-1).

Table 3-1. Soil Map Units Most Common to the Sandia Bosque

Soil Name	Classification	Available Water Holding Capacity (AWHC)	General Location	Potential for Riparian Area
Brazito	Mixed, thermic, Typic Torripsamments	Low to Moderate	Along the levees	Poor (deep water table and low AWHC)
Gila	Coarse-loamy, mixed (calcareous), thermic Typic Torrifuvents	Low to high	Along the levees	Good to Moderate (generally moderate water table and moderate to high AWHC)
Vinton	Coarse-loamy, mixed (calcareous), thermic Typic Torrifuvents	Low to high	Adjacent to the river	Good (shallow water table and moderate to high AWHC)

Impacts to soils generated by the proposed project implementation would generally be limited to the disturbance at the immediate site of the channel where it is excavated. Excavated material would be used to construct the berm along the proposed channel. Impacts to soils would be short term (approximately one year for construction) and moderate. Final soil stabilization would be accomplished through the establishment of native vegetation.

Other impacts to soils would be associated with the construction of the access routes and staging area. These impacts are expected to be short term and negligible, given the overall aquatic and riparian habitat restorative goals of the project and native revegetation of all areas of disturbance. The extent of riparian habitat improvements (native revegetation) resulting from disturbance would be approximately five acres.

Under the Proposed Action, nearly all work would take place on the floodplain above the river terrace with no work in the Rio Grande itself and the bankline would not be altered except for the connection to the inlet and outlet of the proposed channel. Best management practices would be implemented to minimize the chance that any sediment enters the river from activities on the floodplain. However, in the event that the channel does fill with sediment, the Pueblo of Sandia would be responsible for maintaining the channel. Some soil compaction may occur from the use of heavy equipment on the site. However, this is not expected to affect the site's ability to grow plants, or the ability to support riparian vegetation.

Under the No Action Alternative, there would be no direct impacts to soils or geology.

3.2 HYDROLOGY, WATER RESOURCES, AND NET WATER DEPLETIONS

The project area is bordered by the Rio Grande, a perennial river. The riparian forest in the bosque is supported by the water table. Water table depths within the bosque range from near zero feet at the southern end to over eight feet in the northern end (Buscher Soil and Environmental 2003). In some years of very high river flow (such as in 2005) the water table comes close to the surface.

Under the Proposed Action, water would continue to flow in the Rio Grande as before, and groundwater would continue to support riparian vegetation in the bosque. Water balance in the Rio Grande would not be affected by this change. Though water would enter the project site from the Rio Grande, it would also return to the Rio Grande via the channel. Seepage into the ground would recharge the shallow aquifer, which is hydrologically connected to the Rio Grande. In addition, some vegetation would be planted that would draw groundwater, and other vegetation such as saltcedar and other weedy species that use groundwater would be removed. In sum, this project is expected to be depletion neutral, which is required by the 2003 Biological Opinion for all habitat restoration projects.

Under the No Action Alternative, the increase of phreatophytes (deep-rooted plants that obtain water from the water table or permanent ground supply) such as saltcedar and Russian olive would continue to deplete water via evapotranspiration, which would result in no net-change in depletions.

3.3 AIR QUALITY AND NOISE

The project area is in a natural area in which air quality is good and ambient noise is generally low. The proposed restoration site is in the New Mexico intrastate Region Two (Central New Mexico) for air quality monitoring. Region Two is considered Class II under the Prevention of Significant Deterioration (PSD) program as required by the Clean Air Act of 1972 as amended (42 U.S.C. 7401 et seq.). PSD Class II areas allow for moderate levels of development accompanied by the resulting air quality impacts.

Under the Proposed Action, noise and air quality would undergo short-term minor disturbances. The project area is within 10 miles of the village of Sandia and the town of Bernalillo, though the dust and noise from the project is not expected to create a great disturbance to residents of these areas. The proposed project would result in a temporary but negligible negative impact on air and noise quality.

Under the No Action Alternative, air quality and noise would remain the same.

3.4 VEGETATION AND NOXIOUS WEEDS

Mature Rio Grande cottonwoods (*Populus deltoides* var. *wisleyenii*) dominate the project area, along with a few mature black willows. The entire project area has been recently disturbed by activities related to the removal of non-native understory trees including Russian olive, tamarisk, and tree of heaven (*Ailanthus altissima*). Desirable grasses, including vine mesquite (*Panicum obtusum*) and alkali sacaton (*Sporobolus airoides*) and forbs such as yerba mansa (*Anemopsis californica*), are present, but have not yet been re-established within these disturbed areas. Herbaceous vegetation density is broadly correlated with the canopy. The more open the canopy, the greater the density of herbaceous vegetation including heath aster (*Aster falcatus*), goldenrod (*Solidago canadensis*), and wild licorice (*Glycyrrhiza lepidota*). Water-loving plants, including pencil grass (*Equisetum* spp.) and bulrush (*Scirpus olneyii*), are restricted to the river bank along the margin of the river. Upland plants, including one-seed juniper (*Juniperus monosperma*) and plains yucca (*Yucca glauca*), are also present. Appendix B lists many of the plants observed in the project area.

The Rio Grande riparian floodplain is largely vegetated by deciduous woodlands. Many of the plants of this community have traits that are adapted to disturbance caused by inundation of floodwaters such as the ability to re-sprout from root rhizomes and re-colonize barren areas quickly. The project area is a Rio Grande floodplain riparian area primarily characterized by a contiguous mature Rio Grande cottonwood forest. Over time, lack of seasonal flooding has altered the floodplain, contributing to the establishment of non-native, phreatophytic, understory vegetation. This understory is dominated by trees such as Russian olive, saltcedar, and tree of heaven. Recently, removal projects focused on the extraction of these non-native trees have been implemented within the project area. Currently, the area can be described as an open cottonwood forest with a dense canopy and understory of sparse, weedy herbaceous plants and grasses. Hydrophytic plants (plants requiring completely saturated soil conditions) are restricted to the river bank along the margin of the river and on several created ponds located directly below the main irrigation channel (ditch). The main site of construction is located along the Rinconada Slough. The majority of this area does not contain vegetation which is distinct from the surrounding area.

Under the Proposed Action, the site would be maintained by the Pueblo of Sandia to prevent the spread of noxious weeds, especially saltcedar, Russian olive, and other riparian weeds. Every year for three years the site would be inspected for weeds by the Pueblo of Sandia. Weeds that are easily removed via hand-pulling would be pulled; other species may require foliar applications of Garlon 4.

Under the No Action Alternative, the site would not be maintained, and weeds would continue to spread.

3.5 WETLANDS AND FLOODPLAINS

Executive Order 11990 (Protection of Wetlands) requires avoidance, to the greatest extent possible, of both long- and short-term impacts associated with the destruction, modification, or other disturbance of wetlands. Section 5(b) of this Executive Order calls for the maintenance of natural systems, including the conservation and long-term productivity of existing flora and fauna, species and habitat, diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources.

