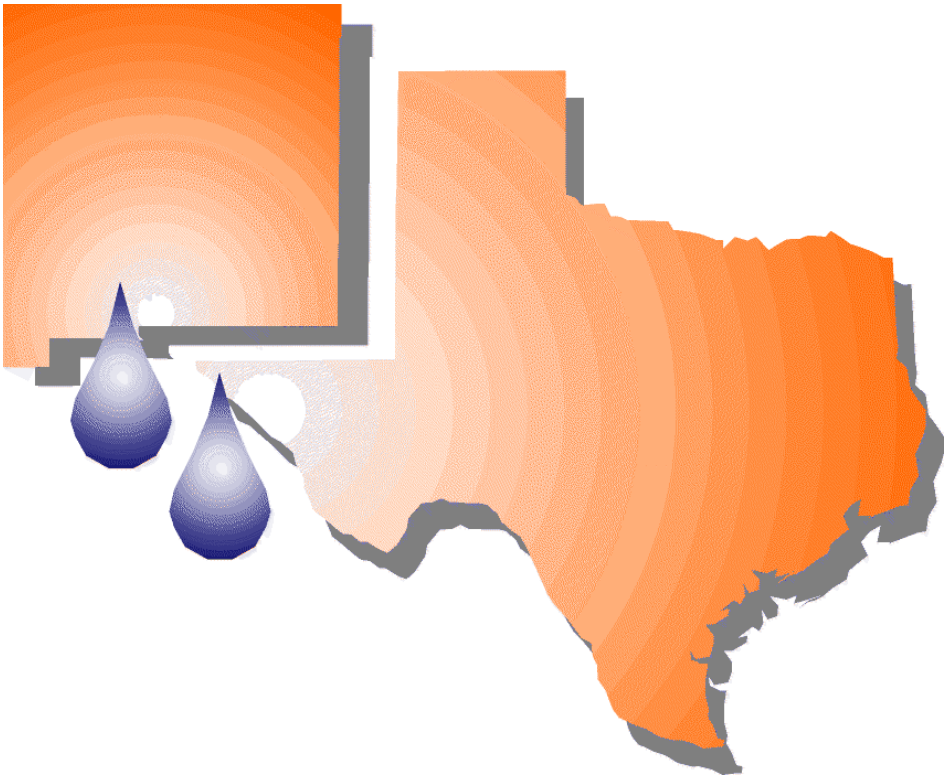
EL PASO - LAS CRUCES REGIONAL SUSTAINABLE WATER PROJECT

ECONOMIC SUMMARY FOR NEPA PROCESS
FINAL TECHNICAL MEMORANDUM



PREPARED FOR:

New Mexico – Texas Water Commission

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Executive Summary

The City of El Paso realized in the late 1980s that its existing groundwater supply was declining at an alarming rate and that supply would not be sufficient to meet its current population water needs, much less satisfy its rapidly increasing population. To address the current ground water decline problem and assure that a sustainable water supply for the future could be found, El Paso and its surrounding neighbors concerned about water supply in southern New Mexico and west Texas created the New Mexico – Texas Water Commission (Commission). The Commission embarked on a series of evaluations, under the primary heading of the El Paso - Las Cruces Regional Sustainable Water Project, to determine the most feasible way of providing a sustainable water supply not only to El Paso but also to its neighbors to the north, in northern and southern Dona Ana County, New Mexico.

The overall sustainable water supply project was divided into a number of water supply alternatives that are composed of major improvement components, including water treatment plants for Hatch, Las Cruces and Anthony, New Mexico, the New Mexico - Texas Aqueduct for both Anthony, New Mexico and El Paso, Texas, the El Paso Upper Valley Water Treatment Plant, the El Paso Aqueduct, and the Northeast El Paso Aquifer Storage and Recovery System. Probable estimates of construction cost were prepared for each improvement component of the overall project. Operations and maintenance costs were prepared for those improvement components in which several construction options were available, whose operations and maintenance costs may be

pivotal in the final construction option decision process; however, operations and maintenance costs were not estimated for many components of the overall project. The purpose of this Technical Memorandum is to bring together into one document the probable estimate of construction costs and operation and maintenance cost for the El Paso Las Cruces Regional Sustainable Water Project. Where previously not determined, this Technical Memorandum estimates operation and maintenance costs. These cost data are presented in two chapters, in this Technical Memorandum, one for New Mexico's improvements to be constructed under the project and one for El Paso Water Utilities' (EPWU) improvements. The cost data contained in this Technical Memorandum, in essence, presents the cost data in a concise document which can be used for planning and budgetary purposes as the El Paso – Las Cruces Regional Water Project moves forward and becomes reality.

The Engineer's Opinion of Probable Capital Cost, inclusive of administration and permitting fees, as well as Operations and Maintenance Cost for the major system components have been summarized in the table below.

System Component	*Capital Cost*	*Annual Operations & Maintenance Cost*	*Estimated Operation and Maintenance Cost per 1,000 Gallons*
New Mexico Entities			
Hatch Area Water Treatment Plant	*$10,461,260*	*$861,356*	*67.0¢*
Las Cruces Area Water Treatment Plant	*$48,175,056*	*$3,576,684*	*49.0¢*
Anthony Area Water Treatment Plant	*$16,058,683*	*$924,666*	*63.0¢*
El Paso Water Utilities			
New Mexico – Texas Aqueduct	*$49,496,780*	*$305,370*	*1.2¢*
Upper Valley Water Treatment Plant			
Conventional Filtration	*$121,260,000*	*$10,432,000*	*40.0¢*
Membrane Filtration	*$103,510,000*	*$9,932,000*	*38.0¢*
El Paso Aqueduct/ASR	*$141,687,022**	*$5,561,425*	*25.4¢*
** Excludes $600,000 allocated to Well Site acquisition*			

Introduction

Objectives

The goal of this technical memorandum is to summarize the probable estimate of construction and probable operation and maintenance costs for the Phase 1 Alternative Components of the El Paso – Las Cruces Regional Sustainable Water Project. This work is in support of the National Environment and Policy Act (NEPA) process, which is currently underway by the New Mexico – Texas Water Commission (Commission) in connection with the El Paso – Las Cruces Regional Sustainable Water Project.

Related Reports

Information primarily from the following previously completed reports was used in developing this report.

