ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY SOUTHWESTERN WILLOW FLYCATCHER HABITAT RESTORATION PROJECT

ENVIRONMENTAL ASSESSMENT

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ACRONYMS AND ABBREVIATIONS

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
Albuquerque A&R	Albuquerque Reach Habitat Analysis and Recommendations Study
BiOp	Biological Opinion
cfs	cubic feet per second
City	City of Albuquerque
Collaborative Program	Middle Rio Grande Endangered Species Collaborative Program
cm	centimeters
CWA	Clean Water Act
dBA	A-weighted decibel
DO	dissolved oxygen
EA	environmental assessment
ESA	Endangered Species Act
flycatcher	southwestern willow flycatcher
FR	*Federal Register*
GIS	geographic information system
GPS	global positioning system
ha	hectares
ITA	Indian Trust Assets
km	kilometer(s)
m	meter(s)
MBTA	Migratory Bird Treaty Act
MEI	Mussetter Engineering, Inc.
MRG	Middle Rio Grande
NEPA	National Environmental Policy Act
NMDGF	New Mexico Department of Game and Fish
NMOSE	New Mexico Office of the State Engineer
NMWQ	New Mexico Water Quality
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
Open Space	City of Albuquerque Open Space Division
Project	ABCWUA Southwestern Willow Flycatcher Habitat Restoration Project
Reclamation	U.S. Bureau of Reclamation
RM	river mile
RPA	Reasonable and Prudent Alternative
SHPO	State Historic Preservation Officer
silvery minnow	Rio Grande silvery minnow
SSED	suspended sediments
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
TCP	traditional cultural property
TDS	total dissolved solids
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The Albuquerque Bernalillo County Water Utility Authority (ABCWUA) plans to restore habitat for the benefit of the southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher) on a 20-acre section of the Middle Rio Grande (MRG) in Bernalillo County, New Mexico (Figure 1.1). Habitat restoration would entail creating an approximately 10-acre swale that would be dominated by willow (*Salix* sp.). An additional approximately 10-acre buffer area would be planted with native riparian shrubs typical of the surrounding floodplain. The site is on lands that are owned by the City of Albuquerque (City) and managed by the City of Albuquerque Open Space Division (Open Space). The ABCWUA has assembled a project team that includes SWCA Environmental Consultants (SWCA) and Open Space to implement the project (the Proposed Action). The project, when implemented, would contribute to the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) goal of meeting the habitat restoration requirements as stated in Element S of the Reasonable and Prudent Alternatives (RPA) in the March 2003 Biological Opinion (U.S. Fish and Wildlife Service [USFWS] 2003).

This environmental assessment (EA), completed in accordance with provisions of the National Environmental Policy Act (NEPA), evaluates potential direct, indirect, and cumulative impacts of the project to all resources within the project area during project implementation. The project will be implemented between March 1 and April 15, 2012. If all the work constructing the swales or planting is not completed during this period, construction will resume after August 15, 2012, as needed. This period is the best season for implementing dormant cut stem plantings. Funding for this project comes from the Collaborative Program via the U.S. Bureau of Reclamation (Reclamation).

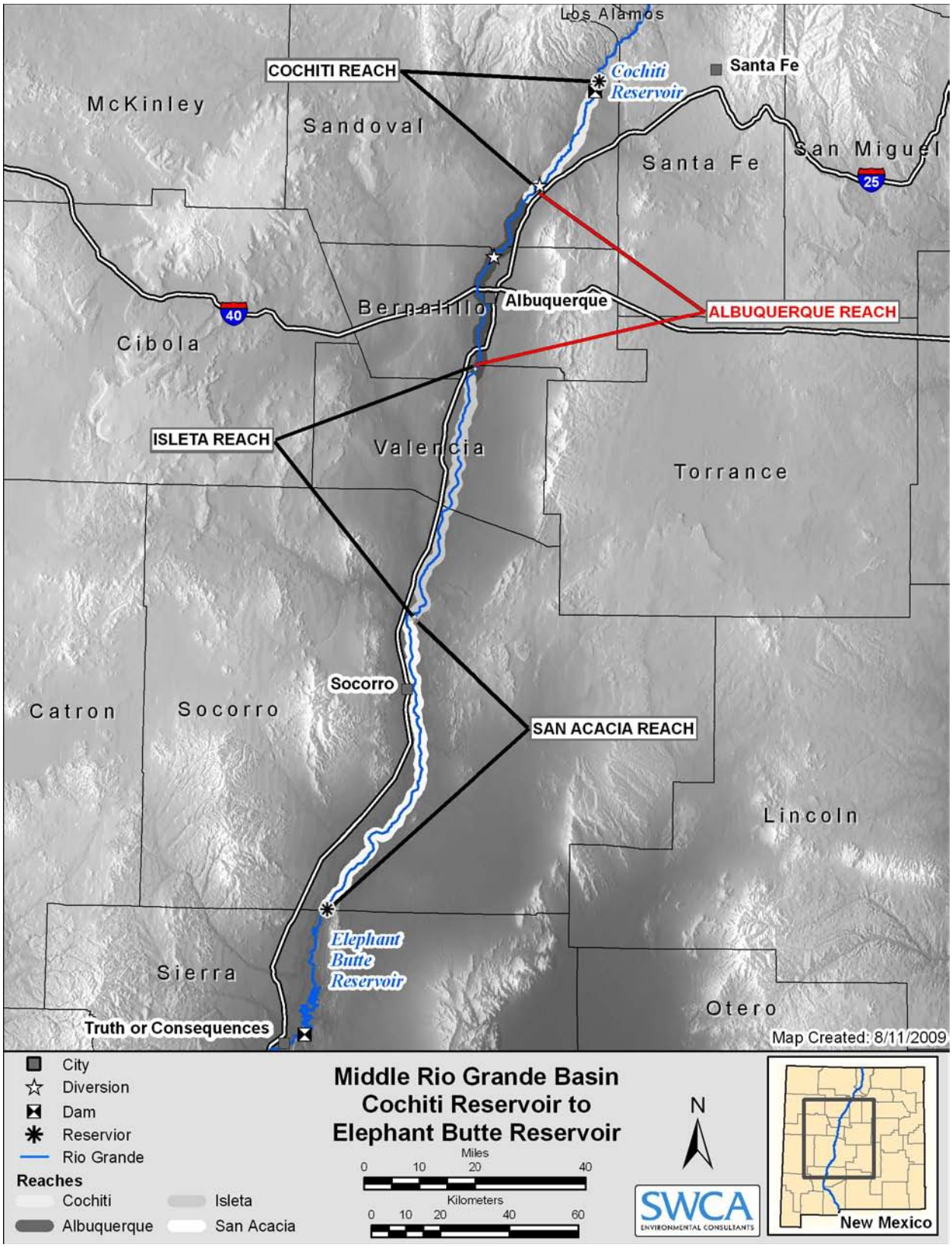

Figure 1.1. Albuquerque Reach location map.

1.2 PROPOSED ACTION LOCATIONS

1.2.1 ALBUQUERQUE REACH

The project is located in the Albuquerque Reach of the MRG, which is located in Bernalillo and Sandoval counties, New Mexico, and extends 64.9 kilometers (km) (40.3 miles) from Angostura Diversion Dam (river mile [RM] 209.7) in the north to Isleta Diversion Dam (RM 169.4) (Collaborative Program 2006) (see Figure 1.1). The Collaborative Program defines the MRG as "the headwaters of the Rio Chama watershed and the Rio Grande, including tributaries, from the New Mexico-Colorado state line downstream to an elevation 1,356 m (4,450 feet) above mean sea level, the elevation of the spillway crest of the Elephant Butte Dam" (Collaborative Program 2006:1). The project area is located on the west bank of the river between RM 188 and RM 189 and is demarcated by La Orilla drain to the north, the Corrales Riverside drain to the west, Montaño Road to the south, and the Rio Grande to the east (Figure 1.2).

The Albuquerque Reach of the Rio Grande is a predominantly sand-bedded channel that has experienced significant channel degradation since the closure of Cochiti Dam. Flood control activities have caused the river to be significantly channelized. The reduced magnitude of peak flows and the presence of non-native phreatophytes have resulted in stabilization of the river planform and disconnection of the channel from its historical floodplain (Mussetter Engineering, Inc. [MEI] 2008). Channel degradation has resulted in a reduced frequency and duration of inundation of bosque lands outside the floodway and the bank-attached and mid-channel bars within the floodway.

The project reach is characterized in *Albuquerque Reach Habitat Analysis and Recommendations Study* (Albuquerque A&R) (SWCA 2010) as having moderate potential for persistent standing water or saturated soils and a high potential to develop dense stands dominated by willow for the benefit of the flycatcher. Groundwater depths may be suitable for supporting native willow vegetation, especially closer to the river channel. However, overbank inundation in this reach, as indicated by FLO-2D modeling, is unlikely to occur at discharges less than 6,000 cubic feet per second (cfs) (SWCA 2010). Therefore, creating suitable flycatcher breeding habitat, which consists of dense willow near standing water, will require using well established restoration techniques such as constructing willow swales, and active vegetative management.

Figure 1.2. Project location.

1.3 PURPOSE AND NEED

The Proposed Action is needed to satisfy federal recommendations under the 2003 Biological Opinion (BiOp), which describes a series of reasonable and prudent alternatives that can be implemented that will avoid jeopardy to the flycatcher. Although the City is not a party to the consultation that resulted in the BiOp, they have expressed a desire to engage in activities that will benefit the flycatcher and have received funding from the Collaborative Program via Reclamation for completion of this project. The BiOp requires the funding and collaborative execution of habitat restoration projects that would have positive effects on the flycatcher. Projects planned in consultation with the USFWS include those that reintroduce native vegetation and result in periodic inundation of riparian areas. These recommendations for restoration to benefit the flycatcher are reflected in RPA Element S:

> In consultation with the USFWS and appropriate Pueblos and in coordination with parties to the consultation, action agencies shall conduct habitat/ecosystem restoration projects in the Middle Rio Grande to increase backwaters and oxbows, widen the river channel, and/or lower river banks to produce shallow water habitats, overbank flooding, and regeneration stands of willows and cottonwood to benefit the silvery minnow, the flycatcher, or their habitats. Projects should be examined for depletions. It is the Service's understanding that the objective of the action agencies and parties to the consultation is to develop projects that are depletion neutral. By 2013, additional restoration totaling 1,600 acres (648 hectares) will be completed in the action area.

RPA Element S advocates the creation of riparian habitat to help distribute and stabilize sediment and provide the low velocity habitats needed by the flycatcher. Flooded habitat is necessary to sustain the native riparian vegetation and wetlands that the flycatcher requires for shelter, feeding, and breeding. RPA Element T also states that habitat restoration through planning and implementation is necessary to offset the adverse effects to the flycatcher of river engineering techniques.

The project consists of the application of an alternative restoration/rehabilitation technique designed to create suitable flycatcher habitat in the Albuquerque Reach. The objective of the restoration process is to re-establish dense willow stands along excavated swales that will produce nesting substrate in the periodic presence of surface water, considered one of the most important factors in determining suitable flycatcher breeding sites (USFWS 2003). Dense stands of willow that lie within 100 meters (m) of water are categorized by the BiOp for flycatcher habitat as Highly Suitable Native Riparian.

The Albuquerque Reach of the MRG, which extends from Angostura Diversion Dam south to Isleta Diversion Dam (see Figure 1.1), has been identified by Reclamation, as well as the Collaborative Program, as a segment of the river where habitat/ecosystem restoration projects would be beneficial to the flycatcher.

1.4 ISSUES

1.4.1 ECOLOGICAL VALUES

The Rio Grande floodplain, including the riparian corridor (bosque) and river channel, is highly valued by the residents of New Mexico for its natural beauty, recreational opportunities, importance as a refuge for birds and other wildlife, and the presence of rare and protected species. The floodplain provides numerous ecosystem services to all citizens of New Mexico (Costanza et al. 1997).

1.4.2 NET WATER DEPLETIONS

The 2003 BiOp, the Collaborative Program, and the New Mexico Office of the State Engineer require that proposed projects demonstrate that they would not result in any increases in net water depletions. Since this project would be constructed with no direct connection to the main channel, no depletion calculations or offsets will be required.