Although a formal wetland delineation has not been done, some portions of the upland terrace of the Rio Grande bosque might be considered a jurisdictional wetland. Though most of the area is not within the OHWM of the Rio Grande and shows no evidence of wetland hydrology, smaller pockets of saturated soil may exist. Local residents report that the river has not topped the bank and there has been no standing water in the project site in recent memory (this was even true during the spring of 2005 when many sites that had not been inundated in many years had standing water). The dominant plant species present have varying wetland indicator status, from Obligate (Goodding's willow, Coyote willow), Facultative wetland (Cottonwood, Russian olive), Facultative Upland (New Mexico olive, Ailanthus), or No Indicator Status (Saltcedar). The soils were not examined in great detail for indications of wetland characteristics.

If nothing is done to the site and it is not maintained, it would likely eventually revert to habitat dominated by non-native invasive species (Anderson et al. 1984; Busch and Smith 1993; Stuever 1997; Smith et al. 1998) that would inevitably decrease the overall quality of the area. This restoration project would serve to substantively improve the riparian, aquatic, and wetland habitats in the area because the frequency of inundation at a variety of elevations would increase, thereby promoting the growth of the native flora that have evolved in the Rio Grande bosque.

Executive Order 11988 (Floodplain Management) provides federal guidance for activities within the floodplains of inland waters. This order requires federal agencies to take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. The proposed project site is situated within the formerly active floodplain of the Rio Grande between the channel mainstem and the east levee. While previous channelization has reduced the frequency at which this area would experience flooding, the potential for such natural flooding does exist in some areas. This was demonstrated by the relative high spring runoff of 2005, although this site did not experience over-bank flooding. This restoration project seeks to allow for the inundation of a small area within the abandoned floodplain. As the high-flow channel would be inundated at the normal high water level of the Rio Grande, we do not anticipate any reduction in the level of floodplain protection. The project would create wetlands over a relatively small portion of the Sandia bosque (less than 0.1 percent). However, these would be riparian-associated wetlands, and there would be relatively little standing water in the project site. All flood protection features of the floodplain (e.g., levees,

jetty jacks now in place, drainage features) would be maintained. The Pueblo of Sandia would be responsible for maintaining the channel in the event that it fills with sediment.

Under the Proposed Action, riparian wetlands would be created along the channel to encourage use by wildlife, and habitat for silvery minnow eggs. In addition, the site would be maintained to favor the balance of native riparian vegetation and the elimination of weeds.

Under the No Action Alternative, the site would remain as it is today, which would have no impact on wetlands. Encroachment by non-native salt cedar and Russian olive would likely continue.

3.6 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

Several federal- and state-listed species have the potential to occur in the project area (Appendix B). We accessed online databases, spoke to local experts, and reviewed Pueblo of Sandia survey records for species ranges and habitat requirements. The **bald eagle** was recently de-listed by the USFWS and impacts to this species are not considered for this EA.

Southwestern willow flycatcher

Except where cited, information in this section is summarized from the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002).

The Flycatcher, a federally listed endangered species, is one of 11 flycatchers in the genus *Empidonax* (Family Tyrannidae) breeding in North America and is one of four subspecies of the willow flycatcher currently recognized. The historical breeding range for the species included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico but the quantity of suitable habitat within that range is much reduced from historical levels. The flycatcher occurs from near sea level to over 8,500 feet, but is primarily found in lower elevation riparian habitats. As of the 2001 breeding season, there were approximately 1,200 pairs/territories.

The primary cause of the flycatcher's decline is loss and modification of its riparian nesting habitat, which tends to be uncommon, isolated, and widely dispersed. With increasing human populations and the related industrial, agricultural, and urban developments, these habitats have been modified, reduced, and destroyed by various mechanisms. Riparian ecosystems have declined from reductions in water flow, interruptions in natural hydrological events and cycles, physical modifications to streams, modification of native plant communities by invasion of exotic species, grazing, and direct removal of riparian vegetation. Wintering habitat has also been lost and modified for this and other neotropical migratory birds.

The flycatcher usually breeds in patchy to dense riparian habitats along streams or other wetlands, near or adjacent to surface water or underlain by saturated soil. General characteristics of flycatcher habitat usually consist of dense vegetation or an aggregate of dense patches interspersed with openings that create a mosaic. In almost all cases, slow-moving or still surface water and/or saturated soil is present at or near breeding sites during wet or non-drought years. Nest sites typically have dense foliage from the ground level up to approximately 13 feet above ground and have a dense canopy. The flycatcher nests in native vegetation such as willows or box elder, where available, but has also occasional nests in non-native species. The flycatcher's riparian habitats are dependent on hydrological events such as scouring floods, sediment deposition, periodic inundation, and groundwater recharge for them to become established, develop, be maintained, and ultimately to be recycled through disturbance.

A neotropical migrant, Flycatchers spend only three to four months on their breeding grounds. The remainder of the year is spent on migration and in wintering areas south of the United States. Flycatchers typically arrive on breeding grounds between early May and early June and establish breeding territories that range in size from approximately 0.5 to 1.5 acres. The flycatcher builds a small open cup nest, constructed of leaves, grass, fibers, feathers, and animal hair. In general, a new nest is built every year. Typical nest placement is in the fork of small-diameter vertical branches at a height of 1.6 to 60 feet, usually lower than 20 feet above ground. Incubation begins after the last egg is laid, and lasts 12 to 13 days. Most eggs in a nest hatch within 48 hours of each other and the female provides most of the initial care of the young. Nestlings fledge 12 to 15 days after hatching. Fledglings typically stay in the general nest area a minimum of 14 to 15 days after fledging. Second clutches within a single breeding season are uncommon if the first nest is successful. Most attempts at re-nesting occur if the young fledge from the first nest by late June or very early July. Re-nesting is regularly attempted if the first nest is lost or abandoned due to predation, parasitism, or disturbance; a female may attempt as many as four nests per season. Replacement nests are built in the same territory. Adults that are successful in raising young may remain at breeding sites through mid-August to early September. Pairs with unsuccessful first and/or second nests sometimes abandon their territories midway through the breeding season.

The flycatcher is an insectivore, catching insects while flying, hovering to glean them from foliage, or capturing insects on the ground. Wasps and bees (*Hymenoptera*) are common food items, as are flies (*Diptera*), beetles (*Coleoptera*), butterflies/moths and caterpillars (*Lepidoptera*), and spittlebugs (*Homoptera*).

Predation of Flycatcher eggs and nestlings is documented for several species of snakes and birds, raccoons, cats, and foxes. The species also experiences brood parasitism by the brown-headed cowbird (*Molothrus ater*), which lays its eggs in the nests of other species. The “host” species then incubate the cowbird eggs and raise the young. Because cowbird eggs hatch after relatively short incubation and hatchlings develop quickly, they often out-compete the host’s own young for parental care. Cowbirds may also remove eggs and nestlings of host species from nests or injure nestlings in the nests, thereby acting as nest predators.

