4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This section of the EA evaluates direct, indirect, and cumulative impacts to all resources described in Section 3, Affected Environment. Environmental commitments, which would provide ongoing guidance for the proposed Project, are summarized at the end of the section.

4.2 GEOMORPHOLOGY AND SOILS

Under the No Action Alternative, the geomorphology of the Rio Grande is expected to remain relatively stable, though it may be exacerbated by drought conditions, which could cause channels between islands to narrow and deepen. In the absence of frequent and sustained high discharges, the river in this reach would continue to have high velocities and would have limited meandering capability, a process that is important in moving and redefining islands and bars. Channels within the river are expected to degrade, resulting in high banks and islands that are rarely inundated. Islands and bars would be stabilized with increasingly mature vegetation, predominantly non-native species. The geomorphic trends produced under No Action are unfavorable for the Rio Grande silvery minnow because of decreased capacity for egg retention or larval success and decreased presence of quality mesohabitat.

Under the Proposed Action, the Project would undertake actions to alter the islands and bars within the channel as well as parts of the channel banks to create the desired habitat types. In doing so, the current local geomorphology is anticipated to change. Changes in local geomorphology would facilitate an increase in the amount of habitat necessary for egg retention, rearing of larvae, and survival of young-of-year. Under the Proposed Action there would be minimal to moderate soil and sediment disturbance levels. The overall effects would be monitored and quantified, but are expected to be beneficial and completely within normal parameters for a sand-bed river system.

Before the initiation of construction activities, environmental protection measures would be reviewed at a pre-Project meeting. All activities would be in compliance with local, state, and federal regulations. To mitigate negative effects from erosion, native herbaceous communities may be planted.

4.3 HYDROLOGY AND HYDRAULICS

Under both the No Action and the Proposed Action there would be no change in the amount or duration of flow in the river. However, the Proposed Action would cause decreased flow velocities in some restoration locations, but is not expected to significantly alter the hydrologic conditions of the river on a broader scale. The Proposed Action would work with the existing hydrologic conditions to develop the desired habitat types.

4.4 WATER QUALITY

The No Action Alternative and Proposed Action would not result in negative changes to water quality where it currently meets applicable standards for physical constituents, such as surface

water temperature, pH, turbidity, DO, SSED, conductivity/TDS, and fecal coliform. There would be a temporary and localized change in turbidity and TDS under the Proposed Action because of the mobilization and dispersal of sediments within the river channel during excavation work.

The Clean Water Act (CWA) provides protection for wetlands and waters of the United States from impacts associated with dredged or fill material in aquatic habitats, as defined under Section 404(b)(1). CWA compliance is required of all aspects of the Project, and since most work associated with the Proposed Action would be completed within jurisdictional areas, a 404 permit from the USACE and 401 permits from the State of New Mexico and Sandia Pueblo are required. Compliance with the CWA would ensure that the Proposed Action would have no adverse effect on the water quality of the MRG. Water quality would be monitored and evaluated for the duration of the Project.

The Proposed Action would result in temporary and localized changes in the measures for physical constituents, particularly for turbidity and TDS, because of the mobilization and dispersal of sediments within the river channel. Short-term and localized adverse effects to water quality may result, but are not expected to exceed applicable standards. The techniques to be tested would depend on high-flow events to release and redistribute sediments within the floodplain. The high-volume flows would be expected to dilute the effects of added sediment load on water quality standards.

4.5 CULTURAL RESOURCES AND TRADITIONAL CULTURAL PROPERTIES

Under the No Action there would be no change to cultural resources and traditional cultural properties.