Siting Study for Phase 1 Facilities for Dona Ana County, Draft Final Report, July 1999

This study, prepared by Parsons Engineering Science, Inc., provides information as to the location, capital cost, and operation and maintenance cost of a 4.5 million-gallons-per-day (MGD) water treatment plant for the Village of Hatch, New Mexico, a 50 MGD water treatment plant for the City of Las Cruces, New Mexico as well as other central Dona Ana County water users, and a 16 MGD water treatment plant for Anthony, New Mexico. The route and capital cost of treated water transmission waterlines are also included.

Addendum to the Siting Study for Phase 1 Facilities for Dona Ana County, Draft Final Report, November 1999

The objectives of this study, prepared by Parsons Engineering Science, Inc. was to:

- Determine the capacity of the water treatment plant required for the Central Planning Area (CPA) in 2010, 2020, and 2030, considering conjunctive use of ground water by CPA water suppliers.
- Identify a land parcel north of Las Cruces for a water treatment plant to serve the CPA.
- Estimate treatment plant construction, operation, and maintenance costs for the water treatment plant.
- Identify any impacts of construction activities on the current operations of the canals if canals are used for raw water delivery.

- Compare costs of construction of a water treatment plant on the Rio Grande at the I-10 site and a site north of Las Cruces.

Study of Conveyance Facilities for Year-Round Delivery of Surface Water to Water Treatment Plants (New Mexico - Texas Aqueduct), Draft, July 1999

This study, prepared by Parsons Engineering Science, Inc., evaluated the feasibility of a number of open channel and closed conduit conveyance systems and alignments to transport 96 MGD from the Mesilla Dam and deliver 16 MGD to Anthony, New Mexico, and 80 MGD to the Upper Valley Treatment Plant site. Probable estimate of construction costs associated with viable options, including lined and unlined channels and closed conduit pipe, were provided in the study.

El Paso Upper Valley Water Treatment Plant Conceptual Site Layout, Draft Final Report, June 8, 1999

This report, prepared by Boyle Engineering Corporation, provided information on capital and annual operation and maintenance costs for a conventional and/or membrane technology water treatment plant for a capacity of 80 MGD.

El Paso Aqueduct Conceptual Design, Draft Final Report, June 18, 1999

This technical memorandum, prepared by Boyle Engineering Corporation, provided preliminary cost estimates of construction improvements required to convey treated water from the Upper Valley Water Treatment Plant to northwest El Paso and, through the Anthony Gap, to northeast El Paso for either direct use in the EPWU water distribution system or to the contemplated Aquifer Storage and Recovery System (ASR).

Concept Design of ASR Wellfield and Collection Facilities, Final Report, July 1999

This report, prepared by Boyle Engineering Corporation, provided proposed system components and engineer's estimate of construction cost for 71 ASR wells in northeast El Paso.

Project Construction Details Technical Memorandum, Draft Report, August 1999

This report, prepared by Boyle Engineering Corporation and Parsons Engineering Science, Inc., documented the construction schedules and anticipated construction sequencing, staging, workforce estimates, and environmental surface exposure for each anticipated individual project construction contract.

Probable Estimate of Construction Costs for Phase 1 Identified Improvements for New Mexico Entities

General Description of the System

The identified Phase 1 needs for New Mexico entity water supply improvements include providing 3.5 million gallons per day (MGD) of treated water to municipal water entities in Rincon Valley, 20 MGD of treated water to municipal water entities in north and central Mesilla Valley, and 4.0 MGD of treated water to municipal water entities in southern Mesilla Valley. To provide this water will require the construction of three new water treatment plants and associated distribution pipelines. This section describes the Phase 1 water treatment and delivery facilities needed and provides cost estimates for their construction.

Hatch Area Water Treatment Plant

The Hatch Area (North Planning Area) Water Treatment Plant will be located near the community of Hatch in the Rincon Valley. Phase 1 construction for this plant will provide a total treatment capacity of 3.5 MGD with the capability for later expansion to 4.5 MGD capacity. The treatment plant will initially service the communities of Hatch, Rincon, and Spaceport in Phase 1, but will eventually service the communities of Salem and Garfield as well.

Raw water will be either diverted to the plant directly from a new diversion facility at the Rio Grande or through the existing Rio Grande Project canal system with initial diversion from the river at Percha Dam and delivery to the Hatch Area Water Treatment Plant from the Hatch Canal. No enlargement of the canal system would be necessary, but substantial non-irrigation season conveyance losses may occur due to evaporation and seepage. Due to these potential losses, this study assumes raw water will be diverted directly from the Rio Grande to the treatment plant rather than delivered through the existing canal system. The Hatch Area Water Treatment plant will receive the delivered raw water into a series of storage/sedimentation ponds for settling of suspended solids. The water will then be pumped through a membrane treatment process and passed through a granular activated carbon (GAC) filter. Chlorination will complete the treatment process to achieve Safe Drinking Water Act (SDWA) standards for finished drinking water.

Two conveyance pipelines will distribute treated water from the Hatch Area Water Treatment Plant to the communities of Hatch, Rincon, Spaceport, and eventually to Salem and Garfield. A 14-inch diameter pipeline will convey treated water 4.0 miles to the communities of Rincon and Spaceport. A 10-inch diameter pipeline will convey treated water 1.9 miles to Hatch. In a later phase, an 8-inch pipeline will extend from the 10-inch Hatch pipeline terminus another 4.8 miles to Salem and Garfield.

As a part of Phase 1, two treated water pump stations will be located at the Hatch Area Water Treatment Plant site. The North Pump Station will provide pressure for the transmission line to Hatch and eventually to Salem and Garfield. The South Pump Station will provide pressure for transmission to Rincon and Spaceport.

Las Cruces Area Water Treatment Plant

The Las Cruces Area (Central Planning Area) Water Treatment Plant, will be located near Las Cruces alongside the Rio Grande at Interstate 10 and will serve the communities of north and central Mesilla Valley. Phase 1 construction for this plant will provide a total treatment capacity of 20 MGD with the capability for later expansion to 26 MGD and finally to 34 MGD capacity. Phase 1 will include the construction of all transmission pipelines required for water delivery to Las Cruces and to the smaller communities of north and central Mesilla Valley. This will make the Phase 1 20 MGD treatment plant capacity available to service all areas of growth in the Las Cruces Area.

Raw water will be diverted to the Las Cruces Area Water Treatment Plant directly from a new diversion on the Rio Grande and through a short 48-inch pipeline to the treatment plant. The plant will employ the treatment process described above for the Hatch Area Water Treatment Plant.