Although the entire Sandia Reservation has not been surveyed for willow flycatchers, protocol surveys have been conducted in some areas, including the project site. No breeding birds have been found, although migrant willow flycatchers are present on occasion (L. Abeita, Wildlife Biologist, pers. comm.). There appears to be no suitable breeding habitat at the present time. It is hoped that this project would increase the potential for creating willow flycatcher habitat.

Under the Proposed Action, habitat would improve for this species, because willows would be planted and would eventually grow into thickets. The project may affect but is not likely to adversely affect this species.

Under the No Action Alternative, habitat would continue to degrade and conditions would remain unfavorable for this species.

Rio Grande Silvery Minnow

Except where cited, information in this section is summarized from the Rio Grande Silvery Minnow Draft Revised Recovery Plan (USFWS 2007).

The RGSM is a small, silvery-white, relatively heavy-bodied minnow of the family Cyprinidae. Historically, the minnow was one of the most abundant and widespread fishes in the Rio Grande Basin, occurring from at least as far north as Española to the Gulf of Mexico. However, the RGSM has been extirpated from most of this area, mainly due to the construction of dams, poor water quality, de-watering of the Rio Grande by surface diversions, and the introduction of non-native fishes. Currently, the species is present in the Rio Grande between Cochiti Reservoir and the upper end of Elephant Butte Reservoir, an area representing less than 10 percent of its former range (Bestgen and Platania 1991). The RGSM was declared an endangered species in 1994.

Adults may reach 3.5 inches or more from the tip of the snout to the base of the tail. Fish spawn in open water and spawning is associated with high-flow events such as spring runoff, summer rainstorms, or artificially caused “spike” flow releases from reservoirs. This typically occurs over a relatively brief period in May or June. Spawning is also associated with high mortality in adults. Six months after spawning, more than 98 percent of surviving fish are those that hatched the previous summer. Maximum documented longevity in the wild is about 25 months. Females produce thousands of semibuoyant, non-adhesive eggs that, after fertilization, drift with the current for 1 to 2 days. Egg hatching generally occurs in 24 to 48 hours. About three days after hatching, the fish begin feeding and actively seek low-velocity habitats. Larvae reach sizes of approximately 1.5 inches by autumn.

Studies in the Rio Grande have shown that the minnow uses only a small portion of the available aquatic habitat. Summer habitats include shallow pools and backwaters. In winter, preferred habitat is deeper areas, such as the slack water behind instream debris piles. In general, it prefers areas of water velocity less than 10 centimeters per second (cm/sec), in depths of less than 20 cm. It is most commonly found over silt or sand substrates and avoids main channels or areas of swift water.

During the larval stage, the RGSM, almost without exception, use relatively shallow areas with low or no water velocity and a fine particulate substrate (silt or silt/sand mixture). Such conditions are most frequently encountered in habitats not directly associated with the main river channel (backwaters and secondary channel pools). As they grow larger, the RGSM demonstrate an overall shift in velocity, depth, and substrate use that is reflective of habitat use shifts from low-to-moderate velocity areas.

The RGSM has an elongated and coiled gastrointestinal tract, which is typical of an herbivorous fish. The presence of sand and silt in the gut of wild-captured specimens suggests that algae that grows on sand is an important food. Laboratory-reared RGSM have been observed grazing on algae in the aquaria. Mark-recapture studies have demonstrated that the distance traveled by fish ranged from about 0.68 mile to more than 15.5 miles over 48 hours.

Surveys conducted in October 2006 at the Highway 550 crossing of the Rio Grande and at the Rio Rancho Water Treatment Plant showed 38 and 7 silvery minnows, respectively. Surveys conducted in June 2007 at these same locations showed 1 and 118 silvery minnows.

Under the Proposed Action, habitat would be created for this species in the form of a meandering channel that mimics a former channel of the Rio Grande. Water would not be drawn from the Rio Grande during base flows, a time of critical importance to the minnow life cycle. In addition, when water recedes from the channel, surveys would be done by the Pueblo of Sandia for entrapped RGSM. Construction, operation, and maintenance issues for the RGSM would be minimal, as most of the construction would occur outside the Ordinary High Water Mark of the Rio Grande. The Pueblo of Sandia would notify the USFWS, and it is anticipated that these would be moved to the mainstem of the Rio Grande. The project may affect but is not likely to adversely affect this species.

Under the No Action Alternative, conditions would remain the same for this species.

Yellow-billed cuckoo (*Coccyzus erythrophthalmus*)

The yellow-billed cuckoo is a federal candidate species that inhabits woods, orchards, and streamside willow and alder groves. If the cuckoo is present, initial construction would likely displace it. However, this species has not been found during four years of bird surveys in the bosque. In addition, because the species is mobile, it is not likely to be adversely affected by the construction or implementation of the proposed project. If it is present, the cuckoo would benefit from the restoration efforts in the long term, because restored water and riparian vegetation in the abandoned floodplain may provide additional habitat.

The No Action alternative would is not expected to have any impacts on this species, as it is very unlikely that it is currently at the site.

3.7 OTHER WILDLIFE

Wildlife species in the bosque and adjacent riparian area are typical for the Middle Rio Grande Valley. The Pueblo of Sandia has been conducting seasonal bird surveys in the bosque for several years and has documented more than 60 bird species in the bosque. In addition, numerous species of mammals, reptiles, and amphibians are present (Appendix A).

Under the Proposed Action, wildlife in the project area and in adjacent staging areas would be disturbed and/or displaced during construction (approximately one breeding/nesting season). After completion, the project would significantly improve the wildlife habitat for most species, and the long-term benefits to wildlife would far outweigh the impacts generated from construction.

Under the No Action Alternative, wildlife habitat would remain largely as is in the short term. In the longer term, encroachment by non-native species such as Russian olive, saltcedar, and tree of heaven is expected to occur.

3.8 CULTURAL RESOURCES

Cultural resources include archaeological sites, sites eligible for the State Register of Cultural Properties and/or the National Register of Historic Places, and properties of traditional religious or cultural importance (Traditional Cultural Properties or TCPs).

A survey of cultural resources was conducted by Cibola Research and the area was determined to not contain any cultural resource that would be impacted by the project. A copy of this report has been reviewed by Reclamation and is on file with the Pueblo of Sandia.

Under the Proposed Action, it is anticipated that no cultural resources or TCPs would be affected.

Under the No Action Alternative, conditions would remain the same, and there would be no impacts to cultural resources or TCPs.

3.9 INDIAN TRUST ASSETS

Indian Trust Assets are legal interests in assets held in trust by the United States government for Indian tribes or individuals. Some examples of trust assets include lands, minerals, hunting and fishing rights, and water rights. Indian Trust Assets cannot be sold, leased, or alienated without the express approval of the United States government. The United States has a 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.

