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 Torrifluvents	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 Torrifluvents	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. *wislezenii*) 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 (*Ailianthus altissima*). Desirable grasses, including vine mesquite (*Panicum obtusum*) and alkali sacaton (*Sporobolis 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 (*Glycorhyza 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 erythropthalmus*)

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 Montaño 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.