1.5 RELEVANT STATUTES, REGULATIONS, AND OTHER PLANS

The Proposed Action does not conflict with any known state or local planning or zoning ordinances. The Proposed Action is required to conform to the provisions of Section 7 of the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA) as administered by the USFWS, as well as Section 106 of the National Historic Preservation Act as administered by the New Mexico State Historic Preservation Officer (SHPO). Compliance with Sections 401, 402, and 404 of the Clean Water Act (CWA) is also required.

2.0 ALTERNATIVES

2.1 INTRODUCTION

The *Habitat Restoration Plan for the Middle Rio Grande* (Tetra Tech 2004) contains a toolbox of habitat restoration treatments that may be selectively applied to specific sites. Although techniques presented in this document likely result in benefits to the habitat diversity in the floodplain, it has not been determined that implementation of specific methods have direct benefits to the flycatcher. Restoration techniques have been recommended based on professional judgment and observations from other riparian systems (Tetra Tech 2004). Flycatcher habitat needs are not completely known and although conditions at a specific site can be created that are conducive, there is no guarantee that birds will use the site.

This flycatcher habitat restoration project has been selected from those identified by the Albuquerque A&R (SWCA 2010) and through discussions with Open Space. The Albuquerque A&R has identified the project site as suitable for the development of flycatcher habitat based on site conditions, including the relative depth to groundwater, the lack of existing vegetation, and the proximity to the La Orilla drain and the river. The site is appropriate for completing this restoration project owing to the lack of any established dense vegetation as a result of previous non-native phreatophyte control efforts. Existing stands of coyote willow (*Salix exigua*) are not of sufficient height and density to provide flycatcher habitat. Creation of the swales would provide hydraulic conditions, depth to groundwater, and soil conditions that will be more conducive to willow establishment and growth.

The goal of the restoration project is to provide dense, mid-sized, native willow-dominated vegetation and standing water for flycatchers that breed in scattered, isolated, dense, mesic riparian sites containing five or fewer territories (Sogge et al. 2003). Riparian vegetation at flycatcher breeding sites may contain exotic trees and shrubs, or native species including Goodding's willow (*Salix gooddingii*), coyote willow, boxelder (*Acer negundo*), cottonwood (*Populus* sp.), seep willow (*Baccharis salicifolia*), rose (*Rosa* sp.), and desert false indigo (*Amorpha fruticosa*) (*Federal Register* [FR] 1995, 2005). Plant species composition, however, appears less important than vegetative structure in attracting flycatchers.

Quantitative vegetation studies by Moore (2007) along the southern MRG were conducted to assess the habitat at flycatcher breeding sites to act as a guide for restoration efforts aimed at creating such habitat. These results further support the findings of Allison et al. (2003) and McLeod et al. (2008) that flycatchers prefer nesting sites with dense vegetation in the mid-canopy layer between 3 and 4 m (10–13 feet) high. Moore and Ahlers (2008) report that in willow-dominated stands (defined as greater than 90% *Salix* species), nesting attempts were higher, but nesting success did not differ from saltcedar (*Tamarix* sp.) dominated or mixed stands.

The importance of standing water and/or saturated soil to flycatcher breeding sites has been referenced consistently in the literature. The presence of water may be most important to sustaining the particular vegetation at favored breeding sites (Paradzick 2005) and providing a more suitable microclimate for raising offspring (McLeod et al. 2008; Sogge and Marshall 2000).

2.2 PROPOSED ACTION AND NO ACTION ALTERNATIVES

Two alternatives, the Proposed Action Alternative and a No Action Alternative, are analyzed in detail below.

2.2.1 PROPOSED ACTION ALTERNATIVE

ABCWUA and Open Space plan to create flycatcher breeding and migratory habitat through the creation of willow swales in an area of approximately 10 acres. The swales would be excavated to a depth just above the groundwater table in order to create moist soil conditions during periods of high flow. These swales would be planted with dense stands of Goodding's and coyote willow with approximately 10 additional acres of riparian vegetation planted on the side slopes of the swales. The plantings on the side slopes would provide a buffer area and transition to the mature cottonwood overstory that is adjacent to the proposed treatment site (Figure 2.1).

Swales would consist of the excavation of surface-water catchments in order to decrease depth to groundwater within the bosque outside of the ordinary high-water mark. These features consist of depressions in the earth to catch surface-water runoff and allow groundwater saturation. The decreased depth to groundwater, coupled with the potential for runoff collection, would provide an environment that would encourage the recruitment of desirable woody native vegetation. Upon maturation of the vegetation, the created habitat would act as refuge for migratory birds, including the flycatcher.

A series of six swales will be excavated in the 10-acre area. Four smaller trench swales will be excavated surrounding two larger basin swales (Figure 2.2). Approximately 45,808 cubic yards of excavated material will be spread in the planting areas, along the adjacent levee roads, or hauled off-site as needed.

Coyote willow would be planted as cut stems (Natural Resources Conservation Service [NRCS] 2012a), approximately 3–4 m (10–12 feet) long, in trenches excavated in the bottom of the swales using an excavator or backhoe. The trenches would be excavated to groundwater depth. Willow stems, planted at a spacing of one stem per foot, would be planted in the trenches. Spacing of the trenches can vary, but is generally less than 2 m (6 feet). Goodding's willow would be planted as poles (NRCS 2012b), approximately 4 to 5 m (12–16 feet) in length. To improve survival, Goodding's willow stems may be planted using an auger to drill holes to the groundwater. Planting methods should ensure contact with the capillary fringe by placing stems immediately above the groundwater table or directly into the water table.

The preferred method for planting riparian shrubs follows well-established techniques (NRCS 2012c). Containerized willows would be planted by burying the potted end close to the capillary fringe. Riparian shrub species, common in portions of the MRG floodplain, would also be planted and include New Mexico olive (*Forestiera pubescens*), baccharis (*Baccharis salicifolia*), desert false indigo, and wolfberry (*Lycium* sp.).

Construction of the swales and planting would take place between March and April 15, 2012. Planting during this time will increase the likelihood that the dormant cut stems will establish correctly, and avoid any impact to breeding migratory birds.

Figure 2.1. Flycatcher habitat restoration project area.

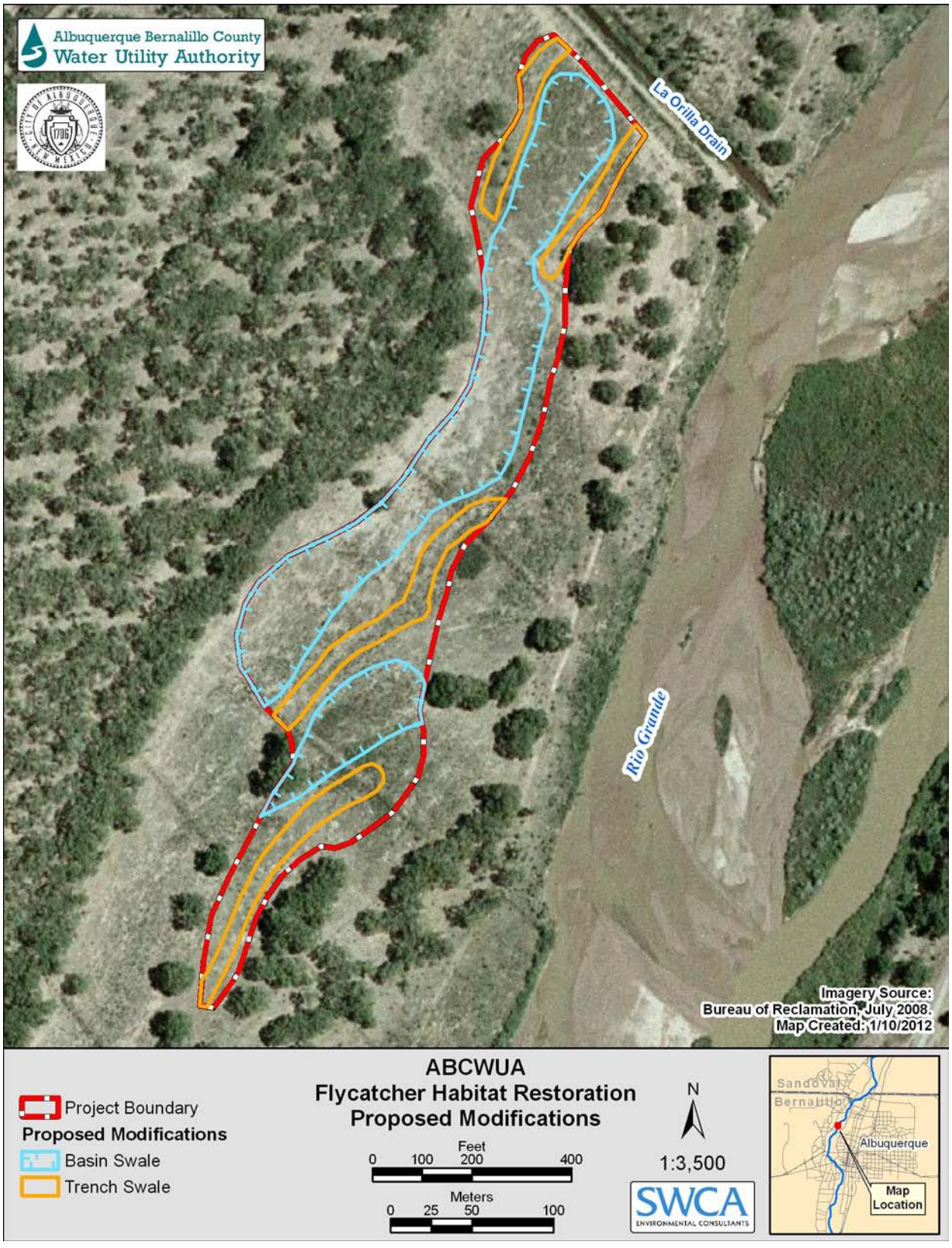

Figure 2.2. Proposed modifications.

2.2.2 NO ACTION ALTERNATIVE

The No Action Alternative assumes that no anthropogenic changes would be made to the riparian environment or the riverine habitat available to the flycatcher in the Albuquerque Reach at the proposed project location. Current river operations, as well as trends in riverine habitat quality and quantity, with the exception of other habitat restoration or bosque maintenance projects within the Albuquerque Reach, would remain dominant under the No Action Alternative.

2.2.3 PREFERRED ALTERNATIVE

The Preferred Alternative is the Proposed Action alternative, which implements the restoration techniques summarized in Section 2.3.1 with the goal of restoring, and/or creating riparian habitat for the flycatcher. Approximately 10 acres (4 hectares [ha]) of dense willow habitat would be created in conjunction with a riparian shrub buffer in order to provide the conditions that would encourage the development of flycatcher habitat.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section describes the current condition of resources in the study area that may be affected by the Proposed Action. Resources and related topics include geomorphology and soils; hydrology; water quality; cultural resources and traditional cultural properties; vegetation and wetland resources; fish and wildlife; threatened, endangered, and special-status species; socioeconomics; visual and aesthetic resources; air quality and noise; net water depletions; environmental justice; and Indian Trust assets.

3.2 GEOMORPHOLOGY AND SOILS

The MRG lies in an asymmetric, elongated valley along the Rio Grande Rift (Chapin 1988; Hawley 1978). Connected alluvium-filled sub-basins defined by normal faulted mountain ranges dominate the rift valley. The land flanking the Rio Grande is ancestral Rio Grande alluvial deposits. The river channel flows in a wide valley with a fertile but narrow (2–3 miles wide [3–5 km wide]) floodplain that has been cultivated for centuries.

Historically, the Rio Grande continuously reworked valley deposits on the active floodplain. However, floodway constriction and channel stabilization projects have confined the natural course of the river. For example, dams, levees, and jetty jacks have been used to create channel banks that control the location of the river, preventing flow from reaching the historical floodplain and causing sediment to accumulate within the levees (MEI 2003). The channel narrowing process has been accelerated by the accretion and attachment of bars to the river bank (MEI 2006).

Geomorphology plays an important role in shaping the evolution of the Rio Grande and in influencing the spatial extent and species diversity of plant species in the riparian areas. Existing channel-margin conditions in the Albuquerque Reach are the result of channelization of the river, hydrologic modifications that have reduced the magnitude of the frequently occurring peak flows, and the degradational response of the river to reduced upstream sediment supply and the presence of non-native vegetation species (MEI 2008). In combination, these drivers have resulted in stabilization of the river planform and disconnection of the channel from its floodplain, which together have caused loss of habitat for the flycatcher.