Because the project site is on Sandia tribal land, it is an Indian Trust Asset. However, the Sandia Tribe supports the project, which is expected to have beneficial results to the Tribe.

There are no Indian Trust Assets that would be adversely affected by the Proposed Action or the No Action Alternative.

3.10 SOCIOECONOMIC CONSIDERATIONS

Current land use is wildlife habitat, fishing, wood gathering, and visitation by Pueblo of Sandia tribal members. Current conditions and land use would remain unchanged until site restoration is initiated.

Under the Proposed Action, the amount of \$695,000 spent on the project would have a very minor economic impact for the Pueblo of Sandia and within Sandoval County. The total population of the County was estimated in 2006 to be 113,772, mostly White, Hispanic, and Native American. The median income in the County is \$47,745, with a median family income of \$48,984 with a per capita income of \$19,174 (U.S. Census Bureau 2007). The two largest employers in the County are Intel Corporation (in Rio Rancho) and J.C. Penney (New Mexico Department of Labor 2007). Total land area of the County is 3,714 square miles.

Under the Proposed Action, a few short term and relatively low-paying jobs would be created to complete the project, including the hire of subcontractors and tribal employees. This amount is low in comparison with federal, state, and local expenditures, and the overall economy of the County. The overall socioeconomic impact is not expected to be very large.

Under the No Action Alternative, there would be no socioeconomic impact to the area.

3.11 LAND USE

The project is located in an area that has no current formalized land use. There is no grazing allowed in the area, and tribal members use the area infrequently for hunting, fishing, gathering, and recreation. These land uses are compatible with the Proposed Action.

Under the Proposed Action, land use would not change. The increase in desirable native vegetation would likely enhance the experience of tribal members that frequent the area.

Under the No Action Alternative, undesirable non-native vegetation would continue to increase and reduce the appeal of the area for tribal members.

3.12 ENVIRONMENTAL JUSTICE

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations; February 11, 1994) was designed to focus the attention of federal agencies on the human health and environmental conditions of minority and low-income communities. It requires federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations and proposed actions. In an accompanying memorandum, President Clinton emphasized that existing laws, such as NEPA, should provide an opportunity for federal agencies to assess the environmental hazards and socioeconomic impacts associated with any given agency action upon minority and low income communities.

Under the Proposed Action, the project, which is located on Pueblo of Sandia tribal land and is supported by the Pueblo of Sandia, would have beneficial effects for the Tribe, including possible short-term employment, the reduction of unwanted non-native vegetation, reduction of fire hazard, and increased wildlife habitat, a culturally important resource.

Under the No Action Alternative, there would be no change to the Tribe in terms of environmental justice.

3.13 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES OF THE PROPOSED ACTION

Under the Proposed Action, the implementation of this project would result in the commitment of resources such as fossil fuels, construction materials, and labor. In addition, federal funds would be expended for the construction of the proposed project.

Under the No Action Alternative, there would be no change and no commitment of resources.

3.14 CUMULATIVE IMPACTS

NEPA defines cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (42 U.S.C. 4331–4335). Several other projects of similar type and scale are occurring at the present time.

The Pueblo of Santo Domingo, approximately 30 miles upstream from the Pueblo of Sandia, is undertaking a project aimed at enhancing riverine features to create RGSM habitat. The Pueblo is removing non-native vegetation, and construction of a low-flow velocity side channel with constructed embayments on the east bank of the Rio Grande in an old oxbow. Total project area will be approximately 23 acres.

The Pueblo of Santa Ana, approximately ten miles upstream of Sandia, has completed numerous projects along the west bank of the Rio Grande. Most of these projects involved the removal of saltcedar, Russian olive, elm, and other species, and the restoration of native riparian areas and grasslands. Over the last five years, the Pueblo has treated approximately 700 acres.

Ohkay Owingeh (formerly the Pueblo of San Juan), has planned a project that would result in restoration of over 100 acres of riparian woodland on the east side of the Rio Grande floodplain. Approximately 30 to 40 acres of habitat specifically designed for willow flycatchers is being created along a restored natural watercourse. It would also result in enhancement of ten to 15 acres of existing restored wetland with the woody vegetation density required by flycatchers.

The City of Albuquerque (COA) Open Space Division is undertaking restoration activities incorporating active and passive restoration methods that would be applied at three sites within the Rio Bravo Sub-reach of the Rio Grande, approximately 20 miles downstream of Sandia. A total of 58.3 acres of habitat would be created, including 6,647 linear feet of low-flow and ephemeral channels, 1.5 acres of low-velocity scalloped habitat, and two acres of surface water catchments.

The COA Open Space Division has been conducting extensive clearing of non-native vegetation from within the Rio Grande Valley State Park bosque. The thinning process is intended to reduce fuel loading within the bosque, thus reducing the risk of future catastrophic wildfire. Much of the City's thinning has been completed in support of the Collaborative Program. In total, the project will affect approximately 58 acres of habitat.

The New Mexico Interstate Stream Commission has implemented various habitat restoration/rehabilitation techniques intended to enhance, restore and/or create aquatic habitat for the benefit of the silvery minnow in the Albuquerque Reach of the Middle Rio Grande. Phases I and II involve testing the river's ability to mobilize sediment from riverbanks, bars, and islands in order to create low velocity habitat for the RGSM. Phase I, which was completed in April 2006, took place at three locations, each approximately 1.5 miles long and covering 74.5 acres: the North Diversion Channel, the Interstate 40 to Central Avenue-area, and the South Diversion Channel. Phase II, which is still on-going, is occurring at the following four locations: (1) from U.S. Highway 550 to approximately 1,200 m downstream; (2) from Paseo del Norte to Montaña Road; (3) from I-40 to approximately 1,015 m downstream of Central Avenue; and (4) from the South Diversion Channel to I-25. These projects are part of a four-phase Project. Phase I began in 2006 and Phase IV will continue through 2009. Approximately 75–90 acres will be treated during Phase II, with areas that include islands, bars, banks, and a diversion structure. A phased approach will be applied to future restoration activities, with monitoring and evaluation of the outcomes utilized in subsequent phases.

The **Bernalillo Priority Site** project is designed to stabilize banks and prevent damage to the east levee system by reducing the probability that high flows will cause further erosion of the east river bank. Riprap was placed along the east river bank, in 2003. At high flows, the east river bank could continue to erode, possibly breaching the east levee system and flooding private, Pueblo of Sandia, and Middle Rio Grande Project facilities. A secondary purpose of the project would be to restore, improve, and enhance habitat for threatened and endangered species. The total project area would encompass approximately five acres.

