

**ALBUQUERQUE WATER RESOURCES  
MANAGEMENT STRATEGY**

**PROPOSED MITIGATION MEASURES  
CITY OF ALBUQUERQUE'S  
DRINKING WATER PROJECT**

**March 2004**

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## ACRONYMS AND ABBREVIATIONS

ACC	Albuquerque City Code
ac-ft/yr	acre-feet per year
AMAFCA	Albuquerque Metropolitan Arroyo Flood Control Authority
AOP	Albuquerque Overbank Project
AWRMS	Albuquerque Water Resources Management Strategy
BMP	best management practice
cfs	cubic feet per second
City	City of Albuquerque
CWA	Clean Water Act
DWP	Drinking Water Project
EDF	environmental design feature
ESA	Endangered Species Act
EIS	Environmental Impact Statement
gpcd	gallons per capita per day
ISC	Interstate Stream Commission
MRGCD	Middle Rio Grande Conservancy District
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMSHPO	New Mexico State Historic Preservation Officer
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
OMM	Other mitigation measure
OSD	Open Space Division
OSE	Office of the State Engineer
Reclamation	U.S. Bureau of Reclamation
RGSM	Rio Grande silvery minnow
RGVSP	Rio Grande Valley State Park
RM	river mile
ROD	Record of Decision
ROI	region of influence
SHPO	State Historic Preservation Officer
SJC	San Juan-Chama [Project]
SWRP	Southside Water Reclamation Plant
URGWOM	Upper Rio Grande Water Operations Model
U.S.	United States
USACE	United States Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WTP	water treatment plant

## 1.0 INTRODUCTION

In 1997, the City of Albuquerque (City) adopted the Albuquerque Water Resources Management Strategy (AWRMS) (CH2M Hill, 1997). The strategy is designed to end the City's sole reliance on non-renewable ground water resources for its drinking water supply by optimizing conjunctive use of the City's existing water resources, reducing current levels of ground water pumping, create and maintain a ground water drought reserve, protect valued environmental resources, and develop new surface water supplies to provide a sustainable drinking water supply for the Albuquerque metropolitan area. The Drinking Water Project (DWP) is the major feature of the AWRMS, and is the subject of an Environmental Impact Statement. The U.S. Bureau of Reclamation (Reclamation, 2000) requires a description and list of proposed mitigation measures that would be considered as part of the Environmental Impact Statement/Record of Decision (EIS/ROD).

Figure 1 shows the location of the preferred alternative, the Paseo del Norte Diversion Alternative. This figure also illustrates the fishway and fish screen locations. Figure 2 provides the location and other information for the proposed mitigation measures for the Paseo del Norte Diversion Alternative to be implemented within areas of the bosque. Figure 3 shows the location of the Montano oxbow.

There are four categories of mitigation that are considered within this document. The first category consists of those measures suggested during the completion of the National Environmental Policy Act (NEPA) process. Table 1 lists all of the proposed mitigation measures that have been developed during the completion of the EIS. Some or all of these may be further considered and listed as commitments within the Record of Decision (ROD) which completes the NEPA process.

The second category is those measures that result from the Endangered Species Act (ESA) consultation process. These are developed within a Biological Opinion, prepared in consultation with the U.S. Fish and Wildlife Service (USFWS). The measures are presented as Conservation and/or Reasonable and Prudent Measures. These mitigation measures are related to threatened and endangered species.

The third category is those measures that result from the permit process to acquire a Section 404 permit and any necessary water quality certification (Section 401) from the New Mexico Environment Department or the Pueblos of Sandia or Isleta. These measures are listed and proposed within the permit applications for work within the river and floodplain, associated with the diversion structure.

The fourth category is those measures that result from completion of Section 106 consultation associated with the National Historic Preservation Act (NHPA) and cultural resources. This consultation occurs with the New Mexico State Historic Preservation Officer (NMSHPO).

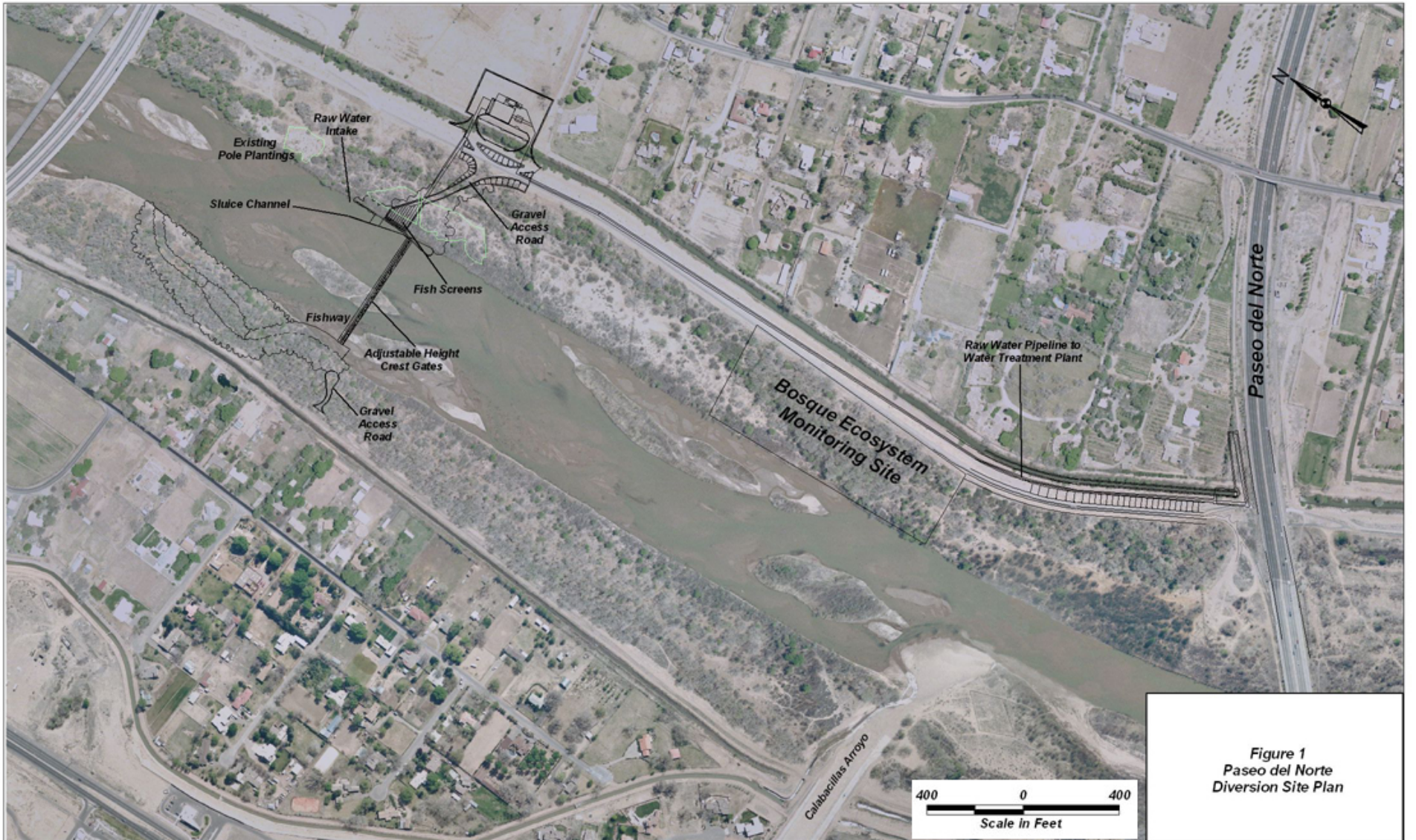
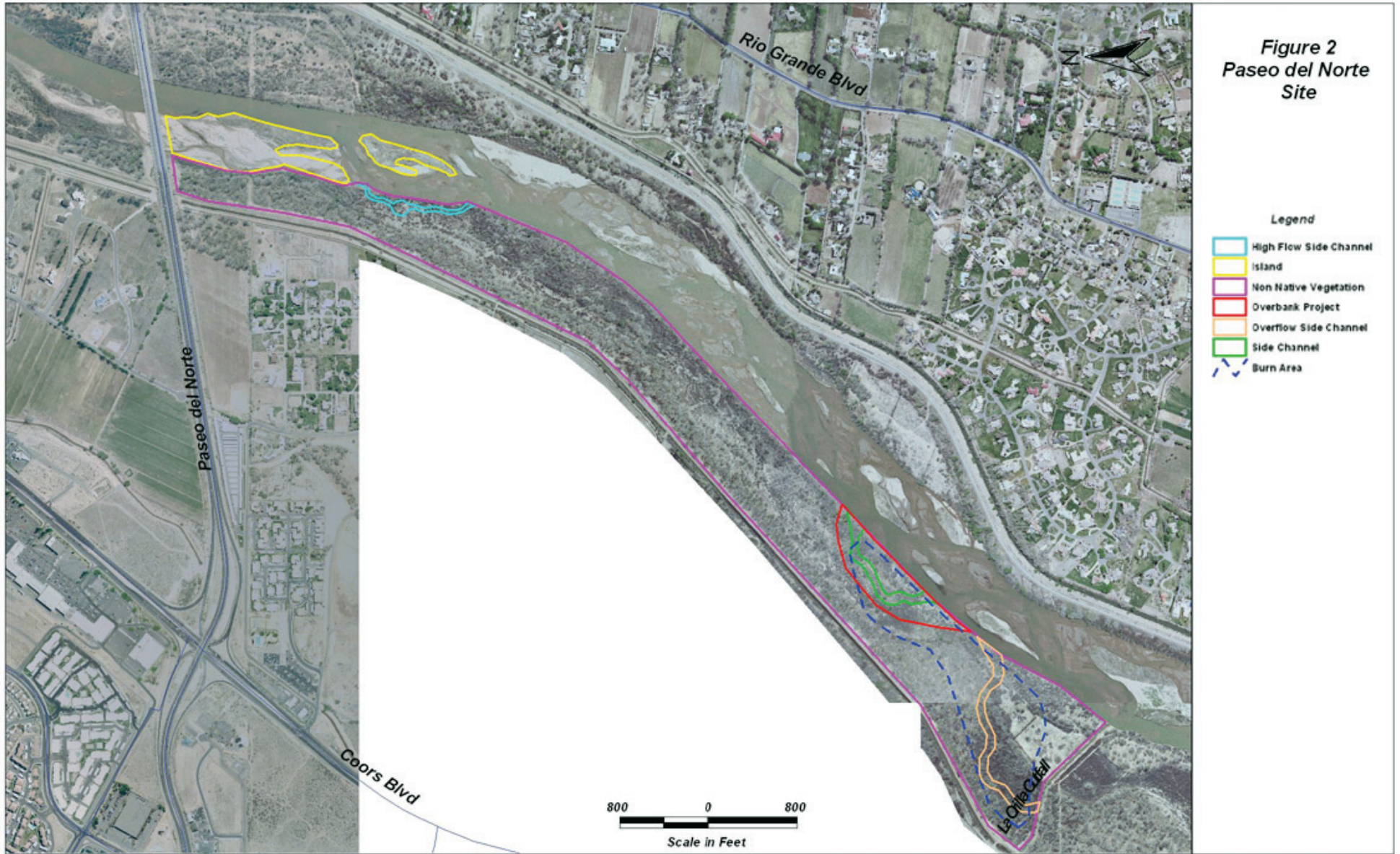