The soil associations in this area are classified as Torrifluvents, Vinton, and Brazito soils. Torrifluvents are a somewhat poorly drained frequently flooded alluvium derived from igneous and sedimentary rock. They are found in floodplains and have a slope of 0 to 1%. The typical sediment profile is loam, to very fine sandy loam, to sand, 0 to 152 centimeters (cm) (0–60 inches). Vinton soils are a well-drained, occasionally flooded recent alluvium derived from igneous and sedimentary rock. They are found in valley floors, alluvial fans, and floodplains, with a slope of 0 to 1%. Typical sediment profile is a fine sandy loam, to loamy sand, to sand, 0 to 152 cm (0–60 inches). Brazito soils are a poorly drained, occasionally flooded residuum weathered from igneous and sedimentary rock. They are located in alluvial fans and floodplain landforms, with slopes of 0 to 2%. The typical sediment profile consists of loamy sand to fine sand, 0 to 152 cm (0–60 inches) (NRCS 2010).

3.3 HYDROLOGY

The MRG, as defined by the Collaborative Program, is the portion of the Rio Grande from the Colorado/New Mexico state line southward to the headwaters of Elephant Butte Reservoir and includes the Rio Chama watershed. Most of the annual flow and discharge of the Rio Grande that reaches the MRG is generated in the headwaters of the river basin in Colorado and in the Rio Chama in northern New Mexico.

3.3.1 SURFACE WATER HYDROLOGY

Most of the discharge volume of the Rio Grande is derived from late spring snowmelt runoff events, which in some years produce large volumes of water that briefly alter the hydrograph of the river. The moderate and high flows associated with the seasonal snowmelt, as well as other channel-altering events, such as monsoonal rains, have the capacity to carry high sediment loads. However, human activities have produced significant changes in the hydrology of the Rio Grande during the past century. The operation of numerous upstream dams (Heron, El Vado, and Abiquiu reservoirs on the Rio Chama, Jemez Canyon Dam on the Jemez River, and Cochiti Dam on the Rio Grande) have significantly affected flows in the river by storing and releasing water in a manner that generally decreases the spring flood peaks and alters the timing of the annual hydrograph. Of the 100 greatest daily discharges since 1942 at the Central gage (U.S. Geological Survey [USGS] Gage No. 08330000), all have occurred prior to the construction of Abiquiu (1963) and Cochiti (1975) dams (USGS 2003). However, these operations have not caused significant changes in the average annual flow volumes, but seem only to affect the magnitude, timing, and duration of peak flows. According to USGS gage data, average daily flow for the Central gage for the pre-reservoir period from 1942 to 1974 was 1,042.70 cfs, while average daily flow for the post-reservoir period from 1975 to 2002 was 1,395.75 cfs.

The project area is not subject to inundation during spring runoff at current water operations. Recent FLO-2D modeling suggests that the project area would not experience inundation at flows less than 6000 cubic feet per second (cfs) (SWCA 2010).

3.3.2 GROUNDWATER HYDROLOGY

Shallow groundwater systems in the Albuquerque Reach of the MRG are affected by river seepage and the complex network of irrigation canals, ditches, and drains. Bartolino and Cole (2002) point out that in the Albuquerque Reach, groundwater pumping has lowered the groundwater table so that the river loses more flow to groundwater than it did during predevelopment conditions and suggest that this trend is in contrast to reaches upstream and downstream where the groundwater flow is to the river from the period 1974 – 2000.

In the MRG Basin, the estimated annual surface water inflow is approximately 1,330,000 acre-feet and the estimated outflow is approximately 1,050,000 acre-feet (Bartolino and Cole 2002). The approximately 280,000 acre-feet difference is consumed by consumptive uses, including irrigation, reservoir evaporation, recharge to groundwater and evapotranspiration by riparian

vegetation. McAda and Barroll (2002) simulate seepage losses between Bernalillo and the Rio Bravo Bridge to be approximately 63,000 acre-feet (84 cfs)[1].

The depth to groundwater was estimated to be a depth of 1.5 to 1.8 m (5–6 feet) (M. Schmader, personal communication with B. Bader, SWCA, 2010). Based on soil cores taken in August 2011, the depth to groundwater in the project area ranges from 1.8 m (6.0 feet) to just over 2.4 m (8.0 feet) (Figure 3.1). River stage is expected to affect the depth to groundwater in the riparian zone. SSPA (2006) suggest that regional groundwater elevations can fluctuate over four feet in the Bernardo and Socorro region. The results of the soil cores taken in August 2011, suggests that there is evidence of saturated soil conditions (e.g., gley layers) one to two feet above the depth to groundwater reported.

3.4 WATER QUALITY

Current information for the water quality of the river system in the MRG is available from the USGS, the U.S. Army Corps of Engineers (USACE), Reclamation, the University of New Mexico, the New Mexico Environment Department, and the USFWS, as well as other sources. Water quality constituents that are typically monitored include surface water temperature, pH, turbidity, dissolved oxygen (DO), suspended sediments (SSED), conductivity/total dissolved solids (TDS), and fecal coliform. These data may be collected in the Rio Grande, in adjacent canals, or within reservoirs. Typically, personnel at specific riverine, canal, or reservoir locations collect the data with automatic data logging devices at stream gage stations. The available data for the Albuquerque Reach are characterized by a high degree of seasonal variability for several water quality measures, as detailed in Table 3.1.

Table 3.1. Average Water Quality Data by Constituent for the Central Avenue Gage, Approximately 4.4 Miles (7.1 km) South of the Project Site

Season	Turbidity (NTU)	DO (mg/L)	pH	Conductivity (mg/L)	Water Temp (°C)	TDS (mg/L)	Fecal Coliform (col/100 mL)	SSED (mg/L)
Nov–Feb	9.12	10.19	8.08	391.86	6.66	255.08	N/A	539.01
Mar–June	45.57	8.66	7.97	359.11	15.90	209.74	82.50	1,167.12
July–Oct	25.67	8.03	8.13	387.95	18.89	273.17	8.00	2,114.67

NTU=nephelometric turbidity unit.
Source: USGS (2003); Data are from 1975–2001.

The USGS has identified the following items as contributors in this region to water pollution: cyanide, fire retardant slurry, impervious surface/parking lot runoff, municipal point source discharges, on-site treatment systems (septic and similar decentralized systems), wastes from pets, and waterfowl.

[1] This is a median value for the period 1996 – 2000. McAda and Barroll (2002) reported seepage losses in cubic feet per second with a conversion to acre-feet. Simulated seepage losses vary seasonally by about 15 cfs.

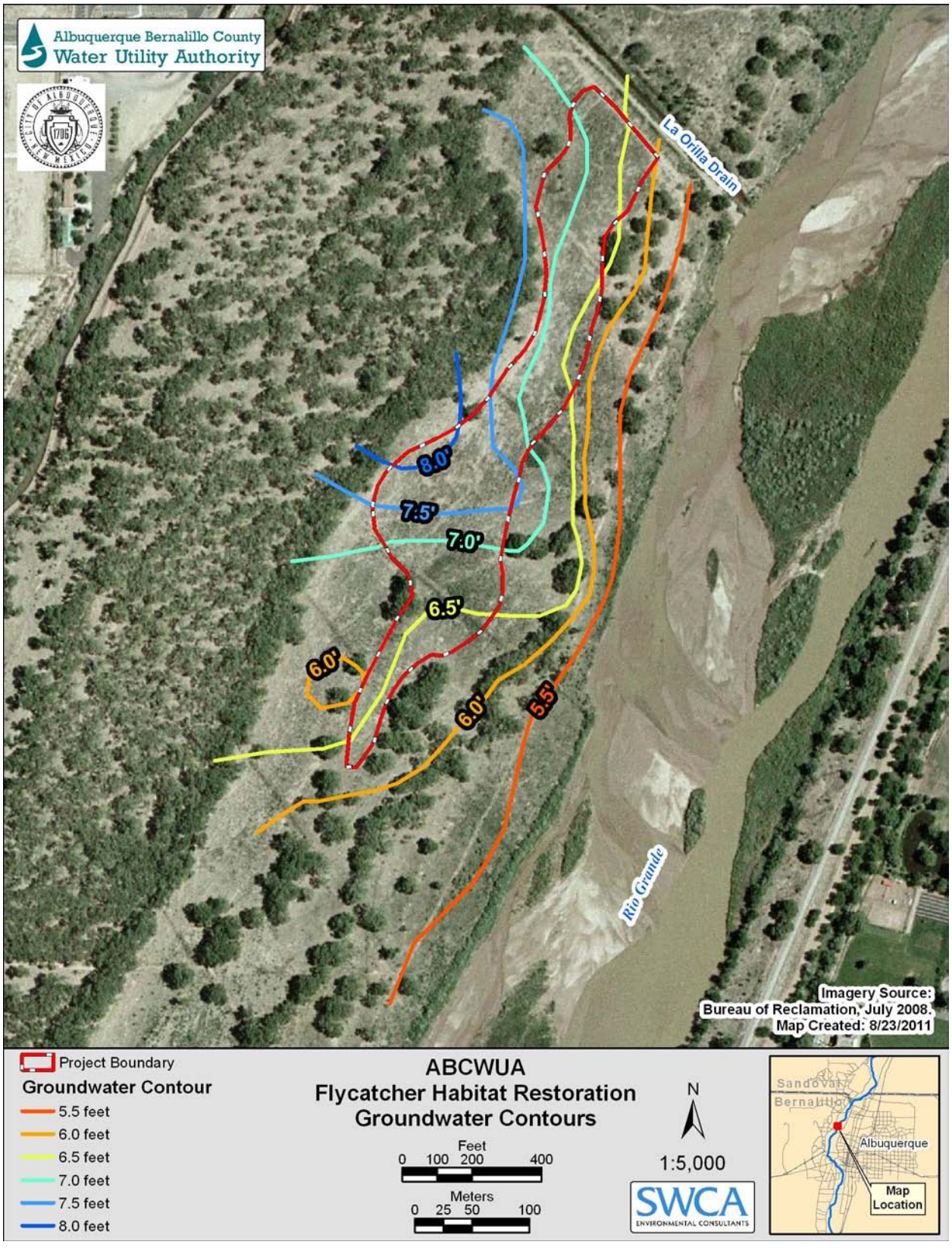

Figure 3.1. Groundwater contours.

New Mexico Environment Department water quality standards exist for stream and river reaches throughout the state of New Mexico. The water quality standards are from the New Mexico Water Quality (NMWQ) Control Commission, as amended through May 23, 2005, and are for two reaches: 1) the mainstem of the Rio Grande from the headwaters of Elephant Butte Reservoir upstream to the Alameda Bridge (NMWQ Standards 20.6.4.106) and 2) the mainstem of the Rio Grande from Alameda Bridge upstream to the Angostura diversion works (NMWQ Standards 20.6.4.105). General criteria established to sustain and protect existing or attainable uses of surface waters of the state are found in the New Mexico Administrative Code 20.6.4.13. These general criteria apply to all surface waters of the state at all times.

3.5 CULTURAL RESOURCES AND TRADITIONAL CULTURAL PROPERTIES

3.5.1 CULTURE HISTORY

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

The indigenous population in the Rio Grande valley of New Mexico dates back at least 12,000 years (Cordell 1997:67–68). The steady influx of peoples of European descent into the Rio Grande valley of present-day New Mexico from the sixteenth century onward has given rise to a diverse cultural mosaic and has left a multitude of varied cultural resources that are more than 50 years old throughout the state. The state was part of the Spanish Colonial Empire until Mexico won its independence in 1821. Twenty-five years later, in 1846, New Mexico was claimed by the United States. These successive cultures have left archaeological sites (habitation, mining, industrial, and other), standing structures, bridges, utilities, and a network of irrigation canals and acequias more than 50 years old (Arrowsmith 1963; Cordell 1997:67–68; Rivera 1998; Van Citters 2003). However, archaeological resources in the Rio Grande floodplain are limited because of poor preservation, the result of flooding episodes, periodic fire, and a long history of agricultural use of the valley floor prior to the existence of a preservation ethic.

A search of the Archaeological Records Management Section database and the online Historic Preservation Division database was conducted on August 1, 2011, for previously recorded archaeological sites and previously conducted archaeological surveys within 500 m (1,640 feet) of the survey area. The Historic Preservation Division and NRHP database records search was conducted on August 1, 2011, for properties on the NRHP and State Register of Cultural Properties within 500 m (1,640 feet) of the survey area.