Under the Proposed Action, the Project would utilize the historic Atrisco Diversion and related diversion works, which no longer function, to create backwater habitat for the silvery minnow. The diversion works were completed in 1933 as part of an MRGCD project to provide a permanent header diversion for irrigation in the Atrisco area. Because of changes in the river channel and sedimentation, the Atrisco siphon replaced the original system in 1955 (Marshall 2003). Today the site consists of a wood-plank and metal header surrounded on both sides by concrete, a largely deteriorated wood and metal catwalk, and an earthen berm running south of the header approximately 300 meters to a large, concrete-framed gate and metal drop structure. When the system was in use, at the drop structure water was diverted to the Main Arenal Canal or continued south down the wasteway (outside the site boundary) 500 meters, where it rejoined the Rio Grande. The current Project would avoid the catwalk and the concrete-framed gate and drop structure; no adverse impacts to the catwalk or the diversion works would occur.

No other archaeological resources were found inside the levees where the Proposed Action would take place. Should archeological resources be found during construction at staging areas, access locations, or proposed construction sites, work in that area would stop and the proper authorities would be informed. A cultural resources survey is not proposed as part of the Proposed Action because the Project area is contained completely within the active floodplain of the Rio Grande. Project activities would be restricted to islands within the channel of the Rio Grande and to the banks of the river. Access to the channel would be wherever it is possible, but

most likely along existing access routes. Therefore, no adverse impacts would occur to known archaeological resources from the Proposed Action.

Tribal entities have been contacted to determine whether any TCPs occur within or near the proposed action areas. If TCPs are identified, mitigation will be implemented to preclude any adverse impacts.

4.6 VEGETATION AND WETLAND RESOURCES

Under the No Action Alternative there may be an increase in vegetation, particularly of non-native species on islands and bars. Overbank flooding would remain very limited under current conditions. Under the Proposed Action there would be some overbank flooding and an increase of over-island flooding. Riparian vegetation is, by definition, subject to intermediate levels of disturbance from flooding. Reduced levels of annual maximum flows under the No Action Alternative have reduced these natural processes. Under the Proposed Action, some native and non-native vegetation would be disturbed by mechanical means during the implementation of the restoration techniques. The estimated acreage impact to riparian vegetation during implementation of Phase II is shown in Table 4.1.

Table 4.1. Effects of Proposed Restoration Techniques on Vegetation

Restoration Technique	Potential Phase II Treated Acres	Relative Cover of Potentially Affected Vegetation *			
		Bare Ground or Open Water	Herbaceous/ Grasses	1–5 m Woody Vegetation (Native)	5–15 m Woody Vegetation (Mixed Native & Non-Native)
Vegetated Island Modification	35.2–40.0	1%	<1%	27%	69%
Backwater and Embayments	5.0–5.3	None	<1%	36%	64%
Large Woody Debris	TBD	100%	<1%	None	None
Bank Modification	32.2–32.8	16%	<1%	63%	20%
Removal of Lateral Confinements	0.5	88%	<1%	None	12%
Drain Enhancement	7.1	37%	<1%	43%	20%
Ephemeral Channels	4.3	59%	<1%	36%	5%

*Any impacts to dense woody vegetation more than 3 meters in height would be avoided wherever possible during construction.

The proposed techniques have different levels of potential impact on riparian vegetation. All vegetative communities, native and non-native, would be altered on selected vegetated islands under the Proposed Action. Dead and downed native woody species may be used for in-channel placement to create large woody debris areas. Living native deciduous species would be avoided to the extent possible. Some herbaceous floodplain species may be trampled during construction, but impacts would be moderate.

The Rio Grande, including the proposed Project locations, is a USACE jurisdictional waterway. Executive Order 11990 (Protection of Wetlands; FR 1977a) requires the avoidance of short- and long-term adverse impacts associated with the destruction, modification, or other disturbance of wetland habitats. Compliance with Sections 404/401 of the CWA will prevent the permanent loss of wetlands associated with Project actions. The Proposed Action would disturb jurisdictional wetland areas; however, these impacts would be temporary, and full wetland function should be restored during the following growing season. Following construction, an increased amount of substrate would have the potential to be inundated and/or saturated for significant time periods, which should lead to a net gain in both the area and function of wetlands. Executive Order 11988 (Floodplain Management; FR 1977b) provides federal guidance for activities within the floodplains of inland and coastal waters and requires federal agencies to "ensure that [their] planning programs and budget requests reflect consideration of flood hazards and floodplain management." Proposed modification to riverbanks and islands would not result in significant changes in flooding patterns outside the existing floodplain.