Phase 1 distribution facilities include:

- 0.9 mile 48-inch transmission line to Las Cruces
- 15.4 mile north transmission line beginning at Las Cruces as a 24-inch line and reducing to a 14-inch line at Dona Ana that extends to Radium Springs.
- 1.6 mile 18-inch lateral transmission line to Dona Ana
- 11.7 mile 14-inch south transmission line extending from Las Cruces to Mesquite
- 2.6 mile 12-inch lateral transmission line to San Miguel

For Phase 1, a 20 MGD treated water pump station will be located at the Las Cruces Area Water Treatment Plant site to pressurize the transmission lines. Later phases will expand the pumping plant as additional pumping capacity becomes needed. Ultimate pumping capacity is expected to be 34 MGD.

Anthony Area Water Treatment Plant

The Anthony Area (South Planning Area) Water Treatment Plant, located in southern Mesilla Valley near the community of Chamberino, will have a Phase 1 treatment capacity of 4.0 MGD with capability for later expansion to 8.0 MGD and ultimately to 16 MGD. In Phase 1, the Anthony Area Water Treatment Plant will provide treated water to the community of Anthony. Later expansions will extend treated water service to the communities of Chaparral, Berino, La Mesa, Vado, and Chamberino.

A diversion facility at the Rio Grande will divert raw water to the Anthony Area Water Treatment Plant. The treatment plant will employ the treatment process described above for the Hatch Area Water

Treatment Plant. Following treatment, a Phase 1 pumping plant located at the treatment plant will pump treated water to use through a transmission pipeline system. The system will begin as a 30-inch diameter pipeline, reduce to a 24-inch pipeline, and further reduce to an 18-inch pipeline which will extend to Anthony.

Probable Estimate of Construction Cost

Table 1 provides probable estimates of Phase 1 construction capital cost for the three treatment plants and their associated raw water and treated water conveyance systems. The estimates were derived by scaling costs from similar membrane treatment plants to the capacities of each proposed plant.

Table 1
New Mexico Entities Probable Capital Construction Cost

Project	Subtotal	Contingency Plants 12%	Contingency Pipelines 17%	Engineering/ Adm. 13%	Total Cost
Hatch Area					
Water Treatment Plant	$6,363,575	$763,629		$926,536	$8,053,740
Distribution System	$672,264		$114,285	$102,251	$888,800
River Diversion	$1,200,000	$144,000		$174,720	$1,518,720
Total	**$8,235,838**	**$907,629**	**$114,285**	**$1,203,508**	**$10,461,260**
Las Cruces Area					
Water Treatment Plant	$29,576,044	$3,549,125		$4,306,272	$37,431,442
Distribution System	$6,307,370		$1,072,253	$959,351	$8,338,974
River Diversion	$1,900,000	$228,000		$276,640	$2,404,640
Total	**$37,783,414**	**$3,777,125**	**$1,072,253**	**$5,542,263**	**$48,175,056**
Anthony Area					
Water Treatment Plant	$8,686,670	$1,042,400		$1,264,779	$10,993,850
Distribution System	$2,586,456		$439,698	$393,400	$3,419,553
River Diversion	$1,300,000	$156,000		$189,280	$1,645,280
Total	**$12,573,126**	**$1,198,400**	**$439,698**	**$1,847,459**	**$16,058,683**

As discussed above, the Hatch Area Water Treatment plant will have a Phase 1 capacity of 3.5 MGD for distribution to Hatch, Rincon, and Spaceport. Phase 1 capacity for the Las Cruces Area Water Treatment Plant will be 20 MGD for distribution to Las Cruces and the other communities of north and central Mesilla Valley. Phase 1 capacity for the Anthony Area Water Treatment Plant will be 4.0 MGD for distribution to Anthony.

These estimates include a contingency of 12 percent for the water treatment plants, a 17 percent contingency for the distribution pipeline networks, and a 13 percent contingency for engineering and administration costs. The 13 percent cost includes six percent for design engineering fees, six percent for construction management and inspection fees, and one percent for permits, easement, and other document and permit preparation.

Construction Costs by Year

In addition to evaluating estimates of total probable construction cost by project, Parsons Engineering Science created a project construction schedule based on the best available projections as to when water is needed by the communities served. All Phase 1 systems are anticipated to be complete before year 2010. Table 2 presents the estimated construction schedule and associated funding requirements by construction activity and duration. The construction schedule provides adequate time for the permitting, acquisition, design, and construction activities for the diversion, treatment and distribution facilities.

The Hatch Area water treatment and distribution facilities will require approximately two years to design and build. If the Hatch Area plant were to begin in year 2001, its estimated completion would be near the end of 2002. Both the treatment plant and the diversion and distribution systems can be completed at the same time.

The total project time for the completion of the Anthony Area water treatment and distribution facilities is approximately 26 months. As shown in Table 2, this project, if began in 2003, could be completed in early 2005.

The total project time for the completion of the Las Cruces Area water treatment and distribution facilities is approximately 3.5 years. As shown in Table 2, this project, if began in late 2005, could be completed in mid 2008.