Results of the records searches show that eight previous investigations and six previously recorded sites have been identified within 500 m (1,640 feet) of the survey area. There were no sites that intersected the project area. One registered property is located within 500 m (1,640 feet) of the survey area. The property—listed only on the State Register of Cultural Properties (No. 1281)—is the Los Ranchos Archaeological District along Rio Grande Boulevard in Albuquerque, Bernalillo County, New Mexico.

SWCA conducted a pedestrian cultural resources survey on August 3, 2011, using a transect interval of 15 m (50 feet) throughout the project area; because of the 2003 fire, almost all of the project area was accessible (no impenetrable thickets of vegetation). No archaeological sites were

found during the survey where the Proposed Action would take place. However, Reclamation requested that jetty jacks (placed both parallel and perpendicular to the Rio Grande by the USACE throughout the MRG valley in the early 1950s through the 1960s) be designated as isolated features.

Five jetty jacks (Nos. 5222, 5223, 5226, 5227, and 5228) were within the 39.6-acre cultural resources survey areas. Of those, four portions of jetty jack segments (Nos. 5222, 5223, 5226, and 5227) are within the 10-acre project area/area of potential effect. Portions of these four jetty jacks within the project area will likely be removed by project activities. Jetty jack locations are shown in Figure 3.2.

3.5.2 TRADITIONAL CULTURAL PROPERTIES

Reclamation has consulted with Native American tribes and pueblos that may have an interest in the project and project area to determine if any TCPs must be considered in the decision-making process.

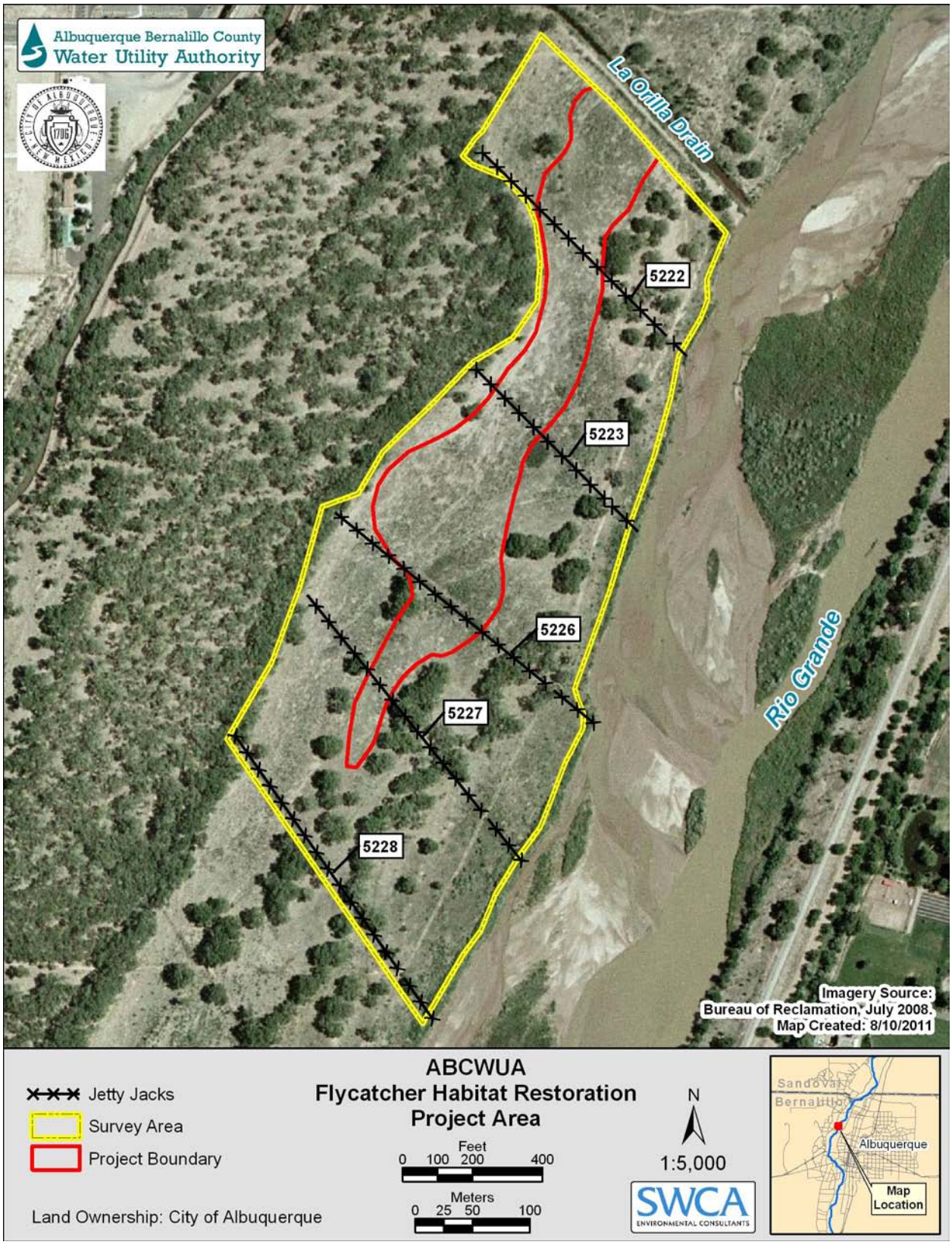

Figure 3.2. The five jetty jacks (isolated features) within the investigated area. Four jetty jacks intersect the project area.

3.6 VEGETATION AND WETLAND RESOURCES

The river bank ecosystem found directly along the main channel of the MRG consists of open sandbars, river bank areas with herbaceous and shrubby vegetation, and small, seasonally saturated or inundated areas characterized by a variety of hydrophytic wetland flora. Herbaceous and shrubby vegetation is common along the river bank in areas where the river channel has become deeply incised. Russian olive (*Elaeagnus angustifolia*) and saltcedar are prevalent throughout the floodplain, but especially along the channel margins. Vegetation has successfully established along the channel margins due to a decrease in overbank flooding, which results in a lack of scouring, displacement, and removal of substrate immediately adjacent to the river bank. The root structures of the river bank vegetation serve to reinforce the river bank, causing less erosion, deeper channel incision, and a decrease in the potential for lateral river migration.

Prior to Euro-American settlement and development, the Rio Grande corridor was a more-or-less continuous ribbon of bosque forest dominated by cottonwoods, willows, and other species adapted to the riparian corridor. The plant community vegetation association in the project area is classified as Floodplain-Plains Riparian (Dick-Peddie 1993). Current vegetation cover consists of mixed native and exotic riparian vegetation communities including small stands of coyote willow with a sparse ground layer and regenerating saltcedar. Open Space removed saltcedar and Russian olive within the project area following the Montaño fire of 2003; however, saltcedar has resprouted. A mature cottonwood stand lies immediately to the west of the proposed swale footprint (Figure 3.3). The surrounding desert-basin floor is sparsely covered by bunch grasses and shrubs typical of Plains and Great Basin Grassland vegetation (Brown 1994:115–121; Brown and Lowe 1994). During periods with higher precipitation, the desert floors were probably covered by denser stands of grasses and other vegetation.

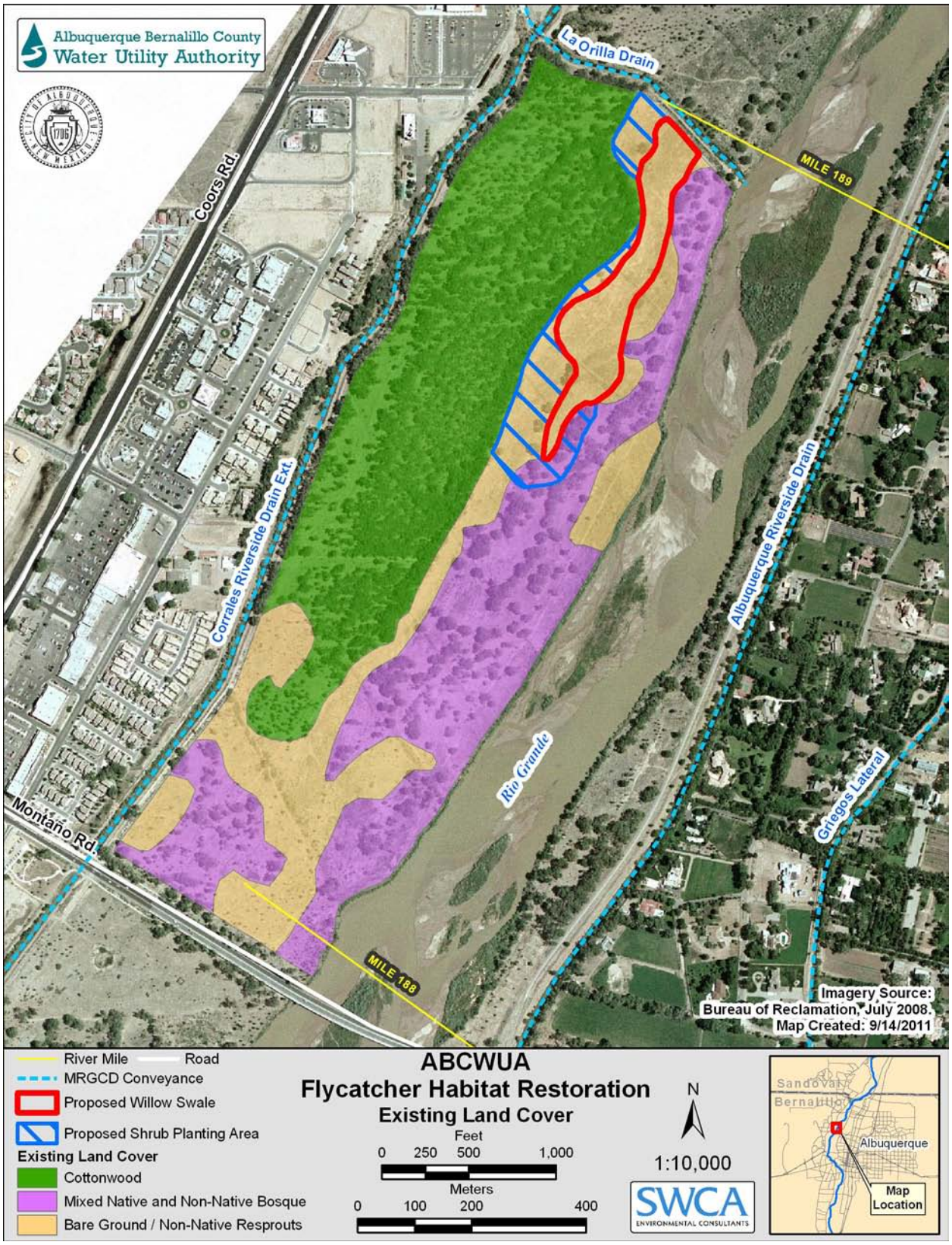

Figure 3.3. Existing land cover in the project area.

Vegetation surveys of the project area and vicinity were carried out by SWCA on April 8, 2011, using aerial photographs of the area and global positioning system (GPS) coordinates. Data collected included vegetation density at different heights, vegetation composition, and other characteristics, such as evidence of previous disturbance, fire, recent flood, or erosion. A modified Hink and Ohmart classification system (Hink and Ohmart 1984) was used to code the vegetation based on height, structural class, and the dominant overstory and understory species (Figure 3.4). Vegetation accounting for less than 25% density in any layer was not included. The field crew used handheld GPS units to record the boundaries of different habitat types. Data were entered into ArcGIS, including the polygon perimeters and acres of each vegetation type. The size of each treatment has been rounded to the nearest 0.05 acre to account for the margins of error for the vegetation survey and geographic information system (GIS) analysis, and any polygons of vegetation smaller in extent than 0.05 acre were eliminated as outside the resolution of the study.

Hink and Ohmart (1984) recognize six structural classes of riparian wetland vegetation in the Middle Rio Grande:

Structural Type 1: Mature and mid-aged trees with shrubby vegetation at all heights

Structural Type 2: Mature and mid-aged trees with little or no shrubby vegetation

Structural Type 3: Intermediate-aged trees with dense shrubby vegetation

Structural Type 4: Intermediate-aged trees with little or no shrubby vegetation

Structural Type 5: Young stands with dense shrubby vegetation

Structural Type 6: Very young, low, and/or sparse vegetation

Results of the vegetation surveys are reported in Table 3.2 as Hink and Ohmart Structural Types.