4.7 FISH AND WILDLIFE

Short-term impacts to fish and wildlife resources would not occur under the No Action Alternative. Long-term adverse effects on breeding and foraging fish, avian species, and mammals, however, are gradual and difficult to quantify. They result from long-term reduction in riparian ecological processes, encroachment of non-native species, increased fire hazard, and increased depth to groundwater.

By comparison, the Proposed Action would produce short-term direct impacts on wildlife in the immediate area of disturbance, and long-term beneficial effects on fish and riparian wildlife from improved ecological function and increased aquatic habitat. To avoid direct impact to migratory birds protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703, ET seq.), clearing and grubbing of woody vegetation would be scheduled between August 15 and April 15, outside of the normal breeding season for many avian species. Should vegetation removal and construction take place between April 15 and August 15, pre-construction nesting bird surveys should be conducted to identify potential MBTA issues. Any positive pre-construction survey results or observations would be brought to the attention of the USFWS in order to determine methods of MBTA impact avoidance.

Other wildlife species inhabiting vegetated islands, such as amphibians, reptiles, and mammals, would be temporarily displaced and may experience mortality during the implementation of the Proposed Action. The short-term effects would be outweighed by the long-term benefits of a healthier riparian ecosystem that includes aquatic habitat creation and increased food abundance within mesohabitats.

4.8 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

Rio Grande Silvery Minnow *(Hybognathus amarus)*

The No Action Alternative would continue the trends of population decline for this species in the Albuquerque Reach. The channel in the Albuquerque Reach is incised, and degradation is expected to continue (Porter and Massong 2004). The silvery minnow is known to occur within the defined Project area, and fish obtained from recent salvage operations conducted during river

intermittency have been stocked in the Albuquerque Reach (M. Hatch, personal communication 2004). In past years, rescued silvery minnow have been released near Alameda Bridge and Central Avenue, between the 550 and PDN Subreaches. Increasing the amount and/or quality of suitable riverine habitat is essential for application of rescue and recovery efforts associated with successful silvery minnow population management.

The Proposed Action may affect, but is not likely to adversely affect designated silvery minnow critical habitat. The primary objective of the Proposed Action is to enhance, restore, and/or create mesohabitat for the silvery minnow at various life stages. The Proposed Action is expected to provide beneficial effects on silvery minnow and their critical habitat, including improved egg and larva retention, increased recruitment rates, and the increased survival of young-of-year and adult silvery minnow in the Albuquerque Reach of the MRG.

Silvery minnow critical habitat encompasses the entire Project area (FR 2003b). Short-term effects to silvery minnow critical habitat may occur following habitat restoration activities, as discussed in the Biological Assessment (SWCA 2006). Portions of the work associated with construction activities would take place within the river channel. Developed BMPs would be strictly enforced to minimize erosion and sediment inputs into the river during construction.

The short-term construction activities and the deposition of sediment in shallow water (current habitat areas) of the Proposed Action may adversely affect silvery minnow and lead to take. In 2005 the USFWS issued a Biological Opinion and an Incidental Take Statement for Phase I of the Habitat Restoration Project, pursuant to sections 7(a)(2) and 7(b)(4) of the ESA. The BiOp determined that short-term direct effects are likely to occur from operation of heavy equipment in the channel where silvery minnow are known to occur, but that these effects would be minimal and not likely jeopardize the continued existence of the species (USFWS 2005). Reclamation has initiated consultation with the USFWS for Phase II.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

The No Action Alternative would not cause changes in the riparian habitats utilized by this species, and no effects would occur.