Figure 1  
Paseo del Norte  
Diversion Site Plan

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**Figure 3**  
**Montañito Oxbow**  
**Site**

**Legend**

 Side Channel

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## 2.0 PROPOSED MITIGATION MEASURES

Several commentors (commenting upon the DEIS) noted concerns about the need for and the City’s commitment to mitigation measures. The City intends to mitigate project impacts to the fullest extent practicable. This appendix provides details on mitigation measures that the City has proposed. Such proposals are also discussed throughout the FEIS text. Where possible, the City has made commitments to specific mitigation measures, such as those required to avoid jeopardy for the Rio Grande silvery minnow. However, in some instances, the City has identified proposed rather than final mitigation measures due to the fact that permitting agencies will consider and require measures they conclude are appropriate as part of the permitting process. The mitigation measures detailed in the FEIS represent the types of requirements that may be imposed by permitting agencies and that the City may implement on its own initiative as good construction and environmental management practices.

The proposed actions described in this EIS incorporate many proposed mitigation measures to benefit the environment and help avoid adverse impacts. Table 1 presents the proposed mitigation measures for the preferred alternative. These features include environmental design features (EDFs), best management practices (BMPs) and other mitigation measures (OMMs) defined as follows:

1. Environmental design features (EDFs) are modifications incorporated into the project design by the City to avoid the potential for an effect to become significant.
2. Best management practices (BMPs) are those engineering, design, and construction procedures, normally incorporated in proper operations that lessen potential or actual effects.
3. Other mitigation measures (OMMs) are actions taken by the City to reduce or minimize an impact after design or other features have been incorporated.

**TABLE 1  
 SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN  
 FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
<b>Aesthetics and Visual Resources (AV)</b>			
AV-01	Appropriate landscaping and interposed wall structures, consistent with site maintenance, access, and security, would minimize visual effects and prevent vandalism and graffiti. The City Public Works Department would coordinate the onsite requirements for construction of project facilities with local and adjacent neighborhood associations.	EDF	Design feature

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
AV-02	Appropriate wall structure patterns and colors would be used to minimize visual intrusion. The Public Works Department would coordinate the onsite requirements for construction of project facilities with local and adjacent neighborhood associations.	EDF	Design feature
AV-03	Appropriate site access limitations and maintenance activities would be implemented to provide security and prevent vandalism and graffiti and to ensure continued visual minimization.	EDF	Design feature
<b>Air Quality (AQ)</b>			
AQ-01	Limit the amount of trench that would be open at any time.	BMP	Construction specification
AQ-02	Each construction contractor would be responsible for assuring that construction equipment (especially diesel equipment) meets City opacity standards for operating emissions.	BMP	Construction specification
AQ-03	The EPA estimates that the effects of fugitive dust from construction activities would be reduced significantly with an effective watering program. This will be implemented pursuant to City dust control ordinances.	BMP	Construction specification
AQ-04	Conform to the BMPs to minimize particulate and dust emissions from construction work sites that are specified in the City excavation, grading, and surface disturbance permits that would be obtained for this project.	BMP	Construction specification
AQ-05	Each construction contractor would acquire excavation, grading, and surface disturbance permits that specify BMPs to minimize particulate and dust emissions from construction work sites.	BMP	Construction specification
AQ-06	Each construction contractor would adhere to any other requirements placed on the activity, and be subject to inspection by the City to enforce the requirements of the permits and the requirements of 20 NMAC 11.20 (New Mexico, 1997).	BMP	Construction specification
<b>Aquatic Life (AL)</b>			
AL-01	Fishway: The proposed fishway for Angostura Diversion and Paseo del Norte Diversion would be designed to enhance aquatic habitat by providing a route around the existing Angostura and new surface dam at Paseo del Norte.	EDF	Construction specification Operation specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
AL-02	Fish screens: Angostura Diversion also would be equipped with a V-shaped, 250-foot long fish screen in the existing concrete-lined channel immediately below the diversion dam. The sluice channel for Paseo del Norte Diversion would be equipped with fish screens as well.	EDF	Construction specification
AL-03	Operational criteria: Water diversions would be curtailed, as defined by the Operation Criteria defined in Section 2, a flow of 180 cfs below Angostura and 130 cfs below the new surface dam at Paseo del Norte.	OMM	Operation specification
AL-04	During installation of the Subsurface Diversion, the City would require the construction contractor to use appropriate BMPs to minimize and contain the discharge of suspended sediments into the Rio Grande.	BMP	Construction specification
AL-05	During construction in the river, any fish stranded by construction of the facility would be salvaged and relocated to a different portion of the river. By agreement, USFWS staff would be available to relocate fish if they inadvertently become separated from the main river channel by construction activities.	BMP	Construction specification
AL-06	During installation of the Subsurface Diversion facility, the City would require the construction contractor to maintain an open channel (velocity less than 3 ft/sec) in the Rio Grande for fish passage around the construction site at all times.	BMP	Construction specification
<b>Biodiversity</b>			
See Threatened and Endangered Species			
<b>Cultural Resources (CR)</b>			
CR-01	Any portions of the Middle Rio Grande Project irrigation system that would be affected by construction would be carefully documented prior to construction and restored to their pre-construction condition following construction.	EDF	Design feature