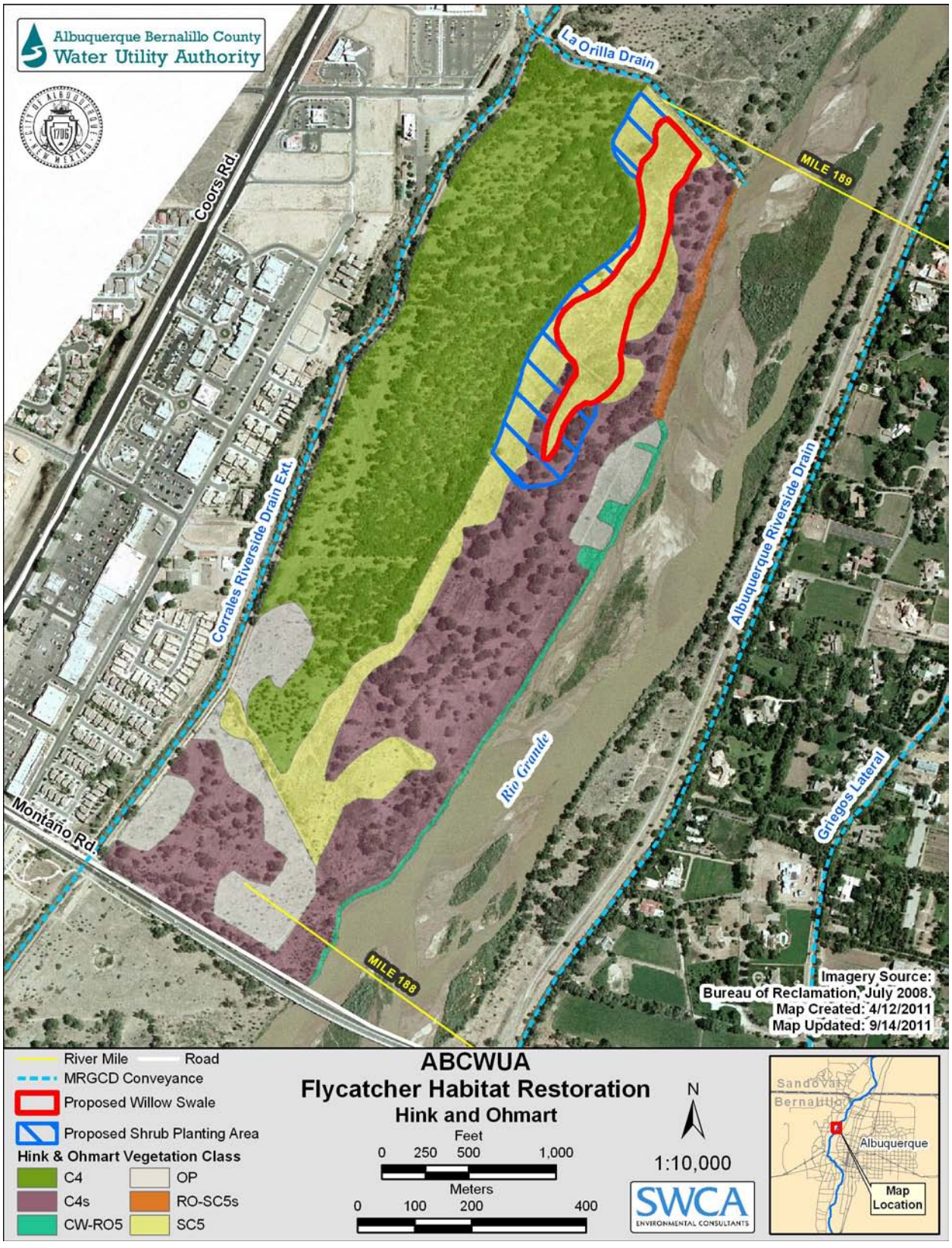

Figure 3.4. Hink and Ohmart classifications for the project area.

Table 3.2. Summary of Vegetation Survey and Impact Acreage

Treatment Site	Hink and Ohmart Classification	Hink and Ohmart Structural Type	Vegetation Composition	Acres
Willow Swale	C4s	4	Sparse intermediate cottonwood	0.1
Willow Swale	SC5	5	5–15 feet saltcedar	9.82
				9.83
Riparian Shrub Transition	C4	4	Intermediate cottonwood canopy with no understory	0.04
Riparian Shrub Transition	C4s	4	Sparse intermediate cottonwood	2.96
Riparian Shrub Transition	SC5	5	5–15 feet saltcedar	6.15
				9.15

A wetland investigation to determine the presence of waters of the U.S. was completed by SWCA on April 8, 2011. The USACE defines waters of the U.S. to include most wetlands, rivers, creeks, streams, lakes, tributaries, etc.

The USACE defines wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory 1987). According to the Environmental Laboratory (1987), in order for an area to be considered a wetland, it must meet the following three parameters under normal circumstances: 1) the presence of hydrology showing regular inundation, 2) a predominance of hydrophytic (water-loving) vegetation, and 3) soils characteristic of frequent saturation (i.e., hydric soils). All wetlands adjacent to waters of the U.S. are within the USACE's Clean Water Act (Section 404) jurisdiction.

Although the project area is within a riparian zone, it is composed of open bosque/forested non-wetland (upland) habitat. There were no wetlands identified within the project area during field surveys conducted in April 2011. The river bank was approximately 2 to 3 feet above the water surface at the time of the survey. The goal of the project is to create flycatcher breeding and migratory habitat through the creation of willow swales. Therefore this project should create wetland habitat within the project area.

3.7 FISH AND WILDLIFE

The aquatic fauna of the Rio Grande have been significantly impacted by changes in the river's hydrology and the introduction of predatory species (game fish). The Rio Grande drainage in New Mexico historically supported at least 21 and perhaps 24 native fish species, representing nine or ten families (Propst 1999). Since the beginning of European settlement along the Rio Grande, a number of native fish species have been extirpated, including the shovelnose sturgeon (*Scaphirhynchus platorhynchus)*, longnose gar (*Lepisosteus osseus*), American eel (*Anguilla rostrata*), speckled chub (*Machrybopsis aestivalis aestivalis*), phantom shiner (*N. orca*), Rio Grande bluntnose shiner (*Notropis simus simus*) and Rio Grande shiner (*Notropis jemezanus*). A remnant population of blue catfish (*Ictalurus furcatus*) might occur in Elephant Butte Reservoir. The Rio Grande silvery minnow (silvery minnow; *Hybognathus amarus*) is the only State- and

federally protected fish species currently inhabiting the Rio Grande, although the Rio Grande sucker (*Catostomus plebeius*) and Rio Grande chub (*Gila pandora*) may warrant State protection (Propst 1999).

Common fish species of the MRG include the silvery minnow, red shiner (*Cyprinella lutrensis*) river carpsucker (*Carpiodes carpio*), flathead chub (*Platygobio gracilis*), fathead minnow (*Pimephales promelas*), longnose dace (*Rhinichthys cataractae*), white sucker (*Catostomus commersoni*), common carp (*Cyprinus carpio*), western mosquitofish (*Gambusia affinis*), and channel catfish (*Ictalurus punctatus*) (Dudley and Platania 2008). Western mosquitofish, white sucker, and common carp are introduced species that are now common throughout the MRG.

The riparian corridor of the MRG historically supported a wide diversity of herpetofauna, including a rich amphibian community supported by a more frequently inundated floodplain and semi-permanent wetlands. Hink and Ohmart (1984) found 18 different species of amphibians and reptiles in the MRG. The most common herpetofauna were the Eastern fence lizard (*Sceloporus undulatus*), New Mexican whiptail (*Aspidoscelis neomexicanus*), Woodhouse's toad (*Bufo woodhousii*), bullfrog (*Rana catesbeiana*), and leopard frog (*Rana pipiens*). The chorus frog (*Pseudacris triseriata*) and the common garter snake (*Thamnophis sirtalis*) are unique to the MRG (Hink and Ohmart 1984).

The riparian forests of the MRG corridor provide important habitat during breeding and migration for many birds. Hink and Ohmart (1984) recorded 277 species of birds within the 262 km (163 miles) of MRG bosque habitat surveyed. Stahlecker and Cox (1997) documented 126 species, 60–65 of which may have been potential breeders in Rio Grande Nature Center State Park. The 10 most common species during the winter of 1996–1997 were dark-eyed junco (*Junco hyemalis*), American crow (*Corvus brachyrhynchos*), American goldfinch (*Carduelis tristis*), white-crowned sparrow (*Zonotrichia leucophrys*), American robin (*Turdus migratorius*), Canada goose (*Branta canadensis*), red-winged blackbird (*Agelaius phoeniceus*), mallard (*Anas platyrhynchos*), European starling (*Sturnus vulgaris*), and house finch (*Carpodacus mexicanus*). The most common species in the bosque during the summer of 1997 were black-chinned hummingbird (*Archilochus alexandri*), red-winged blackbird, black-headed grosbeak (*Pheucticus melanocephalus*), spotted towhee (*Pipilo maculatus*), brown-headed cowbird (*Molothrus ater*), mourning dove (*Zenaida macroura*), Bewick's wren (*Thryomanes bewickii*), black-capped chickadee (*Poecile atricapillus*), cliff swallow (*Petrochelidon pyrrhonota*), house finch, and European starling (Stahlecker and Cox 1997). Waterfowl species such as mallard, Canada goose, and wood duck (*Aix sponsa*) frequent the river in winter and sandhill crane (*Grus canadensis*) occur in large numbers in the floodplain and adjacent agricultural lands during the fall migration. Raptors occurring in the bosque include red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*), western screech owl (*Megascops kennicottii*), and great-horned owl (*Bubo virginianus*) (Stahlecker and Cox 1997).

Thirty-five mammal species were recorded by Hink and Ohmart (1984), and Campbell et al. (1997) observed 14 mammal species in their survey of the Albuquerque Reach. Based on both surveys, the most common small mammals in the proposed project area include white-footed mouse (*Peromyscus leucopus*), western harvest mouse (*Reithrodontomys megalotis*), and house mouse (*Mus musculus*). Other mammals common in the area include coyote (*Canis latrans*), raccoon (*Procyon lotor*), beaver (*Castor canadensis*), muskrat *(Ondatra zibethicus*), pocket

gopher (*Thomomys bottae*), and rock squirrel (*Spermophilus variegates*). Several species of bats also utilize the MRG.

3.8 THREATENED, ENDANGERED, AND SPECIAL-STATUS SPECIES

Special-status species are defined as those plants and animals protected under the federal ESA, New Mexico State threatened and endangered species are protected under the New Mexico Conservation Act of 1974 and the New Mexico Endangered Plant Species Act. Protection from harassment, harm, or destruction of habitat is granted to species protected under the ESA. The New Mexico Wildlife Conservation Act and New Mexico Endangered Plant Species Act protect State-listed species by prohibiting take without proper permits.

Information on the State- and federally listed species evaluated in this section has been obtained from sources provided by the USFWS (2011), the New Mexico Department of Game and Fish (NMDGF) Biota Information System of New Mexico (BISON-M 2011), and New Mexico Energy, Minerals and Natural Resources Department (New Mexico Administrative Code 19.21.2.1). Those plant and animal species that have been federally designated, or are potential candidates for classification as threatened or endangered that could occur in Bernalillo County are included in Table 3.3. Candidate species are those which the USFWS has sufficient information to list, but this action has been precluded by other higher-priority listings. Species of concern may require further research to determine their status or may be regarded as rare, sensitive, or declining by other scientific organizations. No legal protection is afforded these species, but project proponents are encouraged to consider whether implementing projects would adversely affect species of concern population persistence or distribution.