The Proposed Action may affect but is not likely to adversely affect the Western yellow-billed cuckoo. To minimize impact on this and other riparian species, clearing and grubbing of woody vegetation would be scheduled to take place between August 15 and April 15. Should vegetation removal and construction be implemented during the breeding season (April-August), pre-construction breeding bird surveys would be conducted and monitoring would be performed to assure avoidance of impacts. Any positive pre-construction survey results or observations of affected species during construction would be discussed with the USFWS to coordinate nesting area avoidance.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

A vegetation survey was conducted to evaluate the potential suitability of habitats for flycatchers in the Project area. Vegetation of suitable height and density to support flycatcher breeding was not found in any areas to be impacted by the Project. Without existing suitable habitat for or records of breeding, the No Action Alternative would have no effect on the species.

The Proposed Action would temporarily disturb or remove riparian vegetation, which might support migrating flycatchers in the Project area. Since the proposed construction would take place outside of the breeding season for southwestern willow flycatcher, no adverse effects to the species are anticipated. The Proposed Action may affect but is not likely to adversely affect southwestern willow flycatcher migratory stop-over habitat. To minimize impact on this and other riparian species, clearing and grubbing of woody vegetation would be scheduled between September and April. Should vegetation removal and construction be implemented during the breeding season (April-August), pre-construction breeding bird surveys would be conducted and monitoring would be performed to assure avoidance of impacts. Any positive pre-construction survey results or observations of affected species during construction would be discussed with the USFWS to coordinate nesting area avoidance.

Bald Eagle (*Haliaeetus leucocephalus*)
The No Action Alternative would not disturb the riparian vegetation where this species may occur; therefore, this alternative would have no effect on the species.

The Proposed Action may have short-term potential effects on bald eagles during construction, related to temporary noise and other disruptions. Removal of woody vegetation and other construction activities may take place during the winter months when bald eagles may be in the proposed Project area. Guidelines would be employed to minimize the potential for disturbing bald eagles. If a bald eagle is visible within 0.25 mile of the proposed Project area in the morning when activity starts, or arrives during breaks in activity, the contractor would be required to suspend all construction activity until the bird leaves on its own volition, or the Project biologist, in consultation with the USFWS, determines that the potential for harassment is minimal. However, if a bald eagle arrives during construction activities, or is observed 0.25 mile or more from the construction site, activity would not be interrupted. The Proposed Action may affect but is not likely to adversely affect the bald eagle.

Common Black-Hawk *(Buteogallus anthracinus)*
The No Action Alternative would not cause any changes to riparian vegetation used by this species; therefore, no adverse impacts to the species and its habitats would occur.

The Proposed Action would include clearing of woody vegetation but not mature gallery trees. In addition, areas proposed for vegetation clearing and disturbance are not vegetated with mature forest habitats. Therefore, the Proposed Action should have no adverse impact on the common black-hawk. As a precautionary measure, the contractor or Project biologist would follow the same protocol as that for bald eagles during construction activities.

New Mexican Jumping Mouse (*Zapus hudsonius luteus*)
Lack of suitable habitat in the Project area makes it unlikely that either the No Action Alternative or the Proposed Action would have an adverse effect on the New Mexican jumping mouse.

4.9 SOCIOECONOMICS

The long-term economic consequences of the No Action Alternative are unknown at this time and difficult to assess. These impacts may be greater than the Proposed Action due to the

significant costs of other silvery minnow habitat restoration options that have been proposed by the Collaborative Program.

The Proposed Action would not adversely affect current economic and socioeconomic conditions within Bernalillo and Sandoval Counties. Depending upon available funds, the cost of the Proposed Action is estimated at $3.03 million. This amount is relatively low in comparison with combined state and federal expenditures in Bernalillo and Sandoval Counties and would not adversely affect current economic conditions.