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
CR-02	<p>A cultural resources discovery plan was prepared as part of the cultural resources inventory report. The plan has been approved by Reclamation and will be submitted to the SHPO for their approval prior to the beginning of construction. The plan outlines procedures for protecting newly discovered cultural resources, evaluating their importance, and avoiding or mitigating the project’s adverse effects. The plan also details procedures for complying with the NAGPRA or New Mexico state burial laws, in the event human remains are discovered. The plan includes the following provisions:</p> <ul style="list-style-type: none"> <li>• A pre-construction meeting;</li> <li>• The availability of archaeological assistance during construction; and</li> <li>• Evaluation of discoveries for NRHP eligibility.</li> </ul>	OMM	Construction specification
CR-03	<p>Before ground-disturbing construction work takes place, a meeting would be conducted to inform construction crews of the potential for disturbing subsurface cultural resources, and of the required discovery-plan procedures should a site or human remains be encountered.</p>	EDF	Construction specification
CR-04	<p>Precautions would be taken to ensure qualified archaeological assistance would be immediately available in case of a discovery. The discovery plan approved by Reclamation and SHPO outlines these precautions in detail. Work would cease if cultural resources are unearthed during construction activities. The archaeologist would either be present during construction, or available to respond to a telephone call from the site to evaluate the unearthed materials and to ensure that any uncovered cultural resources are appropriately recorded or avoided, in accordance with the discovery plan.</p>	EDF	Construction specification
CR-05	<p>Any cultural resources encountered during construction would be documented and evaluated as to their NRHP eligibility. Reclamation would consult with the SHPO regarding the eligibility of these sites. LA 132366 would be avoided by realigning the project, or a data-recovery plan approved by Reclamation and the SHPO would be implemented to mitigate adverse effects.</p>	EDF	Construction specification
CR-06	<p>Construction of the DWP would not begin until consultation with the SHPO is completed.</p>	BMP	Construction specification
CR-07	<p>Water transmission lines would be located to minimize impacts on historic structures. Care would be taken during construction to minimize impacts on vulnerable structures.</p>	BMP	Construction specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
CR-08	The City would submit a final DWP design report showing all pipeline alignments to Reclamation. Reclamation would consult with the SHPO to ensure compliance with NHPA on any additions or changes to the pipeline alignments, including required monitoring of sensitive areas including historic structures.	EDF	Construction specification
CR-09	Consultation would occur with the Pueblos as necessary.	BMP	Construction specification
<b>Energy (ER)</b>			
ER-01	WTP and pumping stations would be operated in accordance with the standards of manuals that would be completed during and after design and construction of these facilities.	EDF	Design feature
ER-02	Structures that will house workers on a routine basis (e.g., the WTP) would be designed to meet all building codes and insulation requirements for energy efficiency.	EDF	Design feature
ER-03	Compliance with these design and operational measures would be required to obtain City construction permits. Building heating, ventilation, and air conditioning systems would be appropriately sized and maintained to minimize energy consumption.	EDF	Design feature
<b>Environmental Justice</b>			
No potential effects needing mitigation measures were identified.			
<b>Floodplains</b>			
Construction will require some temporary modifications of levees that could include access road construction or improvement and the placement of pipelines within or through levees. Construction may require the removal or modification of Kelner jetty jacks. Both would require coordination with USACE and/or Reclamation. Disturbed areas or facilities would be restored to pre-construction conditions, or as directed by the USACE or Reclamation.			
<b>Geology</b>			
No potential effects needing mitigation measures were identified.			
<b>Hazardous Materials (HM)</b>			
HM-01	Construction of any DWP facility within 100 feet of a known hazardous waste site, underground storage tank (UST), or leaking underground storage tank (LUST) would be coordinated with the owners of the site or tank to minimize risk of worker or public exposure to hazardous substances.	EDF	Construction specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN  
 FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/ Operations/Design</b>
HM-02	The WTP and pumping stations would be operated in accordance with the standards of O&M manuals that would be developed for each individual facility. These manuals would include health and safety plans and emergency-response procedures.	BMP	Operations specification
HM-03	Transportation of regulated materials would be in accordance with all applicable U.S. Department of Transportation and State of New Mexico regulations.	BMP	Operations specification
HM-04	Storage of regulated substances would be in accordance with applicable state regulations and municipal ordinances.	BMP	Operations specification
HM-05	The City would comply with City of Albuquerque Landfill Monitoring Interim Guidelines.	BMP	Construction specification
<b>Human Health and Safety (HH)</b>			
HH-01	The construction contractor would be required to comply with the City cross-connection ordinance and standards.	BMP	Construction specification
HH-02	The construction contractor would be required to secure all construction zones to control public access and ensure safety. BMPs and compliance with applicable federal, state, and local construction-site safety regulations and ordinances, as specified in the City construction permits, also would be required.	BMP	Construction specification
HH-03	The WTP would be operated in accordance with the standards of O&M manuals to be developed during design and construction.	BMP	Operations specification



**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
<b>Hydrology (H)</b>			
H-01	<p>When river flows above the diversion point are less than 260 cfs (for the preferred alternative), the City will adjust operations of the surface diversion dam and begin curtailing diversion amounts to minimize depletion effects downstream. The City has the option to shut down the plant earlier. When flows just above the diversion point fall below 260 cfs, at the surface diversion dam, the City will begin curtailing the quantity of the native (non-San-Juan-Chama) water diverted by reducing the diversion amount by 1 cfs for each 1 cfs reduction of native flow, but will continue to release and divert the full 65 cfs of its San Juan-Chama water. When native flow reaches 130 cfs just above the diversion, all raw water diversions and San Juan-Chama water releases will be suspended (100 percent curtailment), the adjustable height dam will be completely lowered (about 0.5 ft above the river bottom). During periods of curtailment, the City will offset decreases in the amount of raw water diverted by increasing the amount of ground water pumped for potable use. During periods of complete shut down of river diversions, the City’s water service area will be supplied entirely from ground water wells and the City’s San Juan-Chama water will be stored in Abiquiu for later release as part of the groundwater storage and recovery program. The operation and discharge from the Southside Water Reclamation Plant will not change as a result of the Drinking Water Project. Currently about 60,000 ac-ft is discharged as treated effluent to the river below Rio Bravo Bridge. Based on population trends and current estimates of 46 percent of the water being used consumptively, return flow to the river is projected to increase to approximately 76,000 ac-ft by 2040 and 92,000 ac-ft by 2060 (reduction due to non-potable projects).</p>	OMM	Operations specification
H-02	<p>During installation of the diversion facility, the City would require the construction contractor to use appropriate BMPs to minimize and contain the discharge of suspended sediments into the Rio Grande.</p>	BMP	Construction specification Operations specification
H-03	<p>The City will conduct environmental enhancements with a coordinated sediment management element. Sediment management would include elements of concern with respect to flood control and compact delivery requirements. The City will seek to coordinate and facilitate appropriate sediment management actions with respect to Jemez Reservoir, Cochiti Reservoir, Galisteo Reservoir, irrigation diversion dams, and AMAFCA facilities.</p>	BMP	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/ Operations/Design</b>
H-04	If existing river gages are incapable of measuring the flows, the City would install appropriate stream gaging. The City would also install meters in the pump station at the diversion structure to measure the amount of water diverted on a constant basis. The City will be installing new gages at Alameda, the proposed diversion would be metered, a gage installed at Paseo del Norte and I-25 below the SWRP discharge. Flow data will be available to the public on a real time basis.	BMP	Construction specification Operations specification
H-05	The City will participate in an interagency group that includes Reclamation, USFWS, Office of the State Engineer (OSE), the New Mexico Department of Game and Fish, and the Interstate Stream Commission to monitor and manage the effectiveness of both current and long-term environmental enhancement measures described above. This group will identify and recommend to the City and USFWS necessary management changes to address environmental issues that are uncertain or unforeseen as a result of operating the Drinking Water Project.	OMM	Operations specification
H-06	The City will create, maintain, and update an accounting system that will identify the location(s) and quantities of water released from upstream reservoirs, diverted from the river, and the amount returned to the river. The City will also provide annual reports to the State Engineer with copies to USFWS showing the timing of releases of San Juan-Chama water and diversion and return flow amounts. If curtailment of diversion of San Juan-Chama water were necessary during any year due to stream flow conditions, this will also be reported.	OMM	Operations specification
H-07	When flows are low due to drought, the City may, in coordination with USFWS, decide to shut the diversion off during the entire summer to avoid impacts to the environment. The City will coordinate with the Service beginning April 15 of each year to determine when the diversion facility will curtail or cease operations.	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
H-08	<p>The City will meet with USFWS to discuss their Annual Operation Plan for the Drinking Water Project by May 15 of each year.</p> <p>The City will provide USFWS with an annual report on water accounting for the previous year by February 15 of each year. The City's accounting system will identify the locations and quantities of San Juan-Chama water released and diverted from the river, the amount returned to the river, and the amount of water that will be consumed through beneficial use.</p> <p>The City will notify USFWS in writing regarding any changes in operations related to curtailment of increases of diversions.</p>	BMP	Operations specification
H-09	<p>The City will install meters in the pump station at the diversion structure to continuously measure the amount of water diverted. Gaging information related to the City's DWP will be made available to USFWS on a real-time basis.</p> <p>When developing release schedules for San Juan-Chama water, the City will work with Reclamation, USFWS, OSE, the New Mexico Department of Game and Fish, and the Interstate Stream Commission so that release can benefit stream fisheries above the diversion. However, the city's releases must be consistent with state and federal laws, and must be approved by OSE. The City's San Juan-Chama water will be released from storage in upstream reservoirs in accordance with the conditions set forth in the approved OSE permit. The application for diversion of the City's San Juan-Chama water for this project was submitted to the OSE in May 2001. Upon approval, the City will provide a copy of the permit to USFWS. The final release schedule will be determined by the City under the conditions of the permit.</p>	OMM	Operations specification
H-10	<p>The City has revised water conservation goal of a 40 percent reduction in demand compared to the baseline established in 1995. The timeframe for the implementation of the new goal will be ten years starting in 2005 (175 gallons per capita per day [gpcd]) and ending in 2014 (150 gpcd). This goal supplements the original 30 percent reduction goal that is projected to be achieved in 2005.</p>	OMM	Operations specification
H-11	<p>The City has developed a drought management strategy for a drought reserve for the City water supply.</p>	OMM	Operation specification

**Indian Trust Assets**

No potential effects needing mitigation measures were identified.