Table 3.3. Species with the Potential to Occur in Bernalillo County that are Listed as Threatened, Endangered, or Species of Concern by the USFWS, or Listed as Threatened or Endangered by the State of New Mexico

Common Name (*Scientific name*)	Status		General Habitat
	USFWS*	STATE†	
Fish			
Rio Grande silvery minnow (*Hybognathus amarus*)	E	E	Silt and sand substrates within slow backwaters
Birds			
Mexican spotted owl (*Strix occidentalis lucida*)	T	–	Old-growth coniferous forest
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	C	–	Dense riparian shrub
Southwestern willow flycatcher (*Empidonax traillii extimus*)	E	E	Dense riparian groves of willow or saltcedar
American peregrine falcon (*Falco peregrines anatum*)	SOC	T	Cliffs, wooded and forested habitat, and open habitat including wetlands and savanna
Black tern (*Chlidonias niger surinamensis)*	SOC	–	Emergent marsh with some open water
Baird's sparrow (*Ammodramus bairdii*)	SOC	T	Open grasslands

Common Name (*Scientific name*)	**Status**		**General Habitat**
	USFWS*	**STATE†**	
Northern goshawk (*Accipiter gentilis*)	SOC	–	Higher-elevation coniferous forest
Western burrowing owl (*Athene cunicularia hypugaea*)	SOC	–	Open grasslands, agricultural lands, desert scrub
Neotropic cormorant (*Phalacrocorax brasilianus*)	–	T	Large areas of open water such as lakes and reservoirs
Bald eagle (*Haliaeetus leucocephaus*)	–	T	Riparian areas with old-growth canopy
Aplomado falcon (*Falco femoralis septentrionalis*)	NEP	E	Extensive lower elevation grasslands and shrublands with scattered mesquite or yuccas
Broad-billed hummingbird (*Cynanthus latirostris magicus*)	–	T	Riparian woodlands adjacent to xeric habitat such as desertscrub
White-eared hummingbird (*Hylocharis leucotis borealis*)	–	T	Montane habitat dominated by pine and oak
Brown pelican (*Pelecanus occidentalis carolinensis*)	–	E	Large lakes and rivers. Rare transient in New Mexico.
Bell's vireo (*Vireo bellii*)	–	T	Riparian areas with sufficient understory canopy
Gray vireo (*Vireo vicinior*)	–	T	Juniper savanna
Mammals			
New Mexican jumping mouse (*Zapus hudsonius luteus*)	C	E	Riparian vegetation, dense grass, and willows
Gunnison's prairie dog (*Cynomys gunnisoni*)	C	–	Prairie, desert, and montane grasslands
Black-footed ferret (*Mustela nigripes*)	E	–	Expansive grasslands associated with large prairie dog colonies
Pecos River muskrat (*Ondatra zibethicus ripensis*)	SOC	–	Riparian, emergent marsh, and other aquatic habitat with open water
Townsend's big-eared bat (*Corynorhinus townsendii*)	SOC	–	Xeric to mesic habitats, including desertscrub, sagebrush, deciduous and coniferous forests
Spotted bat (*Euderma maculatum*)	–	T	Meadows in higher-elevation ponderosa pine forest
Invertebrates			
Millipede (*Comanchelus chihuanus*)	SOC	–	Desert, and volcanic outcrops

* USFWS status: C = candidate; E = endangered; T = threatened; SOC = Species of Concern; NEP = Non-essential experimental population

† New Mexico State status: E = endangered; T = threatened

Based on a review of habitat requirements of the 24 species listed in Table 3.3, only eight species have the potential to occur in the project area. The remaining species were eliminated from further consideration because the proposed project area is either outside of the species' range, or did not include the vegetation or landscape features that would support the species, or both. Descriptions of those eight species are provided below.

3.8.1 FISH

Rio Grande Silvery Minnow (*Hybognathus amarus*)

The silvery minnow was federally listed as endangered under the ESA on July 20, 1994 (FR 1994a), and is listed as endangered by the State of New Mexico. The final recovery plan for the silvery minnow was released in July 1999 (USFWS 1999) and critical habitat was subsequently designated on February 19, 2003 (FR 2003) for the area extending from Cochiti Dam downstream to just north of the Elephant Butte Reservoir in Socorro County.

The silvery minnow is a moderate-sized, stout minnow that reaches 9 cm (3.5 inches) total length and spawns in the late spring and early summer, coinciding with high spring snowmelt flows (Sublette et al. 1990). The silvery minnow is omnivorous, feeding primarily on diatoms (Magaña 2007; Shirey 2004). These fish travel in schools and tolerate a wide range of habitats (Sublette et al. 1990), but generally prefer low-velocity areas (10 cm/second [<0.33 feet per second]) over silt or sand substrate that are associated with shallow (40 cm [<15.8 inches]) braided runs, backwaters, or pools (Dudley and Platania 1997). Habitat includes stream margins, side channels, and off-channel pools where water velocities are low or reduced from main-channel velocities. Stream reaches dominated by straight, narrow, incised channels with rapid flows are not typically occupied by silvery minnow (Bestgen and Platania 1991).

3.8.2 BIRDS

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

The western yellow-billed cuckoo is a USFWS candidate subspecies that occurs locally along riparian corridors throughout New Mexico. Ideal habitat appears to be dominated by cottonwood canopy with a well-developed willow understory. The yellow-billed cuckoo's diet consists mainly of caterpillars but may also include other insects, some fruit, and the occasional lizard or frog (BISON-M 2011). The breeding range of yellow-billed cuckoo extends from California and northern Utah north and east to southwestern Quebec and south to Mexico. In New Mexico, historical accounts indicate that the yellow-billed cuckoo was very common along the Rio Grande but was rare statewide (BISON-M 2011). Both Hink and Ohmart (1984) and Stahlecker and Cox (1997) reported yellow-billed cuckoo as a nesting bird in the bosque of the MRG.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The flycatcher was listed as endangered on February 27, 1995 (FR 1995) with critical habitat first designated on July 22, 1997 (FR 1997). The USFWS revised this extent of this designation in October 2005 (FR 2004, 2005). Although part of the Rio Grande Recovery Unit, the Middle Rio Grande Management Unit proposed for critical habitat starts at the Bernalillo–Valencia county line and excludes the Albuquerque Reach (FR 2011).

The historical range of the flycatcher includes riparian areas throughout Arizona, California, Colorado, New Mexico, Texas, Utah, and Mexico (FR 1993). The flycatcher is an insectivore that forages in dense shrub and tree vegetation along rivers, streams, and other wetlands (USFWS 2003) and prefers dense riparian thickets, typically willows with a scattered cottonwood overstory. Dense riparian vegetation with adequate insect prey populations are considered primary habitat constituents for the flycatcher (FR 2011).

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle has been removed from protection under the ESA, but continues to receive protection from the Bald and Golden Eagle Protection Act, the MBTA, and the State of New Mexico (FR 2007), where it is listed as threatened. Bald eagles are associated with habitats near open water. In New Mexico, bald eagles commonly winter in areas adjacent to rivers and lakes or where carrion is available. The major food items for bald eagles in New Mexico are waterfowl, fish, and carrion (BISON-M 2011). Bald eagles are uncommon during the summer and have limited breeding sites in New Mexico, with documented nests in the extreme northern and western portions of the state. The number of birds wintering in the state has been steadily increasing. The species commonly winters along the Rio Grande and may be observed roosting in tall cottonwood trees near the river.

Bell's Vireo (*Vireo bellii*)

Bell's vireo is listed as threatened by the State of New Mexico (BISON-M 2011). Bell's vireo is occasionally found during summer months in the lower MRG. The species uses dense shrubby or woody riparian habitats, including cottonwood and willow habitat patches of 0.25 to 3.0 acres (0.10–1.25 ha) in riparian corridors throughout the southwestern United States. The species is suffering from the effects of habitat loss and cowbird parasitism throughout much of its historical range.

Black Tern (Chlidonias niger surinamensis)

The black tern is a federal species of concern that occurs irregularly in the MRG valley, and is generally considered a migrant in New Mexico (BISON-M 2011). They depend on steady water levels for successful breeding (BISON-M 2011) on wetland vegetation or on the ground near open water. Breeding in scattered colonies, these birds commonly forage for insects or small fish in flocks. Black tern populations have been declining since the 1960s primarily from loss of breeding and migratory stopover habitat. Chemical pollution from farm runoff may also have contributed to population decreases.

3.8.3 MAMMALS

New Mexican Jumping Mouse (*Zapus hudsonius luteus*)

The New Mexican meadow jumping mouse (*Zapus hudsonius luteus*) is listed by the USFWS as a candidate and is considered endangered by the State of New Mexico (BISON-M 2011). The species is endemic to New Mexico and Arizona. It is restricted to mesic habitats, preferring permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges (*Carex* sp.), and forbs. In the Rio Grande valley, the species occurs mainly along the edges of permanent ditches and cattail (*Typha* sp.) stands.

Pecos River Muskrat (Ondatra zibethicus ripenis)

The Pecos River muskrat is listed as a species of concern in Bernalillo County by the USFWS, although there are no known occurrences in the county (BISON-M 2011). Three subspecies of muskrat occur in New Mexico, but there is little information regarding this subspecies in the literature. Muskrats are found in the southern Rio Grande and have been documented using the wetlands and drainage ditches at Bosque del Apache National Wildlife Refuge in Socorro

County (NMDGF 2011f). Muskrats live in burrows in stream banks or in cone-shaped houses made of leafy vegetation in emergent wetland habitat (Fitzgerald et al. 1994). Muskrats are primarily herbivorous, feeding on cattail, bulrush, and other wetland plants. Muskrat territories are typically quite small with most activity being confined to an area within about 50 feet of the nest. Populations are very sporadic and may undergo five- to ten-year cycles. Density in good-quality habitat may reach 22 individuals per acre before food resources are rapidly depleted (Fitzgerald et al. 1994).

3.9 SOCIOECONOMICS

The proposed project location is in Bernalillo County, which includes an area of 1,160.8 square miles of New Mexico. In 2010, the county had an estimated population of 662,564, approximately 32% of the total state population of 2,059,179 (U.S. Census Bureau 2010). Between 2000 and 2010, the county population increased by 19% compared to the statewide population that increased by 13.2%. The county is considered primarily urban and includes Albuquerque, the largest city in New Mexico.

Bernalillo County has a median household income of $45,550, and per capita personal income is $25,830 (2009 dollars) (U.S. Census Bureau 2010).

For the last decade, the MRG area of Bernalillo County has experienced rapid population growth creating an urban and suburban corridor, extending from the town of Bernalillo in Sandoval County to Belen in Valencia County. As such, each community in this region is economically interconnected with its surrounding communities.

3.10 VISUAL AND AESTHETIC RESOURCES

The bosque area within the Albuquerque Reach of the MRG is valued for the visual and aesthetic appeal of the mature gallery forest combined with flowing water in an arid landscape. The bosque is also valued for its recreational opportunities including wildlife viewing within an urban environment. Public access using motorized vehicles is restricted, adding to the aesthetic experience for those recreating in the area on foot, on horseback, or by mountain bike.

The bosque and river are visible to the public from the Montaño Bridge crossing, and the project site would be approximately 3,500 feet north of the roadway as it crosses the river. This bridge vista of the floodplain provides thousands of urban residents with a regular and important visual aesthetic experience. There is a pedestrian crossway across the bridge on the south side of the road with several constructed viewpoints looking south along the river that are accompanied by educational displays. This walkway is commonly used by bike riders as well. Montaño Bridge also has designated bike lanes on both its north and south sides. The view north toward the project area from the walkway is obstructed by the traffic lanes of the bridge.

The paved Paseo del Bosque multiuse trail passes on the east side of the river, and there is a wide buffer of vegetation and river between recreational users and the project. To the west of the project area are several densely populated residential areas and a commercial center. The residences are equidistant between Coors Road to the west and the project area, and the commercial center is located on Coors Road. These are separated from the project by the

elevated levee road running parallel to the Corrales Riverside drain extension and a dense stand of cottonwoods. Therefore, it is unlikely that the project would be visible from the residential or commercial areas.

A network of trails is present along the levee road and both north and south of La Orilla drain. One trail north of La Orilla drain is officially maintained by Open Space and there are numerous informal trails that follow old access roads south of La Orilla drain into the project area. These trails, as well as the levee road, are frequently used by hikers, horseback riders, and mountain bikers.

The project is nearly 2 miles south of the Paseo del Norte Boulevard Bridge and would not be visible to motorists using this river crossing.

3.11 AIR QUALITY AND NOISE

The proposed project area lies within New Mexico's Air Quality Control Region 152 encompassing about 5,000 square miles. Region 152 includes all of Bernalillo County, and is in attainment for all criteria pollutants (carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides) of the National Ambient Air Quality Standards (New Mexico Administration Code 20.2.3). The closest Class I area (a national park or wilderness area) is Manzano Mountain Wilderness, east of the proposed project area. Air quality in the project area is considered to be good. Due to inversions and an increase in the use of wood-burning stoves, carbon monoxide and airborne particulates are occasionally high in the Rio Grande valley during winter months. All vehicles involved in project activities would have emission control equipment that has passed state emissions tests. A fugitive dust permit would be obtained from local municipalities if necessary. Best management practices, including wetting down disturbed areas, sediment disposal areas (e.g., levee roads), and ingress/egress roads to minimize dust, would be followed during project activities.