Table 2
New Mexico Entities Phase 1 Yearly Capital Budget Expenditures

Activity	Total Cost	Beg. Date	End Date	2001	2002	2003	2004	2005	2006	2007	2008	Total
Hatch Area WTP (3.5 MGD)	**$7,974,000**	**01/01/2001**	**12/31/2002**	**478,440**	**7,495,560**	**0**	**0**	**0**	**0**	**0**	**0**	**7,974,000**
Design/Award	$478,440	01/01/2001	12/31/2001	478,440	0	0	0	0	0	0	0	478,440
Construction Phase		**01/01/2002**	**12/31/2002**									
Construction Management Services	$478,440	01/01/2002	12/31/2002	0	478,440	0	0	0	0	0	0	478,440
Initial Construction Effort	$1,967,600	01/01/2002	03/15/2002	0	1,967,600	0	0	0	0	0	0	1,967,600
Transition Construction Effort	$557,159	03/16/2002	05/15/2002	0	557,159	0	0	0	0	0	0	557,159
Peak Work Effort	$1,967,600	05/16/2002	08/15/2002	0	1,967,600	0	0	0	0	0	0	1,967,600
Transition Construction Effort	$557,159	08/16/2002	10/31/2002	0	557,159	0	0	0	0	0	0	557,159
Complete Construction	$1,967,600	11/01/2002	12/31/2002	0	1,967,600	0	0	0	0	0	0	1,967,600
Hatch Area Transmission Lines	**$880,000**	**11/01/2002**	**12/31/2002**	**0**	**880,000**	**0**	**0**	**0**	**0**	**0**	**0**	**880,000**
Construction Management. Services	$105,600	11/01/2002	12/31/2002	0	105,600	0	0	0	0	0	0	105,600
Construction	$774,400	12/01/2002	12/31/2002	0	774,400	0	0	0	0	0	0	774,400
Hatch Area Rio Grande Diversion	**$1,503,683**	**11/01/2001**	**12/31/2002**	**25,474**	**1,478,209**	**0**	**0**	**0**	**0**	**0**	**0**	**1,503,683**
Construction Management Services	$180,442	11/01/2001	12/31/2002	25,474	154,968	0	0	0	0	0	0	180,442
Construction	$1,323,241	05/01/2002	12/31/2002	0	1,323,241	0	0	0	0	0	0	1,323,241
Las Cruces Area WTP (20 MGD)	**$37,060,833**	**11/01/2005**	**09/25/2008**	**0**	**0**	**0**	**0**	**366,536**	**5,097,639**	**18,250,828**	**13,345,831**	**37,060,833**
Design/Award	$2,223,650	11/01/2005	10/31/2006	0	0	0	0	366,536	1,857,114	0	0	2,223,650
Construction Phase		**11/01/2006**	**09/25/2008**									
Construction Management Services	$2,223,650	11/01/2006	09/25/2008	0	0	0	0	0	192,246	1,169,499	861,905	2,223,650
Initial Construction Effort	$9,144,835	11/01/2006	04/30/2007	0	0	0	0	0	3,048,278	6,096,556	0	9,144,835
Transition Construction Effort	$2,589,515	05/01/2007	07/15/2007	0	0	0	0	0	0	2,589,515	0	2,589,515
Peak Work Effort	$9,144,835	07/16/2007	01/15/2008	0	0	0	0	0	0	8,395,258	749,577	9,144,835
Transition Construction Effort	$2,589,515	01/16/2008	03/31/2008	0	0	0	0	0	0	2,589,515	2,589,515	2,589,515
Complete Construction	$9,144,835	04/01/2008	09/25/2008	0	0	0	0	0	0	0	9,144,835	9,144,835
Las Cruces Area Transmission Lines	**$7,750,099**	**01/01/2008**	**09/25/2008**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7,750,099**	**7,750,099**
Construction Management Services	$930,012	01/01/2008	09/25/2008	0	0	0	0	0	0	0	930,012	930,012
Construction	$6,820,087	04/01/2008	09/25/2008	0	0	0	0	0	0	0	6,820,087	6,820,087
Las Cruces Area Rio Grande Diversion	**$2,380,832**	**08/01/2007**	**09/25/2008**	**0**	**0**	**0**	**0**	**0**	**0**	**103,151**	**2,277,681**	**2,380,832**
Construction Management Services	$285,700	08/01/2007	09/25/2008	0	0	0	0	0	0	103,151	182,549	285,700
Construction	$2,095,132	02/01/2008	09/25/2008	0	0	0	0	0	0	0	2,095,132	2,095,132
Anthony Area WTP (4 MGD)	**$10,885,000**	**01/01/2003**	**02/28/2005**	**0**	**0**	**653,100**	**7,455,125**	**2,776,775**	**0**	**0**	**0**	**10,885,000**
Design/Award	$653,100	01/01/2003	12/31/2003	0	0	653,100	0	0	0	0	0	653,100
Construction Phase		**01/01/2004**	**02/28/2005**									
Construction Management Services	$653,100	01/01/2004	02/28/2005	0	0	0	562,221	90,879	0	0	0	653,100
Initial Construction Effort	$2,685,896	01/01/2004	03/31/2004	0	0	0	2,685,896	0	0	0	0	2,685,896
Transition Construction Effort	$760,557	04/01/2004	05/31/2004	0	0	0	760,557	0	0	0	0	760,557
Peak Work Effort	$2,685,896	06/01/2004	09/30/2004	0	0	0	2,685,896	0	0	0	0	2,685,896
Transition Construction Effort	$760,557	10/01/2004	11/30/2004	0	0	0	760,557	0	0	0	0	760,557
Complete Construction	$2,685,896	12/01/2004	02/28/2005	0	0	0	0	2,685,896	0	0	0	2,685,896
Anthony Area Transmission Lines	**$3,385,697**	**01/01/2005**	**02/28/2005**	**0**	**0**	**0**	**0**	**3,385,697**	**0**	**0**	**0**	**3,385,697**
Construction Management Services	$406,284	01/01/2005	02/28/2005	0	0	0	0	406,284	0	0	0	406,284
Construction	$2,979,413	01/15/2005	02/28/2005	0	0	0	0	2,979,413	0	0	0	2,979,413
Anthony Area Rio Grande Diversion	**$1,628,990**	**01/01/2004**	**02/28/2005**	**0**	**0**	**0**	**1,252,297**	**376,693**	**0**	**0**	**0**	**1,628,990**
Construction Management Services	$195,479	01/01/2004	02/28/2005	0	0	0	168,278	27,201	0	0	0	195,479
Construction	$1,433,511	07/01/2004	02/28/2005	0	0	0	1,084,019	349,492	0	0	0	1,433,511
			Yearly Totals	**$503,914**	**$9,853,769**	**$653,100**	**$8,707,422**	**$6,905,701**	**$5,097,639**	**$18,353,979**	**$23,373,610**	**$73,449,133**
			Plus Admin Costs	**$5,039**	**$98,538**	**$6,531**	**$87,074**	**$69,057**	**$50,976**	**$183,540**	**$233,736**	**$734,491**
			Total	**$508,953**	**$9,952,307**	**$659,631**	**$8,794,496**	**$6,974,758**	**$5,148,615**	**$18,537,518**	**$23,607,346**	**$74,183,625**

Probable Estimate of Construction Costs For Phase 1 Identified Improvements For El Paso Water Utilities

General Description of the System

EPWU's identified needs include processing of 80 MGD of water from the Upper Valley Water Treatment Plant (UVWTP). Raw water will be conveyed from Mesilla Dam to the UVWTP by one of two methods. The first method utilizes the New Mexico - Texas Aqueduct to transfer water between the two sites. This method's recommended option involves pumping water from immediately downstream of the Mesilla Dam into the Westside Regulating Reservoir for presedimentation and storage purposes. A gravity system comprising some 22.4 miles of 72-inch diameter pipe would convey water from the Westside Regulating Reservoir to the UVWTP. The second method of transport involves transporting raw water down the Rio Grande River to the UVWTP site, where a diversion structure either across or along the side of the Rio Grande River at the UVWTP site would be constructed to capture the water for treatment at the site.