The **Sandia Priority Site** project is designed to stabilize banks and prevent damage to the east levee system by reducing the probability that high flows will cause further erosion of the east river bank of the Rio Grande, allowing the river channel to be undesirably close to critical irrigation and flood-control facilities (the banks are within 100 feet of the east levee system and present potentially serious threats to project facilities and public health and safety). At high flows the east river bank could continue to erode, possibly breaching the east levee system and flooding private, Pueblo of Sandia, and Middle Rio Grande Project facilities. Riprap was placed along the east river bank, in 2003. A secondary purpose of the project would be restore, improve, and enhance habitat for threatened and endangered species in the project area. The total project area would encompass 40.2 acres.

Under the Proposed Action, the project should contribute positive benefits in terms of endangered species and other wildlife habitat in concert with these projects that are already underway.

Under the No Action Alternative, there would be no change to these projects, and no added cumulative impact.

4. ENVIRONMENTAL COMMITMENTS BY THE PUEBLO OF SANDIA

All applicable permits would be obtained prior to implementation of the project.

- Section 401 of the CWA (CWA; 33 U.S.C. 1251 et seq., as amended) requires applicants for Section 404 authorization to obtain water quality certification prior to initiating construction. This authority rests with, and would be carried out in the proper sequence by the Pueblo of Sandia. Initial conversations with the Army Corps of Engineers have indicated that a 404 Permit would not be required, as most of the work would take place above the OHWM. While coordinating closely with contractors, the Pueblo of Sandia would be responsible for meeting the conditions of these permits, and would use best management practices and avoidance by design, to prevent or minimize effects to water resources.
- Minimal disturbance would occur to the bankline, as most of the project would occur outside the Ordinary High Water Mark of the Rio Grande.
- During construction, desirable native vegetation already established on site would be preserved whenever possible.
- ESA compliance would be addressed through consultation with the USFWS regarding potential impacts to threatened and endangered species. Best management practices would be enforced to minimize potential impacts to willow flycatcher or other listed species. Consultation with the USFWS would determine the most effective best management practices.
- The Pueblo of Sandia is committed to monitoring the habitat restoration projects for one year to document changes in site conditions and the presence of various fish species using the habitat. The Pueblo of Sandia would be responsible for notifying the USFWS if they find silvery minnows using the constructed channel or other habitat features, or in the event that isolated habitats form in the channel.
- To protect aquatic habitat from spills or contamination, hydraulic lines would be protected from punctures. In addition, all fueling would take place outside the active floodplain, and all equipment would undergo high-pressure spray cleaning and inspection prior to operation. Equipment would be parked on pre-determined locations on high ground away from the project area overnight.
- The Pueblo of Sandia would seek to avoid impacts to birds protected by the Migratory Bird Treaty Act (16 U.S.C. 703) by scheduling construction outside of the normal bird breeding and nesting season (approximately April 15 to August 15) for most avian species, or conduct preconstruction breeding surveys and monitoring nests during construction. In this case, nests would be marked and those trees protected until after the birds have fledged. Nests would continue to be monitored twice weekly during the time heavy equipment is being operated, and close coordination would occur between the equipment operators and Sandia Environmental Staff to reduce the possibility of destroying nests. The USFWS would be consulted if bird nests were found.

- The Pueblo of Sandia would comply with Section 106 of the National Historic Preservation Act as administered by the New Mexico State Historic Preservation Office. Should evidence of possible scientific, prehistorical, historical, or archaeological data be discovered during the course of this action, work shall cease at that location and the Reclamation Albuquerque Area Office Archaeologist shall be notified by telephone immediately with the location and nature of the findings. Care shall be exercised so as not to disturb or damage artifacts or fossils uncovered during operations, and the proponent shall provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the government. TCPs would be evaluated as part of this process.

5. CONSULTATION AND COORDINATION

The USFWS has been notified about the Proposed Action and would make the determination concerning project impacts on federal endangered and threatened species potentially occurring in the project area.

The Bureau of Indian Affairs was contacted in regard to the possible presence of endangered species.

The State Historic Preservation Office has been notified about the project.

The USACE Regulatory Program has been contacted and has visited the site. From their initial assessment, an individual Section 404 permit to conduct the work would not be necessary.

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APPENDIX A

Wildlife and Plants Observed in the Pueblo of Sandia Bosque

APPENDIX A

Table A-1. Wildlife Observed in the Pueblo of Sandia Bosque, 2000 - 2005

Species Name	Common Name	Season Observed	Relative Abundance	Years Observed
BIRDS				
<i>Accipiter cooperi</i>	Cooper's Hawk	Su, W	Uncommon	2002, 2003, 2004, 2005
<i>Actitis macularia</i>	Spotted Sandpiper	Su	Uncommon	2004
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	Su	Common	2004
<i>Aix sponsa</i>	Wood Duck	Su	Uncommon	2003, 2004
<i>Anas americana</i>	American Widgeon	W	Uncommon	2003
<i>Anas discors</i>	Blue-winged Teal	Su	Uncommon	2004
<i>Anas strepera</i>	Gadwall	W	Uncommon	2003
<i>Anas platyrhynchos</i>	Mallard	Su, Wi	Common	2000, 2002, 2003, 2004
<i>Archilochus alexandri</i>	Black-chinned Hummingbird	Su	Common	2002, 2003, 2004
<i>Ardea herodias</i>	Great Blue Heron	Su, W	Uncommon	2003, 2004
<i>Branta canadensis</i>	Canada Goose	Su, W	Abundant	2002, 2003, 2004
<i>Buteo jamaicensis</i>	Red-tailed Hawk	Su	Uncommon	2000
<i>Buteo swainsoni</i>	Swainson's Hawk	Su	Uncommon	2004
<i>Butoroides virescens</i>	Green Heron	Su	Uncommon	2003, 2004
<i>Carduelis psaltria</i>	Lesser Goldfinch	Su	Common	2003, 2004
<i>Carpodacus cassinii</i>	Cassin's Finch	W	Common	2003
<i>Carpodacus mexicanus</i>	House Finch	Su	Common	2000, 2004
<i>Cathartes aura</i>	Turkey Vulture	Su	Uncommon	2000, 2003, 2004
<i>Ceryle alcyon</i>	Belted Kingfisher	Su, W	Uncommon	2003
<i>Charadrius vociferus</i>	Killdeer	Su, W	Uncommon	2003
<i>Colaptes auratus</i>	Northern Flicker	Su, W	Common	2000, 2003, 2004, 2005
<i>Columba livia</i>	Rock Dove	W	Common	2003
<i>Contopus sordidulus</i>	Western Wood Pewee	Su	Common	2000, 2002, 2004
<i>Corvus brachyrhynchos</i>	American Crow	Su, W	Common	2000, 2002, 2003, 2004
<i>Dendroica coronata</i>	Yellow-rumped Warbler	W	Uncommon	2005
<i>Dumutella carolinensis</i>	Gray Catbird	Su	Uncommon	2000, 2003, 2004
<i>Falco sparverius</i>	American Kestrel	W	Uncommon	2003
<i>Geothlypis trichas</i>	Common Yellowthroat	Su	Common	2004
<i>Grus canadensis</i>	Sandhill Crane	W	Abundant	2003
<i>Guiraca caerulea</i>	Blue Grosbeak	Su	Uncommon	2000, 2003, 2004
<i>Haliaeetus leucocephalus</i>	Bald Eagle	W	Uncommon	2003
<i>Hirundo rustica</i>	Barn Swallow	Su	Rare	2003
<i>Icteria virens</i>	Yellow-breasted Chat	Su	Common	2000, 2003, 2004
<i>Junco hyemalis</i>	Dark-eyed Junco	W	Common	2000, 2003
<i>Larus delawarensis</i>	Ring-billed Gull	W	Uncommon	2003
<i>Mergus merganser</i>	Common merganser	W	Uncommon	2003
<i>Molothrus ater</i>	Brown-headed Cowbird	Su	Common	2000, 2003, 2004