4.10 VISUAL AND AESTHETIC RESOURCES

The No Action Alternative and Proposed Action would not produce any long-term changes in the visual and aesthetic experience of the river user. The Project would imitate the natural processes of shifting channel configuration, islands and bars, and vegetation mosaic that are part of the river's aesthetic value. Channel and bank modifications may be visible to pedestrians using bridges, trails, and the river edge, or to adjacent homeowners along the river edge during Project implementation. The proposed construction may be visible from bridge crossings at the U.S. Highway 550, Paseo del Norte, Montaño, I-40, Central, Rio Bravo, and I-25 bridges. Visual and aesthetic impacts of the proposed Project would be brief and limited.

4.11 AIR QUALITY AND NOISE

The Project area is a natural area and a park with nature trails and other recreational uses in which a quiet atmosphere is expected. The No Action Alternative would hold ambient noise and air quality levels to this level.

The Proposed Action is not anticipated to generate ambient noise that exceeds the City of Albuquerque Noise Ordinance. Construction equipment to be used during the Proposed Action would create temporary variable noise levels that would likely exceed allowable ambient noise levels of 80 dBa in the immediate vicinity of the restoration site. All construction sites are anticipated to be more than 500 feet from any sensitive noise receptors. The nearest noise receptors would include the recreating public on nearby trails and residents of nearby homes outside the levees. Under the Proposed Action, noise impacts during heavy equipment use would be short term, and heavy equipment would be used only during normal business hours to minimize noise disturbance. The riparian vegetation and levee would abate some of the noise generated by the equipment. A Construction Noise Permit may be issued by the City if sensitive noise receptors are identified within 500 feet of restoration construction sites.

Under the Proposed Action, construction equipment would temporarily generate fumes and air emissions under the Proposed Action. The level of air emissions is anticipated to be low and in compliance with local and federal air emission standards.

4.12 NET WATER DEPLETIONS

Depletions are projected to remain neutral in the Albuquerque Reach under the No Action Alternative (SSPA 2004). The Proposed Action may increase depletions at two site locations: (1) the Atrisco Diversion Project site and (2) the I-40 Subreach 1ch site (Figure 1.5). The site

locations for all additional work would occur on islands and bars that are temporary in nature and located within the 660-foot-wide active river channel. Based on discussions with the OSE as part of the Phase I Riverine Habitat Restoration Project, work within the active river channel would not require an OSE permit. However, the Atrisco Diversion Project site and the I-40 ch1 site do not meet this criterion. The NMISC would submit a permit application or applications, including the EA and other pertinent documentation as necessary, for these two locations. Work would not occur at locations where permits are needed until the necessary permits have been secured. Work at locations where OSE permits are not required would be phased for initial construction.

4.13 ENVIRONMENTAL JUSTICE

Under the No Action there would be no change to environmental justice.

The Proposed Action is in compliance with Executive Order 12898 (FR 1994b), Environmental Justice in Minority and Low-Income Populations. The proposed Project is located on the active floodplain of the Rio Grande, between the flood control levees and within the Albuquerque Reach of the river. Outside of the levees, nearby land use along this reach of the river includes residential neighborhoods of all economic strata, agricultural land, and commercial and industrial uses.

Regardless of their level, impacts would be similar throughout the Albuquerque Reach of the river and would affect a diverse group of communities and populations. There would be no disproportionately high or adverse human health or environmental effects on minority or low-income populations from the proposed Project.

4.14 INDIAN TRUST ASSETS

Consultation has taken place to identify any ITAs in the Project area and to assess potential impacts, in accordance with Secretarial Order 3175 and Reclamation ITA policy. No ITAs were identified. Therefore, no impacts are anticipated from the No Action Alternative or the proposed Project.

4.15 IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Project may result in unavoidable harm to the silvery minnow. While this result would represent a loss to the species, the USFWS did not anticipate that similar activities conducted under Phase I of the Project would jeopardize the species' continued existence (USFWS 2005). Implementation of the Project would also result in the commitment of resources such as fossil fuels, construction materials, and labor. In addition, state and federal public funds would be expended for the construction of the proposed Project.

4.16 CUMULATIVE IMPACTS

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable

future actions regardless of what agency or person undertakes such other actions" (42 U.S.C. 4331-4335). Cumulative environmental impacts associated with the Rio Grande, including islands and riparian areas, have been evaluated for the following projects relative to the Proposed Action.