Once the raw water has been conveyed to the UVWTP, water would be pumped under either scenario into an on-site settling basin. Water will then be treated to Safe Drinking Water Act (SDWA) standards using either conventional or membrane treatment technology, disinfected, and then placed into on-site finished water storage, to await distribution as required in EPWU's distribution system or into the ASR System as contemplated by the project.

Initially, 20 MGD will be pumped from the UVWTP into northwest El Paso to the Canutillo production transmission system, through a 60-inch transmission line. The remainder, 60 MGD, will be supplied via the El Paso Aqueduct System, from the UVWTP, over the Anthony Gap and into northeast El Paso. All water delivered to northeast El Paso through the El Paso Aqueduct System will be used first to meet area demands, in lieu of pumping from existing wells in the Hueco Bolson. During early years of operation, 20 MGD of the 60 MGD may be used to meet the northeast area demands. Water in excess of that required to meet demands will be diverted to one or more of the five selected ASR service areas for recharge through the network of ASR wells. In later years, less water will be available for injection as more water is used to meet the northeast area's demands.

As EPWU's northwest side system demands increase, it is expected that up to 40 MGD of the total 80 MGD UVWTP capacity will be utilized in northwest El Paso, with the remaining 40 MGD being transferred to northeast El Paso.

Probable Estimate of Construction Cost

Probable estimates of construction cost were prepared for EPWU's alternative improvement component of the overall El Paso - Las Cruces Regional Sustainable Water Project. These specific components include the New Mexico - Texas Aqueduct, Upper Valley Water Treatment Plant, El Paso Aqueduct, and the Northeast El Paso Aquifer Storage and Recovery System. EPWU's share of the probable estimates of construction cost for the entire project are shown in Table 3, broken down by specific improvement component. Within each improvement component, major construction projects are listed,

Table 3 El Paso Water Utilities Probable Capital Construction Cost					
Project	**Subtotal**	**Contingencies**		**Engineering/ Adm.**	**Total**
		12%	**17%**	**13%**	**Cost**
Upper Valley Water Treatment Plant					
Conventional	$95,748,106	$11,317,320	$244,308	$13,950,265	$121,260,000
Membrane	$81,723,138	$9,634,324	$244,308	$11,908,230	$103,510,000
New Mexico – Texas Aqueduct					
Option 1, 14’ lift to Regulating Reservoir	$36,757,200		$6,248,724	$5,590,770	$48,596,694
Option 2, 7’ lift to Regulating Reservoir	$37,438,000		$6,364,460	$5,694,320	$49,496,780
Aquifer Storage and Recovery					
Recovery & Injection Wells Drilling *	$13,943,823		$2,370,450	$2,120,856	$18,435,129
Recovery & Injection Wells Equipment	$12,639,420		$2,148,701	$1,922,456	$16,710,577
Collection Pipeline System	$11,630,220		$1,977,137	$1,768,956	$15,376,313
Aquifer Storage and Recovery Total					**$50,522,019**
El Paso Aqueduct					
UVWTP, Anthony 1A and 2A Pump Stations	$12,631,420		$2,147,341	$1,921,239	$16,700,000
UVWTP Finished Water Reservoirs	$2,571,666		$437,183	$391,150	$3,400,000
Anthony 1A, 2A, and Summit Reservoirs	$7,185,538		$1,221,541	$1,092,920	$9,500,000
Pipeline to Canutillo Pump Station	$7,975,317		$1,355,804	$1,213,046	$10,544,167
Pipeline UVWTP to Anthony 1A	$6,613,847		$1,124,354	$1,005,966	$8,744,167
Pipeline, Anthony 1A to 2A	$8,315,685		$1,413,666	$1,264,816	$10,994,167
Pipeline, Anthony 2A To Anthony Gap	$3,966,543		$674,312	$603,311	$5,244,167
Pipeline Anthony Gap to New War Road **	$9,941,886		$1,690,121	$1,512,161	$13,144,167
Pipeline New War Road to Loop 375 ***	$10,206,616		$1,735,125	$1,552,426	$13,494,167
El Paso Aqueduct Total					**$91,765,002**
Note: Corrosion control costs have been distributed evenly among El Paso Aqueduct Pipeline Projects					
* Includes $600,000 for land acquisition/easements					
** Includes connection to New War Road facilities					
*** Includes connection to northeast and Loop 375 facilities					

including 9 projects for the El Paso Aqueduct and 3 specific construction activities for ASR. The costs shown in Table 3 include a 12 percent contingency at the water treatment plant site or 17 percent contingency for aqueduct-related components, and a 13 percent engineering/administration costs for all components. Engineering/administration costs include 6 percent engineering fees, 6 percent construction management/inspection fees, and 1 percent for the preparation of permits, easement and administrative costs.

The Upper Valley Water Treatment Plant capital cost includes the approximately $2,500,000 estimate for the Open Intake River Diversion Structure, located adjacent to the UVWTP Site. which would not be required in the event that the New Mexico - Texas Aqueduct is constructed. Optional costs identified for the New Mexico - Texas Aqueduct are based on the 72-inch diameter fiberglass pipeline with two alternate Westside Regulating Reservoir construction options.

Construction Costs by Year

In addition to evaluating estimates of total probable construction cost by project, Boyle Engineering Corporation created a project construction schedule designed to meet the objective of providing water by the start of the peak summer water demand in 2005 while at the same time providing sufficient time for acquisition of easements and permits as well as design and construction activities. Once specific design and construction project durations and monetary requirements were determined, an estimate of financial requirements over the entire construction period was created for administrative, design, and construction activities. Table 4 presents the estimated construction funding requirements by construction activity, duration, the interface between breakdown of design fees, permit fees, and estimated construction costs. The total costs indicated in Table 4 for the major project components, e.g., UVWTP, are identical to those total costs listed for the UVWTP in Table 3. The total project cost in the column listed as “Total Cost w/o Adm. Fee” of Table 4 reflects the total project cost listed in Table 3 minus the 1 percent identified by EPWU for the preparation of permits and easements and for administrative costs. This cost is listed in the rows entitled “Property and Permanent & Construction Easements” and “Administration/Permitting” under Program Management in Table 4.