Table A-1. Wildlife Observed in the Pueblo of Sandia Bosque, 2000 – 2005 (continued)

Species Name	Common Name	Season Observed	Relative Abundance	Years Observed
BIRDS (continued)				
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher	Su	Common	2003, 2004
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	Su	Uncommon	2004
<i>Parus gambeli</i>	Mountain Chickadee	Su	Common	2000, 2002, 2003, 2004
<i>Passer domesticus</i>	House Sparrow	W	Uncommon	2003
<i>Petrochelidon pyrrhonata</i>	Cliff Swallow	Su	Common	2004
<i>Phalacrocorax auritis</i>	Double-crested Cormorant	Su	Rare	2000, 2002
<i>Phasianus colchicus</i>	Ring-necked Pheasant	Su	Uncommon	2004
<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak	Su	Common	2000, 2003, 2004
<i>Picoides pubescens</i>	Downy Woodpecker	Su	Common	2003, 2004
<i>Pipilo maculatus</i>	Spotted Towhee	Su, W	Common	2000, 2002, 2003, 2004
<i>Piranga ludoviciana</i>	Western Tanager	Su	Uncommon	2003
<i>Piranga rubra</i>	Summer Tanager	Su	Uncommon	2003, 2004
<i>Psaltriparus minimus</i>	Bushtit	Su, W	Common	2003, 2004, 2005
<i>Quiscalus quiscula</i>	Common Grackle	Su	Common	2000, 2002, 2004
<i>Regulus calendula</i>	Ruby-crowned Kinglet	W	Uncommon	2003, 2005
<i>Sayornis nigricans</i>	Black Phoebe	Su, W	Uncommon	2003, 2002, 2004
<i>Sayornis phoebe</i>	Eastern Phoebe	Su	Rare	2003
<i>Sayornis saya</i>	Say's Phoebe	Su	Uncommon	2003
<i>Selasporus playtcercus</i>	Broad-tailed Hummingbird	Su	Common	2000, 2002
<i>Sialia nigricans</i>	Western Bluebird	Su	Rare	2002
<i>Sitta carolinensis</i>	White-breasted Nuthatch	Su, W	Common	2000, 2003, 2004, 2005
<i>Sturnella neglecta</i>	Western Meadowlark	Su, W	Uncommon	2002, 2003
<i>Sturnus vulgaris</i>	European Starling	Su	Common	2000
<i>Thrymanes bewickii</i>	Bewick's Wren	Su, W	Uncommon	2000, 2002, 2003, 2004
<i>Tyrannus vociferus</i>	Cassin's Kingbird	Su	Uncommon	2000
<i>Tyrannus verticalis</i>	Western Kingbird	Su	Common	2002, 2004
<i>Turdus migratorius</i>	American Robin	Su	Uncommon	2000, 2002, 2003
<i>Zenaida macroura</i>	Mourning Dove	Su	Common	2000, 2002, 2003, 2004
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	W	Common	2003
MAMMALS				
<i>Spermophouls variegates</i>	Rock Squirrel	All Year	Common	
<i>Sylvilagus auduboni</i>	Desert Cottontail	All Year	Common	
HERPETOFAUNA				
<i>Scelopourus undulatus</i>	Fence Lizard	All Year	Common	

Table A-2. Plant Species Observed Within Project Area

Common Name	Scientific Name	Category	Occurrence	Comments
FORBS				
Western Ragweed	<i>Ambrosia psilostachya</i>	F	C	
Yerba Mansa	<i>Anemopsis californica</i>	F	C	
Dogbane	<i>Apocynum cannabinum</i>	F	C	
Prairie Sage	<i>Artemisia ludoviciana</i>	F	U	
White Aster	<i>Aster fasciculatus var commulatus</i>	F	U	
Silverscale Saltbush	<i>Atriplex argentea</i>	F	U	
Quelite	<i>Chenopodium album</i>	F	C	
Narrowleaf Goosefoot	<i>Chenopodium leptophyllum</i>	F	U	
Spiny Daisy	<i>Chlorocantha spinosa</i>	F	U	
Mare's Tail	<i>Conyza candensis</i>	F	A	
Tansy Mustard	<i>Descurania obtuse</i>	F	A	
Toothed Poinsettia	<i>Euphorbia dentata</i>	F	U	
Flaveria	<i>Flaveria campestris</i>	F	C	
Wild Licorice	<i>Glychorhizza lepidopta</i>	F	C	
Annual Sunflower	<i>Helianthis annuas</i>	F	A	
Prickly Lettuce	<i>Lactuca serrulata</i>	F	U	Non-native weedy biennial
Puccoon	<i>Lithospermum insisum</i>	F	R	
Purple Aster	<i>Machaeranthera canescens</i>	F	A	
Sweet Clover	<i>Melolotus officianalis</i>	F	A	
Virginia Ground Cherry	<i>Physalis virginianus</i>	F	R	
Cut Leaf Coneflower	<i>Ratibida tagetes</i>	F	A	
Russian Thistle	<i>Salsola kali</i>	F	A	Non-native weedy annual
Groundsel	<i>Senecio multicapitata</i>	F	U	
London Rocket	<i>Sisymbrium irio</i>	F	A	Non-native weedy biennial
Silver Nightshade	<i>Solanum eleagnum</i>	F	A	
Canada Goldenrod	<i>Solidago Canadensis</i>	F	C	
Sow Thistle	<i>Sonchus asper</i>	F	U	Non-native weedy biennial
Rattlesnake Weed	<i>Sphaerophysa salsula</i>	F	C	Non-native rhizomatous perennial
Goathead	<i>Tribulus terrestris</i>	F	U	Non-native weedy annual
Broad Leaf Cattail	<i>Typha latifolia</i>	F	C	Non relevant species to ecoregion
Wooly Mullein	<i>Verbascum thapsus</i>	F	U	
Prostrate Vervain	<i>Verbena brachteata</i>	F	U	