Noise levels are limited to 90 A-weighted decibels (dBA) averaged over an eight-hour day by the Occupational Safety and Health Administration (29 Code of Federal Regulations 1910.95). No worker may be exposed to 115 dBA averaged over an eight-hour day without hearing protection.

3.12 NET WATER DEPLETIONS

The Rio Grande Compact (1939) limits the amount of surface water that can be depleted annually in the MRG based upon the natural flow of the river measured at the Otowi gage near Los Alamos. In addition, the New Mexico Office of the State Engineer (NMOSE) has determined that the MRG is fully appropriated. Therefore, any increase in water use in one sector must be offset by a reduction in use in another sector to ensure that Indian water rights, other existing water rights, or New Mexico's ability to meet its downstream delivery obligations are not impaired. Additionally, the New Mexico State Water Plan (NMOSE and New Mexico Interstate Stream Commission 2003) states that habitat restoration projects should not increase net water depletions, or that if depletions should occur they would be offset through a permitting process established by the NMOSE.

3.13 ENVIRONMENTAL JUSTICE

Executive Order 12898 (FR 1994b), Environmental Justice in Minority and Low-Income Populations, requires consideration of adverse impacts that would disproportionately affect such populations. The ethnic population of Bernalillo County is similar proportionally to that of the state of New Mexico. The county has slightly higher proportions of African-American, Asian, and Hispanic populations and a slightly lower proportion of Native American populations in comparison to the state.

3.14 INDIAN TRUST ASSETS

Indian Trust Assets (ITAs) are legal interests in assets held in trust by the U.S. Government for Native American tribes or individuals. Some examples of ITAs are lands, minerals, water rights, hunting and fishing rights, titles, and money. ITAs cannot be sold, leased, or alienated without the express approval of the U.S. Government. Secretarial Order 3175 and Reclamation ITA policy require that Reclamation assess the impacts of its projects on ITAs. An inventory of all ITAs within the proposed project area is required. If any ITAs are impacted, mitigation or compensation for adverse impacts to these assets is required.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This section evaluates direct, indirect, and cumulative impacts to all resources described in Section 3.0, 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 on its current trajectory, though it may be exacerbated by drought conditions, which might result in lower flow levels in the river channel. In the absence of frequent and sustained high discharges, the river in this reach would continue to have high velocities, and channels within the river are expected to degrade, resulting in high banks that are rarely inundated. Under the No Action Alternative there would be no effect on geomorphology and soils.

Under the Proposed Action, approximately 9 acres (3.6 ha) of vegetated wetland swales would be created resulting in a very minor and localized alteration to the floodplain. The created habitat would not affect the river bank and therefore would not change the local geomorphology. Recent FLO-2D modeling indicates that overbank inundation would not occur at a discharge less than 6000 cfs (SWCA 2010). Flooded or moist soils combined with the planting of riparian shrub species would create potential future breeding habitat for the flycatcher.

Compared to the No Action Alternative, the Proposed Action would directly disturb about 9 acres (3.6 ha) of soil that would need to be excavated from the swales during the construction phase of the project. 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.

4.3 HYDROLOGY

Under the No Action Alternative and the Proposed Action, there would be no change in the amount or duration of flow in the river or any impact on groundwater resources. However, the Proposed Action would cause a small amount of water to seep into the swales, or in the extreme case of overbank flooding (discharges much greater than 6000 cfs), river water would spill onto the floodplain into the created swales. Based on the depth of the swales, a maximum of 9 – 10 acre-feet of water would be stored in the swales resulting from seepage during spring runoff[2], an insignificant amount that is not expected to significantly alter the hydrologic conditions of the river on a broader scale.

[2] Assumes swales would have a maximum of approximately 1 foot of standing water during periods of high spring runoff, from March - June.

4.4 WATER QUALITY

The No Action Alternative and the Proposed Action would not result in any 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. The work would be conducted in the dry floodplain and at a distance from the river bank of at least 91 m (300 feet) to prevent any sediment discharge to the river during construction. There are no wetlands in the vicinity of the project area that might be impacted by construction activities. The proper use of soil barriers as described in the mitigation section would prevent exposed soil in the construction area from being transported off-site to potentially enter the river.

4.5 CULTURAL RESOURCES AND TRADITIONAL CULTURAL PROPERTIES

Archaeological resources that are listed in or eligible for listing in the NRHP are protected under the National Historic Preservation Act of 1966 (16 United States Code [USC] 470). To determine if any cultural resources known to be listed in, or eligible for listing in, the NRHP are within the project area, SWCA conducted a records search for the proposed project in the Archaeological Records Management Section database of the New Mexico Historic Preservation Division on August 3, 2011. No archaeological sites were found during the survey of the proposed project area. However, Reclamation requested that jetty jacks (placed both parallel and perpendicular to the Rio Grande by the USACE throughout the Middle Rio Grande valley in the early 1950s through the 1960s) be designated as isolated features.

Under the No Action Alternative, there would be no change to cultural resources or TCPs. Under the Proposed Action, jetty jacks within the project area may be disturbed or removed during construction; however the disturbed jetty jack lines would be anchored with a deadman before the project ends to maintain functionality for the remaining jetty jacks. No further management of these isolated features is recommended. Reclamation will coordinate with the USACE and the Middle Rio Grande Conservancy District as necessary prior to removing any jetty jacks. Should additional archeological resources be found during construction at staging areas, access locations, or proposed construction sites, work would stop and the proper authorities (Reclamation Albuquerque Area Office Archaeologist and New Mexico SHPO) will be informed.

Tribal entities have been contacted to determine whether any TCPs occur within or near the proposed project areas. If TCPs are identified, mitigation would be implemented to preclude any adverse impacts. Consultation with the New Mexico SHPO has been initiated.

4.6 VEGETATION AND WETLAND RESOURCES

Under the No Action Alternative, current vegetation management practices would continue. Non-native saltcedar is resprouting in the project area and will likely continue and establish dense stands. Overbank flooding, already very limited under current conditions, would not sufficiently inundate riparian areas to provide potential flycatcher habitat. No disturbance of vegetation or soil would occur under this alternative and no suitable flycatcher habitat would be established at the site.

Under the Proposed Action, swales would be constructed to allow for collection of runoff and seepage of groundwater. Under the Proposed Action, native and non-native vegetation would be disturbed by mechanical means during the implementation of the restoration techniques. However, native riparian plant species would be replanted or established that will reduce invasion from non-natives. Continued management of the site by the City would ensure success of plantings and reduce potential resprouting and encroachment of invasive species.

The Rio Grande, including the proposed project location, 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. The occurrence of wetlands would require compliance with Sections 404/401 of the CWA to prevent the permanent loss of wetlands associated with project actions. However, the absence of any wetlands in the project area precludes the need for CWA compliance. Therefore, neither the No Action Alternative nor the Proposed Action would result in any changes to wetland resources.

Following construction, an increased amount of substrate would have the potential to be inundated and/or saturated for variable time periods, which should lead to a net gain in both the area and function of wetlands. Some of the expected effects on wetland function include an increase in surface water storage, increase in the ability of wetlands to perform water quality improvement functions, increased amount of organic carbon available for export, and beneficial effects on the ecosystem diversity (Reclamation 2007). 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" (FR 1977b). Proposed modification to the river bank would not result in significant changes in flooding patterns in the existing floodplain.

4.7 FISH AND WILDLIFE

No short-term impacts to fish and wildlife resources would occur under the No Action Alternative, whereas long-term adverse effects on wildlife may be difficult to quantify. Without active management of the project site, there is the potential for the reduction in riparian ecological processes, exacerbated by the encroachment of non-native species, enhanced fire hazard, and increased depth to groundwater. These habitat responses would likely have a long-term negative impact on some native wildlife species. Although no flycatcher use has been documented in the area, the No-Action Alternative would likely result in the area continuing to degrade in habitat quality.

The Proposed Action may produce short-term negative impacts to wildlife in the immediate area of disturbance due to the removal of existing soils and vegetative cover. However, the removal of invasive plants and the establishment of native riparian habitat would have long-term benefits to native riparian wildlife. The inundation of the swales would result in improved ecological function and increased aquatic habitat. Habitat values particularly for birds are predicted to gradually increase if stands of riparian plants become established and develop adequate structure. To avoid direct impacts to migratory birds protected by the MBTA (16 USC 703, et seq.), construction and clearing of established stands of dense native woody vegetation would be

avoided and construction would be scheduled between August 15 and April 15. This construction period is outside the normal breeding season for the flycatcher and most avian species, however if work is planned within the breeding season, surveys would be conducted to determine the presence of any breeding birds.

Amphibians, reptiles, and mammals inhabiting the project site may be temporarily displaced to other areas in the floodplain, and there is a chance of direct mortality of individual reptiles and amphibians or eggs associated with construction during the implementation of the Proposed Action. The long-term benefits of a healthier riparian ecosystem that includes aquatic habitat creation would outweigh the minimal mortality that might occur during the disturbance of such a small area.

4.8 THREATENED, ENDANGERED, AND SPECIAL-STATUS SPECIES

Rio Grande Silvery Minnow (*Hybognathus amarus*)

The No Action Alternative would have no effect on the silvery minnow and would not cause changes to the habitat used by this species. The swales would be excavated away from the river outside of the critical habitat lateral extent (91 m [300 feet]) of riparian zone adjacent to the MRG (FR 2003). Further, no bank disturbance is anticipated. Therefore, no indirect effects to the silvery minnow are anticipated.

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

The No Action Alternative would not cause changes in the riparian habitats that might be used by this species, and no effects would occur. Any potential habitat may further degrade without restoration and active management.

The Proposed Action is not likely to adversely affect the western yellow-billed cuckoo. There is no suitable nesting habitat in the project area but there is suitable nesting habitat in adjacent stands, and this species could be affected if construction occurs during the nesting period. To minimize impact on this and other riparian species, construction 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.

Habitat enhancement resulting from the establishment of young willow and cottonwood stands adjacent to the cottonwood canopy would provide long-term benefits by creating potential breeding and foraging habitat for this species.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The No Action Alternative would have no effect on the flycatcher and would not cause changes to the habitats used by this species. Any potential habitat may further degrade without restoration and active management.

The purpose of the Proposed Action is to increase the availability of suitable flycatcher habitat. Therefore, it is anticipated that implementation of the Proposed Action would provide long-term benefits to the species.

The project area is not included in designated critical habitat area, there are no known flycatcher territories, and there are no known recorded flycatcher sightings within the project area. The closest known breeding population is in Isleta Pueblo, with seven pairs (14 adults) recorded in 2004 (Smith and Johnson 2005, 2008). However, individual territorial flycatchers were reported in 2009, one near the Montaño Bridge, and one near the Rio Bravo Bridge (Hawks Aloft 2009). Further, the existing vegetation does not provide the primary constituent elements as defined by the USFWS for the flycatcher (FR 2005).

Short-term potential effects on the flycatcher during construction would be related to temporary noise and native vegetation disturbance. Project construction is proposed to take place outside the migratory and breeding season and would therefore not directly affect the species. To minimize impacts to the flycatcher and other riparian species, the construction of the swales and native vegetation planting would take place between August 15 and April 15. Because there may be annual variation in breeding cycles, the ABCWUA would coordinate with the USFWS if work is planned within two weeks before April 15 or after August 15, and would conduct additional surveys under the Migratory Bird Treaty Act, if warranted. Native vegetation would not be disturbed to the extent possible.

Bell's Vireo (*Vireo bellii*)

The No Action Alternative would have no effect on the species since this alternative would not disturb the riparian vegetation where Bell's vireo may occur.

The Proposed Action may affect Bell's vireo summertime habitat during the construction phase. However, if the construction phase of the project is slated for winter, when the species is not present in the MRG, the species is not likely to be impacted by noise and the increased presence of humans. The Proposed Action, if successful in creating densely vegetated riparian zones, is likely to increase habitat available to Bell's vireo.

Bald Eagle (*Haliaeetus leucocephalus*)

The No Action Alternative would not disturb the riparian vegetation where the bald eagle may occur; therefore, this alternative would have no effect on the species.