One row exists in Table 4 that does not exist in Table 3. Table 4 describes the need for an overall Project Program Management Task to oversee all phases of work through completion of the project. This Program Management Task would consist of a Lead Program Manager and a supporting staff of two engineers and clerk(s). The Lead Program Manager would take the lead in the overall coordination of activities and contracts. The Lead Program Manager would rely on two Assistant Program Managers, whose jobs would be to focus on more specific work efforts, such as all work efforts involved on the eastside of El Paso and all work efforts involved on the westside of El Paso, interacting with the Lead Program Manager to keep him informed and able to manage the overall work effort. The Lead Program Manager would also enlist the help of office clerical staff as required.

Table 4
El Paso Water Utilities Yearly Capital Budget Expenditures

Option 2 Activity	Beg. Date	End Date	Total Cost *	Total Cost w/o Adm. Fee	2000	2001	2002	2003	2004	2005
Program Management	**1/1/00**	**8/5/05**		**$7,969,174**	**$2,448,264**	**$2,448,264**	**$1,453,663**	**$624,000**	**$624,000**	**$370,981**
Program Managers	1/1/00	8/5/05		$3,490,981	$624,000	$624,000	$624,000	$624,000	$624,000	$370,981
Property and Permanent & Construction Easements	1/1/00	6/27/02		$1,385,000	$564,202	$564,202	$256,593			
Administration/Permitting	1/1/00	6/27/02		$3,093,194	$1,260,062	$1,260,062	$573,070			
Upper Valley Water Treatment Plant	**1/1/00**	**3/17/05**	**$121,260,000**	**$120,047,400**	**$3,072,688**	**$3,072,688**	**$26,075,738**	**$47,951,672**	**$33,565,648**	**$6,308,966**
Design/ Award	1/1/00	3/21/02		$6,734,659	$3,072,688	$3,072,688	$589,283			
Construction Phase	3/22/02	3/17/05		***$113,312,741***						
Construction Management Services (Inspection & design Team)	3/22/02	3/17/05		$6,734,659			$1,779,202.97	$2,286,652	$2,286,652	$382,152.75
Initial Construction Effort	3/22/02	3/20/03		$29,884,494			$23,707,252	$6,177,242		
Transition Construction Effort	3/21/03	6/19/03		$8,462,300				$8,462,300		
Peak Work Effort	6/20/03	12/18/03		$29,884,494				$29,884,494		
Transition Construction Effort	12/19/03	3/18/04		$8,462,300				$1,140,984	$7,321,315	
Complete Construction	3/19/04	3/17/05		$29,884,494					$23,957,681	$5,926,813
New Mexico - Texas Aqueduct	**1/31/00**	**8/5/05**	**$49,496,780**	**$49,001,812**	**$1,004,683**	**$1,097,932**	**$6,711,574**	**$15,738,715**	**$15,738,715**	**$8,710,193**
Design/ Award	1/31/00	8/9/02		$2,734,301	$1,004,683	$1,097,932	$631,687			
Construction Phase	***8/12/02***	***8/5/05***		***$46,267,511***						
Construction Management Services (Inspection & design Team)	8/12/02	8/5/05		$2,734,301			$359,307	$930,121	$930,121	$514,752
Construction	8/12/02	8/5/05		$43,533,210			$5,720,580	$14,808,594	$14,808,594	$8,195,441
Aquifer Storage and Recovery System	**8/7/00**	**8/5/05**	**$49,922,020**	**$49,422,800**	**$0**	**$2,298,087**	**$10,610,677**	**$12,823,446**	**$16,841,155**	**$6,592,334**
Recovery and Injection Well Drilling/Equipment	***8/7/00***	***5/20/05***		***$34,200,248.94***						
Design/ Award	8/7/00	5/4/01		$1,836,553		$1,004,258	$832,296			
Well Drilling Construction Phase	***5/7/01***	***3/18/05***		***$16,555,731***						
Construction Management Services (Inspection & design Team)	9/24/01	3/18/05		$981,632		$76,714	$285,722	$285,722	$285,722	$47,751
Construction	9/24/01	3/18/05		$15,574,099		$1,217,115	$4,533,131	$4,533,131	$4,533,131	$757,592
Well Equipment Construction	***8/20/01***	***5/20/05***		***$15,550,863***						
Construction Management Services (Inspection & design Team)	1/7/02	5/20/05		$891,559			$263,131	$268,276	$268,276	$91,875.37
Construction	1/7/02	5/20/05		$14,659,304			$4,326,489	$4,411,085	$4,411,085	$1,510,646
Collection Pipeline System	**7/22/02**	**8/5/05**		**$15,222,551**						
Design/ Award	7/22/02	8/8/03		$858,552			$369,908	$488,644		
Construction Phase	***8/11/03***	***8/5/05***		***$14,363,999***						
Construction Management Services (Inspection & design Team)	8/11/03	8/5/05		$858,552				$169,545.96	$438,896	$250,110.35
Construction	8/11/03	8/5/05		$13,505,447				$2,667,042	$6,904,045	$3,934,360