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
<b>Land Use (LU)</b>			
LU-01	The contractor would adhere to project work-hour restrictions (work allowed only between 7 a.m. and 10 p.m.) within 500 feet of residences, hospitals, and schools. Additional work hours would be added only if approved by the local residents.	BMP	Construction specification
LU-02	Project pipeline alignments would be routed primarily in developed public rights-of-way to minimize activity in undisturbed areas.	EDF	Design feature
LU-03 (potential)	Open Space Division, Environmental Land Use Committee land-use approval may require an environmental resource commitment. Commitments would be determined during the approval negotiations.	EDF	Design feature
<b>Noise and Vibration (NV)</b>			
NV-01	The construction contractor would meet the requirements of noise ordinance ACC § 6-22 for noise control on construction equipment.	EDF	Construction specification
NV-02	The contractor would adhere to project work hour restrictions (work allowed between 7 a.m. and 10 p.m.) within 500 feet of residences, hospitals, schools, churches, and libraries. Additional work hours may be necessary only if approved by the local residents, unless approved by entities.	BMP	Construction specification
NV-03	The contractor would arrange the construction schedules to restrict work to five days within 500 feet of the same residences, hospitals, schools, churches, and libraries. Additional work days would be added only if approved by the local residents, hospitals, schools, churches, and libraries.	BMP	Construction specification
NV-04	Project operating equipment (e.g., pumps) would be housed in structures designed to minimize radiated noise outside the structure, and would meet the City's noise-ordinance requirements.	EDF	Construction specification
<b>Recreation (RC)</b>			
RC-01	During construction in parks or the bosque, the construction contractor would have to meet the City's noise-abatement requirements (City, 1981) for operating construction equipment.	EDF	Construction specification
RC-02	If bike or pedestrian trails are temporarily obstructed during construction, where possible a temporary pathway or rerouting would be arranged to allow passage. Access to the City's open space parking lot on Alameda Boulevard would be maintained during all phases of construction.	BMP	Construction specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
RC-03	With the DWP in operation, the City would continue with its historic practice of cooperating with Reclamation and BLM in the coordination of releases from Heron Reservoir to Abiquiu Reservoir to benefit winter fisheries. This program of voluntary cooperation is subject to the City's prerogative and ability to meet its water requirements.	OMM	Operations specification
<b>Riparian Areas (R)</b>			
R-01	Temporary materials- and equipment-staging areas at the water-diversion facility construction area would be reclaimed and revegetated with suitable native woody trees and shrubs.	BMP	Construction specification
R-02	Project facilities to be located in the riparian corridor would be sited and sized to minimize the unnecessary loss of cottonwoods and other native vegetation.	EDF	Construction specification
R-03	The City would restore the bosque and Rio Grande in the areas temporarily affected by the construction of the project to the original condition or complete environmental enhancements. During development of the technical plans and specifications for restoration of the Rio Grande channel, the City would coordinate with Reclamation, USACE, USFWS, and the Interstate Stream Commission (ISC) to design a channel section that could provide some area of potential habitat for the RGSM, potential habitat for the southwestern willow flycatcher, and areas for cottonwood seedling production. If permits and approvals could not be obtained to construct the channel in such a manner, the City would construct the channel to match the existing section, as approved.	BMP	Construction specification
R-04	The City would provide funding to continue to monitor and improve the AWRMS environmental enhancement program, including continuation of mammal, avian, and human-use studies for the bosque. Additional monitoring of amphibian/reptile populations and vegetation is needed in Rio Grande Valley State Park (RGVSP) within the Middle Project Subarea. Permanent transects have been established at 12 sites throughout the RGVSP to monitor these populations. The Bosque Action Plan mandates that these transects be monitored for changes every 3 to 5 years.	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
R-05	Continue fuel reduction throughout the RGVSP utilizing the Inmate Work Camp Program through State Forestry under its current agreement with the Open Space Division. Remove dead and downed material, thin and remove non-native species, treat stumps of non-native species so that they do not resprout, and replant with native cottonwood and understory species. The City is committed to improving the bosque and Rio Grande Valley State Park and will Coordinate annual programs with the Service. These programs, which include removing non-native plant species, will continue throughout the life of the project. In addition, the City began an extensive program in Fall of 2002 to remove non-native species from the riparian area within Albuquerque over the next five years. The City has already invested about \$650,000 for equipment in this endeavor.	OMM	Operations specification
R-06	Areas where fuel reduction or non-native species removal occurs will need to be replanted with native species, primarily the Rio Grande Cottonwood ( <i>Populus deltoides</i> spp. <i>wislizeni</i> ). Trees that are approximately 3 years old can be pole planted by placing them directly in contact with the shallow ground water. This is accomplished by digging a hole with an auger to the water table. Poles are then pushed through so that the root system is in contact with the water and the hole is refilled with dirt. Poles must be planted while they are dormant (i.e., from January through April of each year). Poles are usually wrapped with chicken wire to protect them from girdling by beavers. The pole-planting program has been in place for more than 10 years and has a success rate of approximately 80 percent in the RGVSP. Specific sites for plantings will be dependent upon fuel-reduction sites as well as areas that may need to be rehabilitated after a burn.	OMM	Construction specification
R-07	The City has a ongoing program for improvements to the RGVSD. These programs, which include removing non-native plant species, will continue throughout the life of the project. In addition, the City began an extensive program in the fall of 2002 to remove non-native species from the riparian area within Albuquerque.	OMM	Operation specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
R-08	<p>A habitat mapping technical report has been developed to supplement the City’s ongoing conservation measures to include opportunities for additional aquatic and riparian projects in the Albuquerque Reach of the river. This report included extensive field surveys mapping and ranking of potential sites within the Middle Rio Grande. Field efforts for this project were conducted in cooperation with USFWS during February 2002.</p>	OMM	Operation specification
R-09	<p>The proposed location for the habitat restoration mitigation activities is south of Paseo del Norte on the west side of the river and currently includes 160 acres of mixed bosque and 48 acres on the Montano Oxbow. The work will include mechanical clearing of non-native vegetation to promote native species regeneration. The restoration of native vegetation will be done by either planting or re-establishing hydrologic connectivity. Individual cottonwood poles and willow whips, willow bundles/mats, individual shrubs, reseeding, or other planting methods at a density of 120 plant units per acre are potential methods that may be used to enhance flycatcher habitat.</p> <p>An overbank project of 10 acres will be created that will provide refuge for aquatic organisms, restoration of riparian vegetation, and re-establishment of a river channel/floodplain interaction. The newly created terraces will be placed in an area where the channel is relatively incised and the potential for overbank flows is minimal.</p> <p>Two high-flow side channels will be constructed to provide aquatic habitat at flows greater than 1,500 cfs (42.48 m<sup>3</sup>s) and 2,000 cfs (56.63 m<sup>3</sup>s), respectively. The functional purpose of the side channels is to provide backwater and slower velocity areas for aquatic and terrestrial species and increase the potential for overbank flooding and native species regeneration.</p> <p>Channel widening and bank destabilization will be promoted by the removal of 120 jetty jacks. Removal of the jetty jacks, in combination with clearing vegetation and bank lowering, will encourage native species reestablishment and the creation of shallower, slower velocity habitats for the RGSM.</p> <p>Two river bars will be enhanced by a combination of non-native species vegetation clearing, lowering, and pilot channel work. This project will also promote the creation of shallower, slower velocity habitats for the RGSM.</p>		

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
R-09 (cont)	Flow will be reestablished to the Montano Oxbow by the construction of an additional high-side flow channel and non-native vegetation removal. This project will be designed to provide back-water and side channel habitat, adjacent and connected to, the river channel for RGSM habitat and restoration of native riparian vegetation.		
R-10	The City will be responsible for identifying and reporting the presence of all cottonwoods (seedlings through mature trees remaining in the construction site to the City's Open Space Division. The City will plant 3 new plants for each plant removed smaller than 6 inches in diameter, and 10 new plants for each removed plant larger than 6 inches in diameter within the City's Open Space. These replacement ratios apply to native vegetation within those areas directly damaged by construction. Planting native vegetation near a disturbance area at a ratio of 1 native for every exotic species removed and 2 natives for every native plant removed will mitigate the loss of riparian vegetation.	OMM	Construction specification
R-12	To determine whether these projects are successful, baseline data will be collected, and both short-term and long-term objectives will be established. Examples of parameters that will be assessed under each of these categories are illustrated as follows:  Initial/Baseline Data <ul style="list-style-type: none"> <li>a. Number of acres in non-native vegetation</li> <li>b. Number of acres in native vegetation</li> <li>c. Number of acres in non-restored burned condition</li> <li>d. Initial plant, insect and mammal species composition</li> </ul> Immediate/Short-term objectives <ul style="list-style-type: none"> <li>a. Number of acres planted into native species or restored</li> <li>b. Number of cottonwood pole plantings, willow whips or shrubs</li> <li>c. Acreage of burned area cleared</li> <li>d. Acreage of bank-lowering completed</li> <li>e. Length of side channels created</li> <li>f. Number of jetty-jacks removed</li> <li>g. Changes in species composition</li> </ul>		