The Proposed Action may affect, but is not likely to adversely affect, the bald eagle. Project activities may have short-term potential effects on bald eagles during construction, related to temporary noise and other disruptions. Construction activities may take place during the winter months when the species 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 (0.4 km) 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 (0.4 km) or more from the construction site, activity would not be interrupted.

Black Tern (*Chlidonias niger surinamensis)*

The species has a limited distribution in New Mexico and is not known to occur within the project area. The fluctuating water levels in the river and lack of emergent wetlands would make the project area mostly unsuitable habitat for this species. Therefore, it is unlikely that either the No Action Alternative or the Proposed Action would have an adverse effect on the least tern.

New Mexican Jumping Mouse (*Zapus hudsonius luteus*)

Lack of emergent wetlands 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.

Pecos River Muskrat (Ondatra zibethicus ripenis)

The muskrat has not been observed in the county and the lack of suitable habitat makes it unlikely that either the No Action Alternative or the Proposed Action would have an adverse effect on the Pecos River muskrat.

4.9 SOCIOECONOMICS

The No Action Alternative would not impact the current socioeconomic conditions for Bernalillo County.

The Proposed Action is not expected to adversely affect current economic conditions within the county. The Proposed Action would be constructed as a result of a $309,752 grant funded under the Collaborative Program. This funding will support existing Open Space positions. It is not anticipated that additional personnel would be hired to complete the work.

It is expected that this project would bring some minor economic multipliers to the towns closest to the project area. Construction crews would likely patronize local businesses for supplies such as fuel and food. Many of the economic benefits associated with this project would remain within the greater metropolitan area.

4.10 VISUAL AND AESTHETIC RESOURCES

The No Action Alternative would not produce any long-term changes in the visual and aesthetic experience of those using the river floodplain or recreating on trails nearby.

Under the Proposed Action, the floodplain modifications may be visible to adjacent homeowners along the river edge or to pedestrians using bridges, trails, and the river edge during project construction. The proposed construction may be partially visible to vehicle traffic from the Montaño Bridge, but only for a brief time as vehicles pass across. Users on foot at the bridge would not likely notice the construction since they would be travelling on the south side of the bridge. Bicyclists using the Montaño Bridge may catch glimpses of project activities when using the bike lane on the north side of the bridge.

There may be some minor impact to those using the Paseo del Bosque trail, or to residences on the east side of the river. It is possible that those using the trail or residing on the east side of the river would experience some noise, and with considerable effort they might be able to see construction equipment through the defoliated vegetation.

The trails running south from the La Orilla drain may become inaccessible to users during construction and all trails in the vicinity of the drain would be impacted by noise and other construction activities. However, visual and aesthetic impacts of the proposed project would be brief and limited to a small number of users active during the winter months.

To the west of the project area, the residences are equidistant between Coors Road and the project area, and the commercial center is on Coors Road. Therefore, neither the residences nor the commercial center is likely to be impacted by the construction noise.

4.11 AIR QUALITY AND NOISE

The project area is a natural area 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 County noise ordinances. 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. However, the construction site is at least 381 m (1,250 feet) from any residences. 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 surrounding riparian vegetation and elevated road (on the west side) would abate some of the noise generated by the equipment.

Under the Proposed Action, construction equipment would temporarily generate fumes and air emissions. 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

The proposed restoration work would occur in the upland floodplain and would not be connected to the main river channel. Therefore, no depletion offsets are required.

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 within the active floodplain of the Rio Grande, between the flood control levees and within the Albuquerque Reach of the river. Outside the levees, nearby land use along this reach of the river includes residential neighborhoods of middle class (west side) and upper middle class (east side). Some of the land on the east side may contain horse farms and small agricultural plots. These

communities do not include minority and low-income populations, but represent all other economic strata, agricultural land, and commercial uses. Therefore 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

No ITAs have been identified within or adjacent to the project area; therefore, no impacts are anticipated from the No Action Alternative or the Proposed Action.

4.15 IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of the Proposed Action would result in the commitment of resources such as fossil fuels, construction materials, and labor. In addition, 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 USC 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.

4.16.1 MIDDLE RIO GRANDE ENDANGERED SPECIES COLLABORATIVE PROGRAM

The Collaborative Program has solicited and funded multiple habitat restoration projects in the Albuquerque Reach (Reclamation 2002). Silvery minnow augmentation funded by the Collaborative Program should provide positive synergistic interactions with the habitat that would be created by this project.

4.16.2 ALBUQUERQUE REACH HABITAT RESTORATION PROJECT PHASES I AND II

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 MRG. Phases I (Reclamation 2005) and II (Reclamation 2007a), which involved evaluating methods to create low-velocity habitat for the silvery minnow, have been completed. Phase I, which was completed in April 2006, took place at three locations, each approximately 2.4 km (1.5 miles) long and covering 74.5 acres (30 ha): the North Diversion Channel, the Interstate 40 to Central Avenue area, and the South Diversion Channel. Phase II took place in four locations: 1) from U.S. Route 550 to approximately 1,200 m (3,937 feet) downstream; 2) from Paseo del Norte to Montaño Road; 3) from Interstate 40 to approximately 1,015 m (3,330 feet) downstream of Central Avenue; and 4) from the South Diversion Channel to Interstate 25. Approximately 90 acres (36 ha) were treated during Phase II, with areas that include islands, bars, banks, and a diversion structure.

4.16.3 SANDIA PUEBLO RESTORATION

The Pueblo of Sandia implemented the Pueblo of Sandia Riverine Habitat Restoration Project (Reclamation 2009) in portions of the Sandia Subreach of the MRG, with the goal to provide benefit for the silvery minnow, the flycatcher, and the Rio Grande ecosystem as a whole. Construction took place in 2011 and modified approximately 35 acres of riverine and riparian habitat.

4.16.4 U.S. ARMY CORPS OF ENGINEERS LEVEE MAINTENANCE

The USACE routinely conducts maintenance on the levees in the Isleta area on an ad-hoc basis for the purpose of flood control. When work is conducted, disturbances such as noise and increases in fugitive dust occur in and around the bosque. No levee work is currently proposed in proximity with the restoration work.

4.16.5 CITY OF ALBUQUERQUE OPEN SPACE PROJECTS

Open Space and the City have multiple projects currently taking place or planned near the project area (Matt Schmader, Open Space, personal communication with Heather Timmons, SWCA, February 2, 2011). The City completed mowing of non-native shrubs and mulching of dead-and-down woody debris to reduce fuel loading and fire hazards from Paseo del Norte south to Montaño between October and November 2011.

The City has a small cottonwood and black willow pole planting project of about 150 trees north of the La Orilla channel scheduled to begin in February 2012.

The City also regularly maintains the formal natural-surface interior bosque trail about 1 mile in length north of the La Orilla channel. There are informal trails throughout the bosque, primarily on old service roads, in the area south of the La Orilla channel to Montano that are used by the City.

4.16.6 ABCWUA SAN JUAN CHAMA DRINKING WATER PROJECT AND MITIGATION

ABCWUA completed construction of the San Jan Chama Drinking Water Project dam and facilities between the Alameda and Paseo del Norte bridge crossings in 2004. Environmental mitigation for this project is in the planning stages (HDR Engineering, Inc. [HDR] and SWCA 2010), and construction is scheduled to occur in 2013 near the Paseo del Norte bridge crossing.

4.16.7 USACE BOSQUE RESTORATION

The USACE in cooperation with the MRGCD plans to conduct habitat restoration projects on 916 acres (371 ha) of riparian habitat within the Middle Rio Grande (USACE 2011) with the goals of improving bosque habitat and reestablishing fluvial process between the river and the bosque. Construction for this project began in January 2012.

4.17 ANALYSIS OF CUMULATIVE IMPACTS

The cumulative effects of the Proposed Action plus the described related projects described above may produce short-term changes in several aspects of the existing hydrology and fluvial geomorphology throughout the Albuquerque Reach. 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 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 as part of the Proposed Action and the potential hydrologic and geomorphic alterations to the project area. Long-term monitoring (up to 10 years) and adaptive management would be coordinated with the Collaborative Program and incorporate interagency objectives to assess the self-sustaining and successful regenerating ability of restoration treatments.

4.18 SUMMARY OF EFFECTS

Different techniques considered for habitat restoration within the Isleta Reach would have short-term effects on environmental resources but long-term beneficial effects on biological resources, including the silvery minnow and the flycatcher and their critical habitats. The overall effects of the proposed restoration techniques are summarized in Table 4.1.

Table 4.1. Environmental Consequences of Proposed Restoration Techniques and No Action Alternative

Environmental Resources	Proposed Action	No Action
Geomorphology and Soils	No work will be conducted along the river bank that would alter the geomorphology.	There would be no alteration to the geomorphology.
Hydrology	A small amount of water to seep into the swales from the river resulting in a maximum of 9 – 10 acre-feet of water during high flow years. Overbank inundation is not anticipated. There would be no change in the amount or duration of flow in the river.	There would be no change in the amount or duration of flow in the river or any impact on groundwater resources.
Water Quality	Short-term effects within applicable water quality standards (namely turbidity and TDS); 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 TCPs.
Vegetation and Wetlands	Limited short-term effects on vegetation; no adverse effect on dense, native woody vegetation greater than 3 m (10 feet) tall. Potential long-term benefits through passive or active revegetation.	Continued trends in vegetation, such as increases in non-native species.
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.

Environmental Resources	Proposed Action	No Action
Threatened, Endangered, and Special-status Species	No direct impacts to the flycatcher are expected because construction would take place outside April 15 to August 15. Short-term indirect impacts may occur to the flycatcher through disturbance to the existing riparian vegetation in the project area.	Continued trends in habitat availability and suitability, increased non-native habitat.
Socioeconomics	No adverse effects; the costs of implementing the project are within the annual range of variability for federal and state expenditure for Bernalillo County.	No short-term change in socioeconomics 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 impacts from increased ambient noise levels; short-term adverse impacts to air quality may be observed because of ground disturbances leading to small increases in fugitive dust and particulate matter.	No change in air quality or noise.
Net Water Depletions	No change in net water depletions.	No change in net water depletions.
Environmental Justice	No adverse effect.	No change in environmental justice.
Indian Trust Assets	No ITAs identified at this point in time; no adverse effects.	No change in ITAs.

4.19 ENVIRONMENTAL COMMITMENTS

All applicable compliance would be obtained by ABCWUA and Open Space and Reclamation prior to implementation of the project, including but not limited to:

- Complete Endangered Species Act Section 7 consultation with the USFWS. Concurrence on a determination of "may affect, not likely to adversely affect" the flycatcher was recived on February 22, 2012.
- Nationwide Permit 27 Pre-Construction Notification Letter to the USACE, if required
- Submit CWA Section 401—State Water Quality Certification to the State of New Mexico Environment Department – Surface Water Quality Bureau, if required

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

- Manage for the protection of water quality from activities associated with the restoration project.
- Avoid any TCPs in the project area identified during previous consultation with the SHPO and tribal entities.
- Implement measures to stop work and notify the Reclamation Area Archaeologist in the event prehistoric or historical remains, human burials, or other archaeological resources are discovered during construction or monitoring.

- Minimize impacts to terrestrial habitats by using existing roads and cleared staging areas. In general, equipment operation will take place in the most open area available, and all efforts will be made to minimize damage to native vegetation and wetlands.
- Schedule construction and clearing of dense woody vegetation and vegetated islands between August 15 and April 15 to avoid direct impacts protected by the MBTA and to avoid potential short-term impacts to the flycatcher. This construction period is outside the normal breeding season for the flycatcher and most avian species.
- Limit stormwater discharges under the Proposed Action to ground-disturbing activities outside the mean high water mark. All such activities will be evaluated for compliance with NPDES guidance, an NPDES permit, or an SWPPP.
- Develop as-built plan and profile maps after treatment but before high flows.
- Monitor all treatment and control areas for two years to determine the effectiveness of the methods implemented and identify any project-related hydrologic and geomorphic alterations. Long-term monitoring (up to 10 years) and adaptive management will be coordinated with the Collaborative Program.

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6.0 CONSULTATION AND COORDINATION

Agencies and other entities contacted formally or informally to coordinate efforts in preparation of this EA include:

- Middle Rio Grande Endangered Species Collaborative Program
- New Mexico State Historic Preservation Division
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- City of Albuquerque, Open Space Division
- Albuquerque Bernalillo County Water Utility Authority

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