Table A-2. Plant Species Observed Within Project Area (continued)

Common Name	Scientific Name	Category	Occurrence	Comments
GRASSES				
Cheat Grass	<i>Bromus tectorum</i>	G	C	Non-native weedy cool season annual
Salt Grass	<i>Distictylis spicata</i>	G	U	
Canada Wild Rye	<i>Elymus Canadensis</i>	G	U	
Bottle Brush Squirreltail	<i>Elymus elymoides</i>	G	A	
Alkali Muhly	<i>Muhlenbergia asperifolia</i>	G	A	
Vine Mesquite	<i>Panicum obtusum</i>	G	C	
Plains Bristlegrass	<i>Setaria machrostachya</i>	G	U	
Green Foxtail	<i>Setaria viridis</i>	G	A	Non-native weedy annual
Alkali Sacaton	<i>Sporobolus airoides</i>	G	C	
Spike Dropseed	<i>Sporobolus contractus</i>	G	C	
SHRUBS				
False Indigo	<i>Amorpha fruticosa</i>	S	U	All individuals observed were planted
Baccharisleaf Willow	<i>Baccharis salicifolia</i>	S	C	
Virgins Bower	<i>Clematis linguistifolia</i>	S	U	
Coyote Gourd	<i>Curcubita foetidissima</i>	S	R	
New Mexico Olive	<i>Foresteria neomexicana</i>	S	U	
Snakeweed	<i>Gutierrezia sarothrae</i>	S	U	
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	S	C	
Coyote Willow	<i>Salix exigua</i>	S	A	
Saltcedar (Tamarisk)	<i>Tamarix ramose</i>	S	U	
Plains Yucca	<i>Yucca glauca</i>	S	R	
TREES				
One Seed Juniper	<i>Juniperus monosperma</i>	T	R	
Rio Grande Cottonwoods	<i>Populus deltoides</i>	T	A	
Black Willow	<i>Salix goodinii</i>	T	C	
Siberian Elm	<i>Ulmus pumilla</i>	T	U	
Lanceleaf Cottonwood	<i>Populus acuminata</i>	T	U	All individuals planted; not relevant species to ecoregion

F=Forb, G=Grass, T=Tree, S=Shrub

A=Abundant, C=Common, U=Uncommon, R=Rare

APPENDIX B

Special Status Species of Sandoval County

APPENDIX B

Special Status Species (Plants/Wildlife) of Sandoval County

Table B-1. Special Status Plants of Sandoval County

Species Name	Family	Common Name	Distribution in New Mexico	Habitat	Agency Status			Likelihood of Occurrence at Project Site
					USFWS	State of NM	Sandia	
<i>Abronia bigelovii</i>	Nyctaginaceae	Tufted sand verbena	Sandoval, Santa Fe, and Rio Arriba Counties	Hills and ridges of gypsum in the Todilto Formation, 1,750-2,250 m (5,700-7,400 ft).		Species of concern		Not Present
<i>Astragalus feensis</i>	Fabaceae	Santa Fe Milkvetch	Bernalillo, Sandoval, Santa Fe, Torrance, and Hidalgo Counties	Sandy benches and gravelly hillsides in piñon-juniper woodland or plains-mesa grassland; 1,550-1,830 m (5,100-6,000 ft).		Species of concern		Not Present
<i>Astragalus knightii</i>	Fabaceae	Knight's milkvetch	Sandoval County, NM, found on Mesa Prieta	Rimrock ledges of Dakota Formation sandstone in piñon-juniper woodland; 1,750-1,800 m (5,700-5,900 ft).	Species of concern	Species of concern		Not Present
<i>Dalea scariosa</i>	Fabaceae	La Jolla prairie clover	Bernalillo, Sandoval, Socorro, and Valencia Counties in the central Rio Grande Basin.	Open sandy clay banks and bluffs, often along roadsides, at about 1,450-1,500 m (4,750-4,900 ft).				Not Present
<i>Delphinium robustum</i>	Ranunculaceae	Robust larkspur	Colfax, Rio Arriba, Sandoval and Taos Counties in the Sangre de Cristo Mts; adjacent south-central Colorado.	Canyon bottoms and aspen groves in lower and upper montane coniferous forest; 2,200-3,400 m (7,200-11,200 ft).			Sensitive	Not Present
<i>Delphinium sapellonis</i>	Ranunculaceae	Sapello Canyon larkspur	Bernalillo, Los Alamos, Mora, Sandoval, San Miguel, Santa Fe Counties. Observed in Jemez, Sandia, and southern Sangre de Cristo Mts.	Canyon bottoms and aspen groves in lower and upper montane coniferous forest; 2,450-3,500 m (8,000-11,500 ft).		Species of concern		Not Present
<i>Hackelia hirsuta</i>	Boraginaceae	New Mexico stickseed	W Colfax, W Mora, E Rio Arriba, NE Sandoval, NW San Miguel, NE Santa Fe, and Taos Counties, in the Jemez, Canjilon, and S Sangre de Cristo Mts.	Dry sites of shaley or igneous soils in lower to upper montane coniferous forest, usually with Gambel oak; 2,350-3,100 m (7,700-10,200 ft).				Not Present
<i>Heuchera pulchella</i>	Saxifragaceae	Sandia alumroot	Bernalillo, Sandoval, and Torrance Counties in the Sandia and Manzano Mts.	Limestone cliffs in lower and upper montane coniferous forest; 2,450-3,260 m (8,000-10,700 ft).		Species of concern		Not Present

Table B-1. Special Status Plants of Sandoval County (continued)

Species Name	Family	Common Name	Distribution in New Mexico	Habitat	Agency Status			Likelihood of Occurrence at Project Site
					USFWS	State of NM	Sandia	
<i>Mentzelia springeri</i>	Loasaceae	Springer's blazing star	Los Alamos, NE Sandoval and northwestern Santa Fe counties, only in the Jemez Mts.	Volcanic pumice and unconsolidated pyroclastic ash in piñon-juniper woodland and lower montane coniferous forest; 2,150-2,450 m (7,000-8,000 ft).		Species of concern		Not Present
<i>Puccinellia parishii</i>	Poaceae	Parish's alkali grass	Catron, Cibola, Grant, Hidalgo, McKinley, Sandoval, and San Juan Counties; also found in California, Arizona, and Colorado.	Alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes at 800-2,200 m (2,600-7,200 ft) range-wide.	Species of concern	Endangered	Sensitive	Not Present
<i>Silene plankii</i>	Caryophyllaceae	Plank's campion	Bernalillo, Doña Ana, Sandoval, Sierra, Socorro, and Torrance Counties; in the mountains near the Rio Grande; also in El Paso (TX) Cty.	Igneous cliffs and rocky outcrops; 1,500-2,800 m (5,000-9,200 ft).		Species of concern		Not Present
<i>Townsendia gypsophila</i>	Asteraceae	Gypsum Townsend's aster	Sandoval County, known only from White Mesa near San Ysidro along the western margin of the Nacimiento Mts.	Weathered gypsum outcrops of the Jurassic-age Todilto and overlying Morrison formations.	Species of concern	Species of concern		Not Present