*** Total Cost for Aquifer Storage and Recovery does not include $600,000 allocated to Well Site Acquisition**

Table 4
El Paso Water Utilities Yearly Capital Budget Expenditures

Option 2 Activity	Beg. Date	End Date	Total Cost *	Total Cost w/o Adm. Fee	2000	2001	2002	2003	2004	2005
El Paso Aqueduct	**10/22/01**	**8/5/05**	**$91,765,000**	**$90,847,350**	**$0**	**$130,395**	**$2,153,964**	**$7,649,185**	**$32,677,212**	**$48,333,553**
Pump Stations	***1/28/02***	***8/5/05***		***$16,533,000***						
Design/ Award	1/28/02	8/8/03		$907,662			$556,149	$351,513		
Construction Phase	***8/11/03***	***8/5/05***		***$15,541,020***						
Construction Management Services (Inspection & design Team)	8/11/03	8/5/05		$907,662				$179,244.12	$464,001	$264,417
Construction	8/11/03	8/5/05		$14,633,358				$2,889,781	$7,480,638	$4,262,939
UVWTP Finished Water and EP Aqueduct Reservoirs	***9/23/02***	***8/5/05***		***$12,771,000***						
Design/ Award	9/23/02	3/21/03		$693,465			$385,691	$307,774		
Construction Phase, UVWTP Finished Water Reservoirs	***3/24/03***	***8/5/05***		***$3,164,040***						
Construction Management Services (Inspection & design Team)	8/11/03	8/5/05		$183,059				$36,150	$93,580	53,328
Construction	8/11/03	8/5/05		$2,980,981				$588,681	$1,523,891	868,409
Construction Phase, Anthony 1A, 2A & Summit Reservoirs	*3/24/03*	*8/5/05*		***$8,840,700***						
Construction Management Services (Inspection & design Team)	8/11/03	8/5/05		$510,408				$100,794.88	$260,923	148,690
Construction	8/11/03	8/5/05		$8,330,292				$1,645,058	$4,258,483	2,426,752
Pipeline between UVWTP and Anthony Gap Summit	***6/10/02***	***8/5/05***		***$35,171,400.00***						
Design/ Award	6/10/02	6/18/04		$1,899,256			$532,209	$952,237	$414,810	
Construction Phase Between UVWTP and Anthony 1A	***6/21/04***	***5/6/05***		***$8,188,912***						
Construction Management Services (Inspection & design Team)	11/8/04	5/6/05		$467,509					$139,202.16	328,307
Construction	11/8/04	5/6/05		$7,721,403					$2,299,069	5,422,334
Construction Phase Between UVWTP and Canutillo	***7/26/04***	***8/5/05***		***$9,874,612***						
Construction Management Services (Inspection & design Team)	12/13/04	8/5/05		$563,674					$46,162.96	517,511
Construction	12/13/04	8/5/05		$9,310,938					$762,534	8,548,404
Construction Phase Between Anthony 1A and Anthony 2A	***6/21/04***	***8/5/05***		***$10,296,037***						
Construction Management Services (Inspection & design Team)	11/8/04	8/5/05		$587,767					$116,672.78	471,094
Construction	11/8/04	8/5/05		$9,708,270					$1,927,110	7,781,161
Construction Phase, Anthony 2A to Anthony Gap Summit	*11/1/04*	*8/5/05*		***$4,911,162***						
Construction Management Services (Inspection & design Team)	3/21/05	8/5/05		$280,370						280,370
Construction	3/21/05	8/5/05		$4,630,792						4,630,789
Pipeline, Anthony Gap Summit to Loop 375 Facilities	***10/22/01***	***8/5/05***		***$26,371,950.00***						
Design/ Award	10/22/01	11/28/03		$1,408,262		$130,395	$679,915	$597,953		
Construction Phase, Anthony Gap to New War Road	***12/1/03***	***8/5/05***		***$12,321,342***						
Construction Management Services (Inspection & design Team)	3/22/04	8/5/05		$694,872					400,291	294,581
Construction	3/22/04	8/5/05		$11,626,470					6,697,601	4,928,869
Construction Phase, War Road to Loop 375 Facilities	***3/22/04***	***8/5/05***		***$12,897,843***						
Construction Management Services (Inspection & design Team)	7/12/04	8/5/05		$727,408					326,669	400,739
Construction	7/12/04	8/5/05		$12,170,435					5,465,574	6,704,861
Yearly Totals					**$6,525,635**	**$9,047,365**	**$47,005,616**	**$84,787,018**	**$99,446,731**	**$70,316,027**

*** Total Cost for Aquifer Storage and Recovery does not include $600,000 allocated to Well Site Acquisition**

New Mexico Entities Operations and Maintenance Cost Estimates

General

Operation and maintenance costs were estimated for the Phase 1 water treatment and distribution facilities needed in the North, Central, and South Planning Areas of Southern New Mexico. These cost estimates reflect wholly independent operation for each of three water treatment and distribution systems.

Energy Costs

Energy costs associated with the treatment facilities such as for pumping, lights, equipment, and instruments were estimated assuming an energy cost of $0.065/kWh. Pumping costs for the transmission systems were also included. Energy costs were computed assuming 365 days per year operation at 90 percent capacity.

Personnel Requirements

The staff requirements for each water treatment and distribution system includes administration, operations, and maintenance. Administration can be largely handled with the existing staffs of the water entities served. Each treatment plant should have a plant manager/operator and additional plant operators to cover 24-hour operations. Maintenance can also mostly be handled by existing water entity staff with the addition of a maintenance supervisor/operator for the treatment plant. Staff requirements for the treatment plants were determined from Table 25.1 of AWWA and ASCE's Water Treatment Plant Design manual published by McGraw-Hill, 1998. The estimated water treatment and distribution system labor requirements and costs are provided in Table 5. These estimates do not include labor requirements for future expansion phases of the facilities.

As indicated in Table 5, the personnel to operate each treatment facility are similar. For a small water treatment plant under 5 MGD, a staff of 5 is required. Once capacity reaches 10 MGD, another two personnel are required. As already indicated, the plant manager and maintenance supervisor would fill dual roles as operators since these tasks should not normally require full-time labor.

No additional personnel should be required to maintain and operate the distribution systems. The staff of the associated water treatment plant should be able to perform any required maintenance on the diversions, pump stations, and pipelines.

Table 5 New Mexico Entities Water Treatment Plant Personnel			
Labor	**Hatch Area WTP 3.5 MGD**	**Anthony Area WTP 4 MGD**	**Las Cruces Area WTP 20 MGD**
Plant Manager	1	1	1
Operations Supervisor	0	0	0
Maintenance Supervisor	1	1	1
Operator	3	3	5
Mechanical Technician	0	0	0
Electronics Technician	0	0	0
Instrument Technician	0	0	0
Laboratory Technician	0	0	0
Building Maintenance	0	0	0
Grounds Maintenance	0	0	0
Labor Total	**5**	**5**	**7**
Average Salary	**43,214**	**43,214**	**43,214**
Total Labor Cost	**$216,068**	**$216,068**	**$288,044**

Operations and Maintenance

The expected annual operation and maintenance costs for each of the water treatment plants are shown in Table 6. Each of the cost categories has been scaled according to the plant size. Operation and maintenance costs for the distribution systems are also included in Table 6 and were estimated as one percent of the distribution system capital cost per year.