Middle Rio Grande Endangered Species Act Collaborative Program

The Collaborative Program has solicited and funded multiple habitat restoration projects, including City of Albuquerque and USACE restoration projects near the Proposed Action (Reclamation 2002). Silvery minnow augmentation funded by the Collaborative Program should provide positive synergistic interactions with habitat that would be created by this Project.

Upper Rio Grande Water Operations Environmental Impact Statement

Currently, the USACE, the NMISC, and Reclamation are signatories of a Memorandum of Agreement to develop integrated water operations rules for several dams on the Rio Grande upstream of the Project area (URGWOPS 1999).

City of Albuquerque San Juan–Chama Drinking Water Project

The City will begin construction of a diversion dam in the Rio Grande south of the Alameda Bridge to divert San Juan–Chama water for the City's drinking water supply. The City is currently constructing water intakes and a crossing of the Rio Grande at Campbell Road for that project. Several proposed habitat restoration projects are specified for the Albuquerque Reach as mitigation of adverse effects from the San Juan–Chama Project (Reclamation 2004).

Middle Rio Grande Bosque Wildfire Project and Wetland Restoration Project

The USACE is involved in a Bosque Wildfire Project throughout the Albuquerque Reach of the Rio Grande, thinning riparian vegetation at selected locations adjacent to the river. The USACE is also involved in Ecosystem Restoration projects at the Albuquerque Biologic Park and the Wetland Restoration Project south of Central Avenue within the City (USACE 2000).

NMISC Silvery Minnow Habitat Restoration Projects

Currently, the New Mexico Water Trust Board and the NMISC are conducting projects to improve silvery minnow habitat. These projects include increasing scientific knowledge of available food for aquatic species within the MRG and incorporating large woody debris for improved mesohabitat (Tetra Tech 2004). Phase I construction for the habitat restoration projects included modification of 37 acres within three subreaches in the Albuquerque Reach of the MRG using many of the techniques outlined in this EA. Phase II of that project would incorporate preliminary findings and information from Phase I to best plan and design treatments.

Bureau of Reclamation River Maintenance Projects

Reclamation has authority for river-channel maintenance on the Rio Grande and regularly monitors changes in the channel to keep track of priority maintenance sites where there is concern about possible damage to riverside facilities. At the Bernalillo Priority Site, the planned maintenance action is to install bendway weirs, realign the main channel of the Rio Grande at the project site, and create a secondary channel to reduce erosion potential on the east bank.

Analysis of Cumulative Impacts

The cumulative effects of the Proposed Action plus the described related projects may produce short-term changes in several aspects of the existing hydrology, hydraulics, and fluvial geomorphology throughout the Albuquerque Reach. The Proposed Action may affect other specific downstream restoration projects by changing local fluvial geomorphology and hydrology. Other projects described here may affect the Proposed Action by altering physical processes upon which the proposed techniques depend. Changes in upstream water operations may augment and improve or may decrease the effectiveness of proposed projects.

All treatment and control areas would be monitored for two years to determine the effectiveness of the methods implemented during Phase II of the Proposed Action and the potential hydrologic and geomorphic alterations to the Project area. Long-term monitoring, up to ten years, and adaptive management would be a coordinated effort with the Collaborative Program and would incorporate interagency objectives to assess the self-sustaining and successfully regenerating ability of restoration treatments. After monitoring and natural reshaping, the remaining island areas void of native vegetation may be replanted with appropriate native species to stabilize the contours to the extent possible. Following restoration, the treated islands are expected to have a surface elevation suitable for inundation at moderate to high river flows. Revegetation, whether natural or planted, would also provide suitable roughness to decrease flow velocities and increase egg and larva retention.