**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/ Operations/Design</b>
R-12 (cont)	Ongoing/Long-term Measures a. Percent survival rate of cottonwood planting b. Size of overbank lowering reclaimed to natural conditions c. Survival rate of native species within overbank areas d. Presence or increase of endangered or delivered species in restoration areas e. Presence of indicator species showing habitat improvement f. Overall improvements in water or soil quality.	OMM	Operations specification
<b>Socioeconomic Factors (SE)</b>			
SE-01	Use existing road and utility rights-of-way as much as possible to reduce permitting and land acquisitions cost and to reduce disruption of commercial facilities.	BMP	Construction specification
SE-02	Hire local construction personnel to build the project.	BMP	Construction specification
SE-03	Hire and train local professional or service personnel to operate and maintain facilities so direct and secondary spending remains in the local economy.	BMP	Operations specification
<b>Soils (SO)</b>			
SO-01	The construction contractor would have to meet Occupational Safety and Health Administration and City requirements for slope stability during construction.	BMP	Construction specification
SO-02	The contractor would have to comply with construction permit requirements and local ordinances governing the generation of fugitive dust, control of run-on and run-off, and site restoration (e.g., re-vegetation or seeding) to prevent erosion.	BMP	Construction specification
<b>Threatened and Endangered Species (TE)</b>			
TE-01	Monitor habitat restoration efforts, other mitigation measures, diversion impacts, and fish and wildlife enhancement measures for success and suspend unsuccessful projects/practices. This will be an adaptive process with evaluation of methods and practices that are successful and unsuccessful. This monitoring will be carried out for five years upon completion of each mitigation or restoration effort. <ul style="list-style-type: none"> <li>• The City will provide USFWS with an annual report describing the status of the proposed conservation measures by February 15 of each year. This report will describe activities carried out during previous years and projects planned for the upcoming year(s).</li> <li>•</li> </ul>	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
TE-01 (cont)	<ul style="list-style-type: none"> <li>• The city will provide the service with an annual report describing egg collection directly upstream of the diversion dam by September 1 of each year.</li> <li>• The City will coordinate with USFWS when developing and implementing the habitat restoration projects described in the proposed action.</li> </ul>		
TE-02	Consultation with USFWS has occurred under the auspices of the Endangered Species Act concerning all potential effects to threatened and endangered species. As a result of the consultations, selected conservation measures have been developed (see Appendix I).	OMM	Operations specification
TE-03	Fishway: A fishway, for either Angostura Diversion or Paseo del Norte Diversion, would be designed to enhance aquatic habitat by providing a route around the existing Angostura Diversion. Design of the fishway will be coordinated with USFWS.	EDF	Construction specification Operations specification
TE-04	Fish screens: the Angostura Diversion also would be equipped with a V-shaped, 250-foot long fish screen in the existing concrete-lined channel immediately below the diversion dam. The sluice channel for the Paseo del Norte Diversion would be equipped with fish screens as well. These screens are designed to prevent adult fish from being diverted and transported to the WTP. Maintain fish screens at all times. Any structural or mechanical failures associated with the fish screens shall be reported to the USFWS within one hour when the problem is identified.	EDF	Construction specification Operations specification
TE-05	Operational criteria: Water diversions would be curtailed, when necessary, when flows fall below 180 cfs downstream of Angostura and 130 cfs downstream of the Paseo del Norte Diversion.	OMM	Operations specification
TE-06	During construction in the river, any fish stranded by construction of the facility would be salvaged and relocated to a different portion of the river. By agreement, USFWS staff would be available to move individual specimens of the RGSM, if members of this species inadvertently become separated from the main river channel by construction activities. Coordinate with the USFWS when isolated pools form during installation of the coffer dam and seine isolated pools as the river recedes. The sampling protocol developed by NMESFO will be used. The USFWS will coordinate data collection, and salvage/rescue of the silvery minnows. This will minimize take by rescuing silvery minnows to the maximum extent practicable.	BMP	Construction specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
TE-07	During installation of the subsurface water diversion facility, the City would require the construction contractor to maintain an open channel (velocity of less than 3 ft/sec) in the Rio Grande for fish passage around the construction site at all times.	BMP	Construction specification
TE-08	Initial installation of the water diversion facility would be conducted during the river's low-flow period from September through March to avoid to the extent possible the spring snowmelt and summer monsoon seasons of high flows in the river, and in accordance with Clean Water Act (CWA) Section 404 permit special conditions.	BMP	Construction specification
TE-09	The City would restore the bosque and Rio Grande in the area affected by the construction of the DWP to the original condition or complete environmental enhancements. During development of the technical plans and specifications for restoration of the Rio Grande channel, the City would coordinate with the USACE, USFWS, and ISC to design a channel section that could provide some area of potential habitat for the RGSM. If permits and approvals cannot be obtained to construct the channel in such a manner, the City would construct the channel to match the existing section, as approved.	OMM	Operations specification
TE-10	During installation of the water-diversion facility, the City would require the construction contractor to use appropriate BMPs to minimize and contain the discharge of suspended sediments into the Rio Grande.	BMP	Construction specification
TE-11	When developing release schedules for its SJC water, the City would work with USFWS, OSE, and ISC such that releases can be made to provide incidental benefits to threatened and endangered species. However, the City's releases must be consistent with state and federal laws, and must be approved by OSE. The City's SJC water would be released from storage from Abiquiu Reservoir in accordance with the conditions set forth in the approved OSE permit. The source of the water is the City's contract with the U.S. Secretary of the Interior for SJC water from the SJC Project. The application for diversion of the City's SJC water for this project was submitted in May 2001.	OMM	Operations specification
TE-12	The City will provide funding to develop projects that enhance the habitat of the RGSM in the Albuquerque Reach of the Middle Rio Grande. The shallow water habitats for the RGSM will be developed and monitored in cooperation with the biologists at the Albuquerque Biopark.	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
TE-13	The City will continue support for the RGSM Naturalized Refugium for 10 years from the date of the corresponding biological opinion (Appendix I). This may consist of rearing, research, and maintenance of experimental populations. In the year 2002, the City provided \$150,000 to the Albuquerque Aquarium for construction, staffing, and monitoring of RGSM rearing facilities to raise eggs to the young-of-year (YOY) stage before the fish are relocated to transplant locations upstream from the San Acacia Diversion Dam. The City is supporting and funding ongoing research to increase the understanding of the RGSM life cycle at the Albuquerque Zoo and Naturalized Refugium. These studies will contribute to the understanding of spawning behavior, swimming capabilities, and habitat needs. If additional information becomes available prior to completion of the final design of the project, it can be used in the design of facilities and more effective monitoring strategies.	OMM	Operations specification
TE-14	The City will provide funding to develop projects that provide for the continued enhancement and health of the bosque in coordination with the Bosque Action Plan through the OSD.	OMM	Operations specification
TE-15	The general concept of destabilization was discussed under the proposed AOP Phase II. This concept can also be applied on a smaller scale to destabilize banks enough to allow overbank flooding without manipulating a large site as described in the AOP. Non-native vegetation, jetty jacks, and root structures along the banks should be removed. Sites will be identified through the study phase.	OMM	Operations specification
TE-16	There are a few remaining areas in the RGVSP where the bank meets the river and natural channels occur. Cutting channels into the terrace to allow for flow through or backwater flows to occur can mimic this natural pattern, which would encourage a more permanent water supply in these bosque areas, and would possibly create additional habitat suitable for the southwestern willow flycatcher and the yellow-billed cuckoo. It would also allow for a better connection between the river and the floodplain.	OMM	Operations specification
TE-17	Woody debris from bosque fuel-reduction programs can be placed into the river to allow for greater braiding and return of organic materials. This could create additional habitat for juvenile fish especially the RGSM. Sites will need to be determined based on fuel reduction sites.	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN  
 FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
TE-18	The City OSD recently finished acquiring properties in the Montañito Oxbow for protection as Major Public Open Space. This area is a 58-acre wetland that supports bosque upland and wetland plant species. A number of projects have been determined as needed in order to restore and protect this wetland including: channelization to insure water flow through the system, control of cattail populations, control of beaver populations, creating open water areas, removal of non-native species, and replanting with native species. Phasing of these projects has begun and will continue depending on funding.	OMM	Operations specification
TE-19	If a bald eagle is observed within 0.25 mile from the active project construction site on any morning before construction starts, or following breaks in construction activity, the contractor would be required to suspend all activity until the bird departs the area on its own volition. However, if an eagle arrives during construction activities or if an eagle is observed at a distance greater than 0.25 mile from the construction area, construction need not be interrupted.	BMP	Construction specification
TE-20	<p>Specific tasks that the City has committed to do during project construction/restoration include:</p> <ul style="list-style-type: none"> <li>• Construction site visits.</li> <li>• Map and document with photos or drawings construction progress and compliance with mitigation and monitoring requirements.</li> <li>• Training and explanation of environmental requirements to contractors and designers.</li> <li>• Progress meetings and completing progress memos.</li> <li>• Assist and train field monitoring personnel.</li> <li>• Insure compliance with permits and stipulations of the EIS for mitigation and monitoring.</li> <li>• Maintain mitigation plan checklist and update periodically by verification.</li> <li>• Collection and analysis of environmental data as needed to insure mitigation and monitoring steps are accurate and completed in a timely manner.</li> <li>• Development and implementation of adaptive management procedures.</li> <li>• Monthly and annual reporting to USFWS and Reclamation.</li> </ul>	OMM	Construction specification
TE-21	Replace non-native vegetation with native vegetation that will provide habitat for the flycatcher. This may occur in coordination with other projects proposed by others. In addition, there may be opportunities to combine RGSM habitat restoration activities with flycatcher habitat restoration.	OMM	Construction specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/ Operations/Design</b>
TE-22	The City will restore the bosque and Rio Grande in the areas temporarily affected by the construction of the project or complete environmental enhancements at an offsite location. During development of the technical plans and specifications for restoration of the Rio Grande channel, the City will coordinate with Reclamation, USACE, USFWS, and the ISC to design a channel section that could provide potential habitat for the RGSM, flycatcher, and areas for cottonwood seedling production. If permits and approvals could be obtained, the City will construct the channel to match the existing section, as approved.	OMM	Construction specification
TE-23	The City will develop an adaptive management plan as soon as practicable after the first monitoring periods for the restoration sites and fish monitoring. The adaptive management plan will address modifications of the mitigation plan and outline monitoring schedules. This plan will be based on the results from initial monitoring efforts. Monitor habitat restoration efforts, other minimization methods, diversion impacts, and fish and wildlife enhancement measures for success and suspend unsuccessful projects/practices. This will be an adaptive process with evaluation of methods and practices that are successful and unsuccessful. This monitoring will be carried out for five years upon completion of each minimization or restoration effort.	OMM	Construction specification Operations specification
TE-24	The City will continue to provide funds for utilities, staffing, and equipment for the captive breeding program at the Albuquerque Aquarium for a period of ten years beginning on the date of the corresponding biological opinion (Appendix I). The program has been expanded, in partnership with the Interstate Stream Commission, to include a naturalized refugium. Funding will be provided in the amount of no more than \$165,000 per year. RGSM raised from the captive breeding program will be reintroduced to the wild in coordination with the New Mexico Fishery Resources Office (NMFRO) and the New Mexico Ecological Services Field Office (NMESFO).	OMM	Operations specification
TE-25	The City will provide funding to continue to monitor and improve the Albuquerque Water Resources Management Strategy mitigation measures program, including continuation of mammal, avian, and human-use studies for the bosque. Additional monitoring of amphibian/reptile populations and vegetation is needed in RGVSD. Permanent transects have been established at 12 sites throughout the RGVSP to monitor these populations. The Bosque Action Plan mandates that these transects be monitored for changes every 3 to 5 years.	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
TE-26	<p>For the first 10 years of the project, as determined and requested by USFWS, the City will cease operations of the diversion during a 24-hour period once a year during the RGSM spawn to reduce the take of eggs. After 10 years, the need for this conservation measure will be assessed and if deemed necessary by mutual agreement, may continue. This requirement does not apply if the City’s diversion is not in operation during the spawn. USFWS will notify the City in writing within one week of the requested shutdown when flows are managed to manufacture the spawn. For natural spawning flows, USFWS will coordinate closely with the City to determine when the benefits to the RGSM from the 24-hour operational shutdown can be maximized, realizing that: (1) the City needs at least 48 hours to shutdown, and (2) natural flow spikes cannot be predicted.</p> <p>During the spawning period, the City will monitor and collect RGSM eggs. This egg collection will consist of 1 egg collector for 2 hours per day from May 1 – 31 each year for the first 10 years of the project. The monitoring and collection sites will be identified in coordination with USFWS and should be located near the diversion structure (either in the sluice channel or directly upstream of the water intake structures) to reduce the amount of entrainment associated with the diversion of flows and to more accurately monitor incidental take.</p> <p>The City has proposed to cease their river diversions for a 24-hour period each year in coordination with the service in an effort to reduce incidental take of RGSM eggs during peak spawning periods.</p>	OMM	Operations specification
TE-27	<p>The City signed an Interim Memorandum of Understanding with federal, state, and local entities to continue to support the development and implementation of the long-term program entitled the ESA Workgroup Collaborative Program. The City has assisted in obtaining significant federal funding for short and long-term conservation measures via their participation in the Collaborative Program.</p>	OMM	Operations specification
TE-28	<p>The City has provided personnel and funding for RGSM monitoring and habitat surveys in the Middle Rio Grande during late 1999, early 2000, and 2002. In addition, the City completed a flycatcher survey during May, June, and July 2001. The City has committed to conducting annual winter fish monitoring surveys for the first 10 years of the project. After 10 years, the need for additional fish monitoring will be assessed and, if deemed necessary by mutual agreement between the City and USFWS, may continue.</p>	OMM	Operations specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
TE-29	The City has an agreement to provide personnel, operation and maintenance costs, and other construction improvements for the Naturalized Refugium project at the Albuquerque Biopark. The refugium will expand the current captive rearing and breeding program, including the construction of a natural habitat for the fish. This project is intended to supplement populations of the RGSM by approximately 25,000 fish per year. The City will continue to support these activities for 10 years from the date of the Biological Opinion, February 13, 2004.	OMM	Operations specification
TE-30	The City will conduct egg collection activities just upstream of the Paseo del Norte diversion, or in the sluice channel using sampling protocols developed by the Service. This egg collection will consist of 1 egg collector for 2 hours per day from May 1 – 31 each year for the first 10 years of the project. After the first 10 years of the project, the need for continued egg collection will be assessed and may continue for an additional time period if USFWS and City cooperatively agree that it is necessary.	OMM	Operations specification
TE-31	Construction activities will not occur in the Rio Grande or bosque during the flycatcher nesting and breeding season.	OMM	Construction specification
TE-32	The City will participate in an inter-agency group that includes Reclamation, the USFWS, Office of the State Engineer, New Mexico Game and Fish Department, and the Interstate Stream Commission to monitor and manage the effectiveness of both current and long-term environmental enhancement measures described above. This group will identify and recommend to the City and the USFWS necessary management changes to address environmental issues that are uncertain or unforeseen as a results of the project.	OMM	Operations specification
TE-33	The City will provide the USFW with an annual report describing the status of the proposed conservation measures by February 15 of each year. This report will describe activities carried out during previous years and projects planned ofr upcoming years. The City will provide the USFWS with an annual report describing egg collection directly upstream of the diversion dam by September 1 of each year. The city will coordinate with the USFWS when developing and implementing the habitat restoration projects described in the proposed action.	OMM	Operations specification