Table B-2. Special Status Wildlife of Sandoval County

Species Name	Common Name	Distribution & Abundance in Sandoval County	Habitat and Diet Notes	Agency Status		Likelihood of Occurrence in Project Area
				USFWS*	NM	
Birds						
<i>Accipiter gentilis</i>	Northern Goshawk	Year-round resident in Sandoval County.	Mature, closed canopy coniferous forests of high mountains and mesas; feeds on a variety of small mammals and birds.	Species of Concern	Sensitive	Unlikely. No suitable habitat present.
<i>Ammodramus bairdii</i>	Baird's Sparrow	Rare migrant through Sandoval County	Inhabits Chihuahuan desert grasslands, shortgrass (breeding)/tallgrass prairie, mountain meadows up to 3,600 m.; agricultural lands and croplands. Eats seeds (especially grass) and insects.	Species of Concern	Threatened	Unlikely. No suitable habitat present.
<i>Athene cunicularia hypugea</i>	Western Burrowing Owl	Spring and Summer resident in Sandoval County	Prairie dog towns or other burrows in open areas with sparse vegetation and bare ground. Feeds on a variety of arthropods and small mammals.	Species of Concern	Protected	Unlikely. No suitable habitat present.
<i>Charadrius montanus</i>	Mountain Plover	Uncommon in Spring and Summer	Lowland grasslands, especially with heavy grazing; agricultural fields; short vegetation and bare ground; playas; eats ants, beetles, crickets, and other ground-dwelling insects.	Species of Concern	Sensitive	Unlikely. No suitable habitat present.
<i>Chlidonias niger</i>	Black Tern	Possible Summer resident	Breeds in prairie wetlands with some open water; Feeds on a variety of insects and amphibians.	Species of Concern	Protected	Unlikely. May use open water on river, but bosque provides no suitable habitat.
<i>Coccyzus erythrophthalmus</i>	Yellow-Billed Cuckoo	Rare Spring and Fall migrant	Associated with lowland deciduous woodlands, willow and alder thickets, second-growth woods, deserted farmlands, and orchards	Candidate	Sensitive	Possible Habitat present. Has not been found during 4 years of surveys
<i>Empidonax traillii extimus</i>	SW Willow Flycatcher	Uncommon in Spring, Summer, and Fall	Riparian or lacustrine habitats, especially those with thick willows or other vegetation, permanent water, and a multi-layered canopy.	Endangered (Proposed Critical Habitat)	Endangered	Possible Habitat present. Has not been found during 4 years of surveys
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	Spring and Fall migrant and occasional winter resident.	Wide variety of open habitats including wetlands, riparian, montane, lowlands; nests on ledges, usually near water, elev. 3,500-9,000; preys almost exclusively on live birds.	Species of Concern	Threatened	Unlikely. May pass through during migration, but no suitable habitat present.
<i>Falco peregrinus tundrius</i>	Arctic Peregrine Falcon	Rare possible migrant through County	Cliffs in wooded/forested habitats, with large "gulfs" of air nearby in which these predators can forage.	Species of Concern	Threatened	Unlikely. May pass through during migration, but no suitable habitat present.

Table B-2. Special Status Wildlife of Sandoval County (continued)

Species Name	Common Name	Distribution & Abundance in Sandoval County	Habitat and Diet Notes	Agency Status		Likelihood of Occurrence in Project Area
				USFWS*	NM	
Birds (continued)						
<i>Grus americana</i>	Whooping Crane	Extirpated from County. Formerly a Winter resident, and a Spring and Fall migrant.	Foraging areas are generally agricultural fields and valley pastures, particularly where there is waste grain or sprouting crops. Roosts with Sandhill Cranes, typically on sand bars in the Rio Grande.	Endangered	Endangered	Local population has been extirpated
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Rare Winter resident along lakes and larger rivers.	Prefers lowland or montane riparian and wetland habitats (though not exclusively), especially with large trees; feeds on wide variety of live birds, mammals and fish; carrion;	Threatened	Threatened	Is present during some seasons.
<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	Rare year-round resident	Upper elevation, mature, closed-canopy forests, riparian areas, especially those with multi-storied canopy, steep cliffs, permanent water; Feeds on a variety of small to medium-sized mammals, birds.	Threatened (Designated Critical Habitat)	Sensitive	Unlikely. No suitable habitat present.
Mammals						
<i>Mustela nigripes</i>	Black-footed Ferret	Extirpated in Sandoval County, though it historically occurred here.	Inhabits large prairie dog colonies nearly exclusively and feeds on variety of mammals, especially prairie dogs	Endangered	Sensitive	Not present in Bernalillo or Sandoval County.
<i>Ondatra zibethicus ripensis</i>	Pecos River Muskrat	Present in the Rio Grande, though not likely in Sandoval County	Permanent water sources such as riparian areas, lakes and ditches with cattails.	Species of Concern	Sensitive	Unlikely. Not known from Sandoval County
<i>Plecotus townsendii pallescens</i>	Townsend's Pale Big-eared Bat	Known to occur in Sandoval County	Occurs in a variety of xeric to mesic habitats, including desert scrub, sagebrush, chaparral, deciduous and coniferous forests. Roosts and breeds in caves or abandoned mines; Feeds on a variety of insects.	Species of Concern	Sensitive	Unlikely. No suitable habitat present.
<i>Zapus hudsonius luteus</i>	New Mexican Meadow Jumping Mouse	Year-round resident in Sandoval County.	Often associated with a grass perennial forb community with at least 65% vegetative cover. They are usually found in marshes, moist meadows and riparian habitats in open prairie	Species of Concern	Threatened	Possibly present. No surveys have been done to date.

Table B-2. Special Status Wildlife of Sandoval County (continued)

Species Name	Common Name	Distribution & Abundance in Sandoval County	Habitat and Diet Notes	Agency Status		Likelihood of Occurrence in Project Area
				USFWS*	NM	
Fish						
<i>Hybognathus amarus</i>	Rio Grande Silvery Minnow	Regular year-round resident in suitable habitat.	Larger Southwestern rivers that typically exhibit flashy or unpredictable flow, and seasonal (Spring) spikes.	Endangered (Designated Critical Habitat)	Endangered	Is present in river.
Other Taxa						
<i>Comanchelus chihuanus</i>	Slate Millipede	Known from Bernalillo, though not Sandoval County	Present in the soil at the base of boulders and rock escarpments in and around Petroglyph National Monument.	Species of Concern	Sensitive	Unlikely. No suitable habitat present.

* **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.

APPENDIX C

Conceptual Alternatives for Channel