Geomorphic, vegetation, and fisheries monitoring would be components of the monitoring plan. Geomorphic monitoring would occur at least once a year following spring runoff or summer monsoons. Hydrologic events would constitute the need for additional geomorphic monitoring efforts. Vegetation monitoring would occur twice on an annual basis. Fisheries monitoring would focus on presence/absence of silvery minnow. The Collaborative Program is currently working to finalize a fishery-monitoring plan for the purpose of monitoring presence/absence of silvery minnow eggs, larvae, and adults.

All participants to the various activities on the Rio Grande recognize the need for dramatic change in the riverine ecosystem to provide better support for the endangered silvery minnow; however, the complex cumulative outcome of multiple actions is unpredictable and potentially adverse to water quality and various indicators of silvery minnow reproductive success. The only effective means of assessing complex cumulative effects on ESA critical habitat and species is to have group participation among all involved parties. Sound scientific measurement of baseline parameters most closely associated with silvery minnow success needs to be developed and a detailed silvery minnow monitoring protocol implemented.

4.17 SUMMARY OF EFFECTS AND SITE SUITABILITY

Different techniques considered for habitat restoration within the Albuquerque Reach would have short-term effects on environmental resources but long-term beneficial effects on biological resources, including silvery minnow and silvery minnow critical habitat. The four subreaches considered for the different restoration techniques are not equally suitable. The overall effects of the proposed restoration techniques are summarized in Table 4.2.

Table 4.2. Environmental Consequences of Proposed Restoration Techniques and No Action Alternative

Environmental Resources	Proposed Action	No Action
Geomorphology and Soils	Short-term adverse impact to channel and bank characteristics; long-term beneficial effects on these altered channel features	Development of channel features that are unfavorable for silvery minnow egg retention and larval and adult success would continue
Hydrology and Hydraulics	Short-term minimal adverse impact to hydrology; long-term positive effect	No change in the amount or duration of flows in the Albuquerque Reach
Water Quality	Short-term effects within applicable water quality standards; no long-term adverse effects	No change in levels of constituents such as pH, DO, temperature, and turbidity
Cultural Resources and TCPs	No adverse effects on archaeological resources or TCPs are anticipated	No change in cultural resources and traditional cultural properties
Vegetation and Wetlands	Limited short-term effects on vegetation, including some wetlands, no adverse effect on dense, native woody vegetation >3 m tall	Continued trends in vegetation, such as increases in non-native species and woody vegetation on islands
Fish and Wildlife	Short-term adverse impacts; long-term positive effect on fish and wildlife abundance and diversity from habitat improvements are anticipated	Continued adverse trends toward decreased fish and wildlife abundance and diversity
Threatened, Endangered, and Special Status Species	Short-term direct effects my occur from the operation of heavy equipment in the channel where the silvery minnow is known to occur, but effects would be minimal and not likely to jeopardize the continued existence of silvery minnow; may affect but not likely to adversely affect southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle	Continued adverse trend toward decreased habitat for silvery minnow
Socioeconomics	No adverse effects; the costs of implementing the Project are within the annual range of variability for federal and state expenditures for Bernalillo and Sandoval Counties	No short-term change in socio-economics is anticipated
Visual and Aesthetic Resources	Short-term negative impacts; long-term positive effect	No long-term or short-term changes in the visual and aesthetic experience
Air Quality and Noise	Short-term adverse impact from increased ambient noise levels	No change in air quality or noise
Net Water Depletions	No adverse effects anticipated, further evaluation required	No change in net water depletions
Environmental Justice	No adverse effect	No change in environmental justice
Indian Trust Assets	No ITAs identified; no adverse effects	No change in ITAs

Multiple site assessments were completed at the 550 Subreach to examine appropriate restoration sites and techniques. Determination of proper treatments was based on multiple field visits involving numerous GPS data collection points, photographs, historic channel locations, and the location of other projects within the vicinity of this subreach. Proposed restoration techniques include the creation of an ephemeral channel on one island, and the creation and enhancement of a series of braided channels on an attached bar downstream of the island. Access would be via existing levee roads in the vicinity of the U.S. Highway 550 Bridge. Proposed access and staging areas would be coordinated with the City Open Space Division, Reclamation, and MRGCD.