**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/Operations/Design</b>
<b>Traffic and Circulation (TC)</b>			
TC-01	Water pipelines would be routed in existing utility rights-of-way to minimize potential interference with traffic.	EDF	Design feature
TC-02	Pipeline installations would be bored under major intersections involving state and interstate highway crossings to minimize traffic disruption.	EDF	Design feature
TC-03	The construction contractor would meet City requirements for preparing an impedance analysis and traffic/barricade plan, where necessary, and would implement appropriate work measures as needed to ensure an adequate level of service on affected streets.	EDF	Construction specification
TC-04	Limit the amount of trench that would be open at any time.	BMP	Construction specification
TC-05	Existing road and utility rights-of-way would be used as much as possible to reduce permitting and land-acquisitions cost and to reduce disruptions to commercial facilities.	BMP	Design feature
<b>Upland Vegetation</b>			
	Project pipeline alignments have been routed primarily in developed public rights-of-way to minimize activity in undisturbed areas. Those undeveloped areas that are disturbed during construction would be replanted with appropriate native upland vegetation.	EDF	Construction specification
<b>Water Quality (WQ)</b>			
WQ-01	The City would perform periodic sampling of raw-water WTP influent and treated water to ensure compliance with the SDWA, state requirements, and City WTP operating procedures.	OMM	Operations specification
WQ-02	The WTP would be operated and maintained in accordance with the O&M procedures to be detailed in a plant-specific manual.	OMM	Operations specification
WQ-03	During in-river construction activities, the City would require the construction contractor to use appropriate BMPs to control turbidity and minimize and contain the discharge of suspended sediments into the Rio Grande.	BMP	Construction specification
WQ-04	A plan to monitor the turbidity levels in the river during in-river construction would be developed and implemented. The plan will be submitted to the USFWS for approval prior to construction activities taking place.	BMP	Construction specification
WQ-05	The City would implement measures to address Section 401 water-quality certification conditions and Section 404 discharge limitations.	BMP	Construction specification

**TABLE 1 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION, OPERATIONS, AND DESIGN**  
**FEATURE MITIGATION MEASURES, ENVIRONMENTAL IMPACT STATEMENT**

<b>Resource Category</b>	<b>Proposed Mitigation Measures</b>	<b>Type</b>	<b>Construction/ Operations/Design</b>
WQ-06	The treated surface water may be conditioned with hydrated lime (calcium hydroxide) to create treated surface water that is compatible with the ground water.	BMP	Operations specification
WQ-07	The City would implement necessary spill prevention and containment methods and training during construction and in the long term operations and maintenance of facilities. The City will provide the USFWS with a copy of the spill prevention and containment plan for the proposed action prior to construction beginning. Notify the USWS of any spills or contamination associated with construction or maintenance within one hour of occurrence. The Service will determine whether silvery minnow salvage is appropriate, water quality testing is necessary, and assess the effects of the spill on the silvery minnow. The City will ensure that all construction workers have received spill prevention and containment training prior to construction beginning.	BMP	Construction specification Operations commitment
<b>Resource Area – Wildlife</b>			
See Threatened and Endangered Species and Riparian			

## 2.1 Proposed Construction Mitigation Measures

The City proposes to design and build a fishway and fish screen to prevent impacts towards the Rio Grande silvery minnow (RGSM) and other fishes. The City also proposes to initiate a program of flow metering and measurement. Riparian areas will be restored at construction sites, and riparian areas will be enhanced at other locations to offset direct construction impacts. During construction activity related to building DWP facilities and transmission pipelines, additional proposed mitigation measures outside the bosque are also described. The proposed construction mitigation measures are discussed in more detail as follows.