Modification to islands and banks was identified as the most practicable and potentially effective restoration technique in the Paseo del Norte Subreach. Multiple site assessments, which included the collection of GPS data, photographs, and vegetation data, were completed between the Paseo del Norte and Montaño Bridges. Work at this location would help create a variety of silvery minnow habitats over a wide range of flows. Equipment and personnel access and staging areas would be via existing levee roads and storm drain channels. Proposed access and staging areas would be coordinated with the City Open Space Division, Reclamation, and the MRGCD.

Bar enhancement, the creation of backwater and embayment areas, bank terracing, and the modification of islands would be utilized within the I-40 Subreach. Multiple site assessments were completed, including the collection of photographs, GPS data, and vegetation data, to evaluate this subreach. Work at this location would create essential habitat for the early life stages of the silvery minnow and promote increased egg retention during periods of high flow. Equipment access would come from the South Diversion Channel, and proposed staging and access would be coordinated with the City Open Space Division, Reclamation, and the MRGCD.

Bank-line modification, the development/enhancement of the historic Atrisco Diversion with control structures, and the creation of a backwater habitat would be implemented at the Atrisco site of the I-40 Subreach. Multiple site assessments were completed, including the collection of photographs, GPS data, and vegetation data, to evaluate this subreach. Work at this location would create essential habitat for the early life stages of the silvery minnow and promote increased egg retention during periods of high flow. Equipment access would come from the South Diversion Channel, and proposed staging and access would be coordinated with the City Open Space Division, Reclamation, and the MRGCD.

Island modification and evaluation techniques, the creation and enhancement of ephemeral channels, bank-line modification, and the removal of lateral confinements would be implemented in the SDC Subreach. Multiple site assessments were completed in this subreach, including GPS data collection, vegetation surveys, and photographs. Access would be from the Southern Diversion Channel, and proposed staging and access would be coordinated with the City Open Space Division, Reclamation, the MRGCD, and the Albuquerque Metropolitan Arroyo Flood Control Authority.

4.18 ENVIRONMENTAL COMMITMENTS

All applicable permits will be obtained by the NMISC prior to implementation of each phase of the Project, including but not limited to:

- Landowner access permissions
- Clean Water Act (CWA), Section 404
- State Water Quality Certification under CWA, Section 401
- Pueblo of Sandia Water Quality Certificate under CWA, Section 401
- Temporary Construction Noise Permit, City of Albuquerque Environmental Health Department
- National Pollutant Discharge Elimination System (NPDES) Permit
- Storm Water Pollution Prevention Plans

In addition to obtaining these permits, the following environmental commitments are to be undertaken by the NMISC:

- Avoiding construction or location of staging areas in jurisdictional wetlands.

- Avoiding impacts to birds protected by the Migratory Bird Treaty Act by scheduling construction outside of the normal bird breeding and nesting season (April 15 through August 15) for most avian species or conducting pre-construction breeding bird surveys and monitoring if construction were to occur during the breeding and nesting season and consultation with the USFWS if affected species are observed.

- Implementing specific mitigation measures to avoid impacts to threatened or endangered species and their habitats identified in the Project area, as identified in the Biological Opinion for Phase II from the USFWS

- Avoiding any Traditional Cultural Properties identified in the Project area identified during previous consultation with the State Historic Preservation Officer and tribal entities.

- Implementing measures to stop work and notify the Reclamation Area Archaeologist in the event that prehistoric or historic remains, human burials, or other archaeological resources are discovered during construction or monitoring.

- Water depletions for each site will be assessed. If increases do occur, they would be offset through a permitting process established by the Office of the State Engineer.

- Silt curtains and fences will be used to minimize any potential increases in turbidity in the river during and immediately after construction-related activities.

- Monitoring would be performed as described in the ten year monitoring plan at each site to ensure that project goals are met.