### 2.1.1 Fishway

The fishway concept design was based on a U.S. Bureau of Reclamation (Reclamation, 2003) gradient control structure just downstream of Angostura Diversion Dam, and is a “constructed channel”. A slope of 0.004 feet per foot has been found by Reclamation to allow for upstream passage of RGSM. The fishway would be located on the west side of the river to allow fish to swim up or down stream when the adjustable-height crest gates are raised. The fishway is a 50-foot-wide, low gradient V-shaped, roughened channel. The high boundary roughness resulting from the riprap channel combined with rock boulders located along the channel create flow conditions suitable for fish passage. The slope of the fishway, along the thalweg, is 0.004 feet per foot (250 feet long per foot of rise). A 250-feet-long by 100-feet-wide “backwater” area is located

at the center of the fishway. The averaged water velocity through the fishway is approximately 2 feet per second at an average flow rate of 50 cfs. The average water depth at the center of the channel is approximately 1.6 feet. Trees planted on either side of the channel provide shade for the fishway. The fishway design is appropriate for Angostura and Paseo del Norte alternatives. Although the fish passageway is located on the west side of the river in the schematics contained within the BA, the final design may result in the fish passageway being placed on the east side of the river.

### **2.1.2 Fish Screen**

Design criteria for the fish screen were those used by the State of California, National Marine Fisheries Service, and the U.S. Fish and Wildlife Service for the delta smelt. This fish, for which it was originally designed, and the RGSM, have similar size and physical characteristics. These criteria are:

- Approach velocity, 0.20 feet per second (fps)
- Sweeping velocity, at least 2 times the approach velocity
- Screen opening, 1.75 mm (0.069 inch)

The fish screen design for the diversion at Paseo del Norte provides for a surface diversion flow rate of up to 142 cfs with an approach velocity normal to the screens of 0.2 fps. A diversion rate of 130 cfs or less would be normal. When used in concert with the sluice channel on the east abutment of the diversion structure a minimum of 1.0 fps of sweeping velocity is provided to move the downstream migrating fish past the screens.

The fish screen design for the surface diversion at the existing Angostura Diversion Dam would be based on the same 0.2 fps velocity criteria but would be sized for the existing irrigation flow. It would be an “in canal” fish screen in a “V” configuration with a fish by-pass pipe back to the river.

### **2.1.3 Flow Metering and Measurement**

The City commits to meter and measure the City's Drinking Water Project by installing, monitoring and maintaining river gages as follows prior to any diversions:

- a. One U.S. Geological Survey river gage upstream of the Drinking Water Project diversion, at Alameda Bridge or other suitable location;
- b. One U.S. Geological Survey river gage downstream of the Drinking Water Project diversion, at Paseo del Norte Bridge or other suitable location;
- c. One U.S. Geological Survey river gage at a suitable location immediately upstream of the City's return to the Rio Grande at the Southside Water Reclamation Plant; and

- d. One U.S. Geological Survey river gage downstream of the City's return to the Rio Grande at the Southside Water Reclamation Plant, at Interstate 25 crossing or other suitable location.

It is recognized that such gages, based on past experience, may not be accurate during periods of low flows due to the shifting, sand-bed nature of the river channel. Should such gages prove unsatisfactory, the City will work with the U.S. Geological Survey to develop a gaging approach upstream and downstream of the Drinking Water Project diversion that is satisfactory to all parties. The above river gages, in addition to the existing gage located at Central Avenue (Albuquerque gage), will be used to continuously monitor the flows in the Rio Grande through the Albuquerque reach. The City will work with the other users in the Middle Rio Grande, including the federal agencies, to coordinate the installation of gages within existing or planned activities.

#### **2.1.4 Riparian Area and Aquatic Proposed Mitigation Measures**

The physical effects of construction include:

1. 4.2 acres of riparian vegetation removed permanently for access road, sluice channel, fishway, and pumping station construction.
2. 14.7 acres (which includes 4.2 acres noted above) temporarily lost due to diversion construction activities. 2.4 acres temporarily lost due to treated pipeline crossing construction activities.
3. 0.2 acres of aquatic habitat lost due to construction of bladder dam.
4. 1.8 acres of aquatic habitat temporarily lost (which includes 0.2 acres noted above) due to construction activities for bladder dam and 1.5 acres of aquatic habitat temporarily lost due to construction activities for pipeline construction.

The proposed mitigation measures for physical effects for construction will include:

1. Mitigation for 4.2 acres of riparian vegetation permanently removed at the diversion site would consist of 1 to 1 replacement of non-native vegetation and 2 to 1 replacement of native vegetation. All replacement would be accomplished with native vegetation.
2. Mitigation for additional construction impacts to 8.1 acres at the diversion site (14.7-6.6) would consist of replacement and re-vegetation of the 8.1 acres with native vegetation.
3. Mitigation of 2.4 acres of construction impacts at the treated pipeline crossing would consist of replacement and re-vegetation with native vegetation.
4. Mitigation for 0.2 acres of aquatic habitat lost due to construction would be offset with 0.2 acres of higher value aquatic habitat which could consist of bank lowering, bank destabilization, bank terrace channel cuts, or oxbow re-establishment.
5. Mitigation for temporary construction within the aquatic habitat would consist of the following:
  - a. During construction on the river, any fish stranded by construction of the facility would be salvaged and relocated to a different portion of the river.
  - b. During installation of the water-diversion facility, the City would require the construction contractor to maintain an open channel (velocity of less

than 3 feet per second) in the Rio Grande for fish passage around the construction site at all times.

- c. During installation of the water-diversion facility, the City would require the construction contractor to use appropriate BMPs to minimize and contain the discharge of suspended sediments into the Rio Grande.

The proposed location for the mitigation to occur is south of Paseo del Norte on the west side of the river and currently includes 160 acres of mixed bosque and 48 acres on the Montano Oxbow. The sites are shown on Figure 2.

The work will include non-native vegetation clearing and floodplain expansion of 135 acres with native vegetation replanting and natural re-generation. An overbank project that will include 10 acres will be created that will provide refuge for aquatic organisms, restoration of riparian vegetation, and re-establishment of a river channel/floodplain interaction. High flow side channels will be constructed to provide aquatic habitat at flows greater than 1,500 cfs and 2,000 cfs. Channel widening and bank destabilization will be promoted by the removal of 120 jetty jacks. Two river bars will be enhanced by a combination of non-native species vegetation clearing, lowering, and pilot channel work.

Additional work will occur at the Montano Oxbow by the construction of additional high side flow channel and non-native vegetation removal.

## **2.2 Proposed Operational Mitigation Measures**

The City will begin and continue many proposed mitigation measures. These may include diversion curtailment, planning with water management agencies, operating stream gages, developing and implementing a sediment management plan, and other measures.

### **2.2.1 Accounting – Annual Operational Plan**

As has been the case since the inception of the SJC Project in 1971, under the DWP the City will continue to work closely with those agencies having responsibility in managing the flows of the Rio Grande and Rio Chama. These include the USBR, the USACE, the OSE, and the MRGCD. More recently, because of the critical habitat designation for the RGSM, the U.S. Fish and Wildlife Service has become a more active player in flow management on the river. With the evolution of the multi-agency sponsored Upper Rio Grande Water Operations Model (URGWOM), and continued conference calls and meetings during critical times of year, the management of the SJC Project and river flows and reservoirs on the Rio Chama and Rio Grande should become more efficient.

The City, in concert with the above agencies, will monitor snowpack, reservoir storage, seasonal weather forecasts, and other factors - particularly in the late-winter and early spring-periods leading up to the irrigation season (which begins in March). Preliminary decisions and action plans will be formulated as to how the City's SJC water will be managed, particularly in the case of likely low-flow or drought conditions, and whether or not surface diversions under the DWP will be curtailed or shut down entirely for several months in the coming year. As the critical warm weather irrigation season approaches (usually beginning in April or May), flow forecasts and river management

decisions will be updated using URGWOM and specific plans formulated relative to the City's DWP release and diversion program for the coming year.

**2.2.2 Curtailment Flow**

The City will curtail operations of the Drinking Water Project during times of low flow. For the Paseo del Norte alternative the City will begin curtailing diversion of native flow and will coordinate its diversion BOR and the FWS when the total flow at the Alameda gage decreases to 260 cfs. The City will cease release and diversion of both its San Juan Chama water and native water when the flow below the City diversion measured at the Paseo del Norte gage decreases to 130 cfs.

**2.3 Proposed Monitoring Mitigation Measures**

There are three biological resource areas of mitigation that require monitoring. In general, monitoring will occur over the life of the project. The monitoring would include the use of the fishway; take at the fish screen, and the effectiveness of riparian area restorations. Annual monitoring reports are also proposed. The monitoring program should also be considered an adaptive management program, meaning a successful process could be monitored less frequently, or changes in techniques or technology could be implemented into the monitoring program. Table 2 lists monitoring tasks and the first four years frequency.

**TABLE 2  
 GENERAL TIMING AND FREQUENCY OF MONITORING**

<b>Monitoring Task</b>	<b>Year One</b>	<b>Year Two</b>	<b>Year Three</b>	<b>Year Four</b>
Fishway	Quarterly	Quarterly	Quarterly	Annually
Dam	Annually	Annually	Annually	Annually
Fish Screens	Quarterly	Annually	Annually	Annually
Riparian	Annually	Annually	Annually	Annually

The fishway monitoring process would consist of fish monitoring within and near the fishway, using passive and active capture techniques. The frequency should be quarterly for a period of three years, to establish fish use patterns and provide design and modification results. On-going research into the aspects RGSM life history and habitat requirements should be considered in initial designs and for opportunities to enhance the fishway. Again, if there is some success, it may be possible to have longer periods of time between monitoring intervals. It may be necessary to coordinate some events with re-introduction of fish at points on the river, especially early in the project. Basic environmental data, such as velocity, depth, and conditions of the fishway should also be noted during monitoring events. Related fisheries data, in addition to the presence and condition of RGSM, would include species compositions within the fishway, native/non-native composition, relative abundance, and age distribution. In addition, the diversion dam would be monitored when the dam was down to determine (if possible) fish passage over the deflated dam.

In general, fish habitat monitoring indicators will include the following variables:

- Average fishway or channel width
- Average fishway velocities
- Fishway depth
- Percent composition of macro habitat types (backwaters, pools, debris, channel of fishway)
- Substrate material

In general, fish community monitoring indicators will include the following variables:

- Species
- Relative abundance
- Size classes
- Condition

Monitoring at the screens is necessary for an evaluation of take. This will occur for larval fish and eggs during the spawning season. Annual sampling is adequate, and it may also be necessary to sample at points near the dam (rip rap area or around retaining walls to check for fish presence around the dam). Techniques will include those currently in use by other researchers (including the City) to collect eggs and evaluate reproductive success. This approach should also be considered adaptive as knowledge is gained about fish in the river, and operations of the screen and dam. Standard data presentation and analysis techniques should be used in preparing reports.

Riparian monitoring information would likely include success rates for planting and removal of vegetation, monitor well information, and other monitoring data. Plant species composition, understory density and plant productivity are variables which contribute to the functional value of riparian plant communities. These variables are linked to river flows and groundwater, and would be monitored at mitigation sites. Specific monitoring parameters for riparian sites might include woody species diversity (long-term trend); productivity of these parameters can be monitored annually at riparian sites. Photos would be used to help establish the success rates of new plantings.

## **2.4 Schedule**

Proposed mitigation measures, some of which are already being implemented, would be continued through the life of the project where necessary. An adaptive management program, implemented at the initiation of construction, would provide information to modify the monitoring program and mitigation measures as necessary. Proposed construction mitigation measures would begin during construction periods.

At the present time, the RGSM captive breeding program is on-going, and the City is completing some steps to enhance and improve the health of the bosque. These activities include fuel wood reduction, debris removal, the re-planting of native species and other tasks. These tasks would continue for approximately 20 years, while the monitoring schedule may last for the life of the project, but may be modified from the adaptive program. The operational commitments would last through the life of the project.

### 3.0 ENDANGERED SPECIES ACT CONSULTATION

As a result of the Endangered Species Act (ESA) Section 7 Consultation, there will be several “reasonable and prudent measures” that serve to minimize impacts on individuals or habitats affected by the action, and generally are developed to reduce or eliminate take resulting from an action. Measures are steps that would be enforced, or are non-discretionary.

### 4.0 CLEAN WATER ACT PERMITS

To comply with provisions of the Clean Water Act, specifically Section 404 and related water quality certifications (Section 401 Certification), a permit is required from the USACE with water quality certification from the NMED, and possibly the Pueblos of Sandia and Isleta.

### 5.0 CULTURAL RESOURCES CONSULTATION

Concurrence for the preferred alternative from the NMSHPO was obtained on July 26, 2002. This concurrence was sought for compliance with Section 106 of the National Historic Preservation Act of 1966 (Reclamation, 2002). Table 5 lists the proposed mitigation measures necessary for this concurrence, while the letter itself lists the following items:

**TABLE 5  
 SUMMARY OF PROPOSED CONSTRUCTION MITIGATION MEASURES,  
 CULTURAL RESOURCES CONSULTATION**

Resource Category	Proposed Mitigation Measures	Type	Construction/ Operations/Design
<b>Cultural Resources (CR)</b>			
CR-01	A cultural resources discovery plan would be prepared and finalized through consultation with Reclamation and the New Mexico SHPO prior to the beginning of construction. The plan would outline procedures for protecting newly discovered cultural resources, evaluating their significance, and avoiding or mitigating any adverse effects from the project. The plan would include procedures for complying with the Native American Graves Protection and Repatriation Act, or New Mexico State Burial Laws in the event human remains are discovered. The plan includes the following: a pre-construction meeting, the availability of archeological assistance during construction, evaluation of discoveries for NRHP eligibility.	EDF	Design feature



**TABLE 5 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION MITIGATION MEASURES,**  
**CULTURAL RESOURCES CONSULTATION**

Resource Category	Proposed Mitigation Measures	Type	Funding Source
CR-02	Precautions would be taken to ensure that archaeological assistance is promptly available in case of a discovery. The discovery plan approved by Reclamation and the SHPO would detail these measures. Work at a site would cease if cultural resources are unearthed during construction. An archaeologist would respond to telephone calls from the site to evaluate the unearthed materials and ensure that uncovered cultural resources are appropriately recorded or avoided.	OMM	Construction specification
CR-03	Any portions of the Middle Rio Grande Project irrigation system that would be affected by construction would be carefully documented prior to construction and restored to their pre-construction condition following construction. Because of widening and other changes within the Atrisco Feeder/Albuquerque Drain associated with Angostura Diversion, this may not be possible, as the basic configuration would be changed. If Angostura Diversion is chosen, mitigation will include additional documentation of these features, per consultation with the SHPO.	EDF	Construction specification
CR-04	Before ground-disturbing construction work takes place, a pre-construction conference would be held with construction crews to inform them of the potential for disturbing subsurface cultural resources, and the procedures involved in the event that this occurs. This is especially important with regard to exhuming human remains.	EDF	Construction specification
CR-05	Any cultural resources found during construction would be documented and evaluated as to their eligibility for listing on the National Register of Historic Places. Reclamation would consult with the SHPO regarding the eligibility of these sites. LA 132366 would be avoided by realigning the project, or a data-recovery plan approved by Reclamation and the SHPO would be implemented to mitigate potentially adverse effects.	EDF	Construction specification
CR-07	The City will submit a final DWP design report showing all pipeline alignments to Reclamation. Reclamation will consult with SHPO to ensure compliance with NHPA on any additions or changes to the pipeline alignments.	EDF	Construction specification

**TABLE 5 (Continued)**  
**SUMMARY OF PROPOSED CONSTRUCTION MITIGATION MEASURES,  
 CULTURAL RESOURCES CONSULTATION**

Resource Category	Proposed Mitigation Measures	Type	Funding Source
<b>Indian Trust Assets</b>			
	<p>No potential effects needing commitment measures were identified. Any effects from Alternative A have not been specifically identified. The facilities currently exist on Pueblo lands and would be renovated, generally a positive effect. Government to government consultation would be required to continue were Alternative A brought forward.</p>		

- All Middle Rio Grande Project irrigation features will be re-constructed in their original configuration after construction is completed.
- The prehistoric site, LA 132266, will be avoided when the transmission line plans are drawn up for the west side.
- The City will provide plans of the transmission line setbacks for review by Reclamation and NMSHPO, to ensure that effects to masonry and adobe structures are minimized during construction of the transmission lines. The City will allow a period of at least 60 days prior to the start of construction of the transmission lines.
- If necessary, the City will ensure that construction in sensitive areas is monitored by a qualified person, to minimize effects to masonry and adobe structures.
- The City will follow procedures described in the “Discovery Plan” section of the cultural resources report, to ensure adequate preparation for and treatment of possible subsurface discoveries during construction.
- Prior to construction, the City will complete the Class III inventory of the portions of the project that have not yet been inventoried.

The following items were recommended by Reclamation, and concurred with by SHPO.

- The proposed transmission line for crossing the North Valley should use Alameda Drain/Matthew Avenue (Option 4) to avoid the historic adobe and masonry structures along Candelaria (Option 3).
- Whenever the pipeline trench is less than 6 m (20 ft) from the setback line for structures, then construction methods will be modified so that the vibration levels do not exceed 0.5 in/sec peak particle velocity, and if the distance of the pipeline trench and the setback line for any adobe building along any part of the water project is less than 6 m (20 ft) then efforts will be made to ensure that vibration levels do not exceed 0.2 in/sec peak particle velocity.

## 6.0 REFERENCES

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