Table 6 New Mexico Entities Treatment and Distribution Systems Estimated Annual Operations and Maintenance Costs			
	Hatch Area System	**Anthony Area System**	**Las Cruces Area System**
Total Labor Costs (see Table 5)	**$216,068**	**$216,068**	**$288,044**
Materials and Supplies			
Membrane Replacement	$30,625	$35,000	$175,000
GAC Replacement	$30,625	$35,000	$175,000
Chlorine	$3,938	$4,500	$22,500
Membrane Cleaning Chemicals	$13,125	$15,000	$75,000
Coagulants	$21,875	$25,000	$125,000
Lubricants	$613	$700	$3,500
Office Supplies & Printing	$875	$1,000	$5,000
Small Tools & Equipment	$1,750	$2,000	$10,000
Materials and Supplies Total	**$103,425**	**$118,200**	**$591,000**
Maintenance			
2-1/2 Percent of Capital Cost (less membranes, GAC)	$199,350	$272,125	$926,521
Maintenance Total	**$199,350**	**$272,125**	**$926,521**
Utilities			
Treatment Process Pumping	$30,625	$35,000	$175,000
Treated Water Delivery Pumping	$113,388	$61,773	$626,119
Ozone Production	$0	$0	$0
Auxiliary Power (lighting, backwash, control, HVAC, ozone)	$56,875	$65,000	$325,000
Natural Gas	$2,500	$3,000	$7,000
Telephone	$2,000	$2,000	$3,000
Utilities Total	**$205,388**	**$166,773**	**$1,136,119**
Miscellaneous			
Transportation	$12,000	$12,000	$20,000
Expense of Supervisors and Employees	$1,500	$1,500	$3,000
Uniforms	$1,000	$1,000	$2,000
Insurance	$12,000	$12,000	$15,000
Miscellaneous	$1,094	$10,000	$20,000
Unidentified contingency	$100,625	$115,000	$575,000
Miscellaneous Total	**$137,125**	**$151,500**	**$603,750**
Distribution System Maintenance	**$15,427**	**$27,230**	**$77,501**
Subtotal	**$861,356**	**$924,666**	**$3,576,684**
Cost per 1,000 gal., 365 days	**$0.67**	**$0.63**	**$0.49**

References

Water Treatment Plant Design, AWWA and ASCE, McGraw-Hill, 1998.

Table 2. Requirements for Operations Personnel for 5 to 50 MGD Plants.

El Paso Water Utilities Operations and Maintenance Cost Estimates

General

The infrastructure required to provide a new year-round surface water supply to El Paso consists of numerous improvement components. The concept design for these improvement components were prepared for EPWU by Boyle Engineering Corporation in association with the El Paso – Las Cruces Regional Sustainable Water Project. In the accomplishment of the concept designs under the El Paso – Las Cruces Regional Sustainable Water Project, operations and maintenance costs for improvement components were prepared only as required to describe differences between possible alternate improvements. Therefore, this Technical Memorandum not only summarizes the operation and maintenance costs already identified, but also estimates operation and maintenance costs for those improvements components not previously identified.

Upper Valley Water Treatment Plant

Boyle Engineering Corporation, as part of the El Paso Upper Valley Water Treatment Plant Conceptual Site Layout Report, estimated specific manpower requirements by number and skill level, as well as estimated other operations and maintenance requirements for the two possible treatment alternatives evaluated. This detailed information was necessary to allow an accurate assessment of the overall costs that could be expected to occur with the two treatment options, in terms of capital costs and operations and maintenance costs. The manpower estimates and other operations and maintenance costs requirements translated into annual costs, are listed in Table 7. The cost categories reflect EPWU operating and maintenance budget categories, specifically Salaries, Materials & Supplies, Maintenance, Utilities, and Miscellaneous.

Costs estimated for conventional treatment were based to a great degree on actual costs incurred for the existing EPWU Canal Street and Jonathan Rogers Water Treatment plants; scaled appropriately to represent the quantity of water that will be treated at the new UVWTP. For the purpose of this Technical Memorandum and associated operations and maintenance costs, it is assumed that the UVWTP will operate at 90 percent capacity on a year-round basis.

Other System Infrastructure Components

Operations and maintenance costs were not calculated for the other major system improvement components including the New Mexico - Texas Aqueduct, El Paso Aqueduct, or ASR System as a part of those specific work efforts. Since those costs were not required to determine construction options, neither Boyle Engineering nor Parsons Engineering Science, Inc. was tasked with identifying operations and maintenance costs for those components. With the help of EPWU operations personnel, additional staff requirements and operations and maintenance costs for those components is estimated in Table 8. The rationale behind the operations and maintenance cost estimates are described in this section.

Table 7
Upper Valley Water Treatment Plant @ 80 MGD Capacity
Estimated Annual Operations and Maintenance Cost

	Conventional Treatment Process	Membrane Treatment Process
Labor		
Water Plant Superintendent	1	1
Water Plant Maintenance Supervisor	1	1
Water Plant Oper. Supervisor	1	1
Electronics Control Specialist	1	2
Electronics Technician	2	2
Maintenance Mechanic II	2	1
Water Plant Operator III	10	5
Water Plant Operator II	5	4
Equipment Operator II	1	1
Plant Operator I	4	4
Trades Helper	1	2
Laborer	3	3
Total	32	27
Average	$38,438	$38,148
Labor Total	**$1,230,000**	**$1,030,000**
Materials and Supplies		
Membrane Replacement		$700,000
GAC Replacement	$700,000	$700,000
Chlorine	$90,000	$90,000
Membrane Cleaning Chemicals	0	$300,000
Coagulants	$1,000,000	$500,000
Lubricants	$14,000	$14,000
Office Supplies & Printing	$20,000	$20,000
Small Tools & Equipment	$40,000	$40,000
Materials and Supplies Total	**$1,864,000**	**$2,364,000**
Maintenance		
2 Percent of Capital Cost (less GAC)	$1,900,000	
2-1/2 Percent of Capital Cost (less membranes, GAC)		$1,400,000
Maintenance Total	**$1,900,000**	**$1,400,000**
Utilities		
Treatment Process Pumping	$400,000	$700,000
Treated Water Delivery Pumping	$700,000	$700,000
Ozone Production	$600,000	0
Auxiliary Power (lighting, backwash, control, HVAC, ozone)	$1,300,000	$1,300,000
Natural Gas	$17,000	$17,000
Telephone	$6,000	$6,000
Utilities Total	**$3,023,000**	**$2,723,000**
Miscellaneous		
Transportation	$50,000	$50,000
Expense of Supervisor and Employees	$9,000	$9,000
Uniforms	$6,000	$6,000
Insurance	$25,000	$25,000
Miscellaneous	$25,000	$25,000
Unidentified contingency	$2,300,000	$2,300,000
Miscellaneous Total*	**$2,415,000**	**$2,415,000**
Subtotal	**$10,432,000**	**$9,932,000**
Cost/1,000 Gallons @ 80 MGD Rate, 365 Days/Year, 90% Usage	**$0.40**	**$0.38**

***Based on Actual Versus Budget for JRWTP 1998-1999**

Conventional Costs are taken from EPWU FY 1999-2000 Operating and Maintenance Budget, except miscellaneous which reflects actual production costs. Production costs increased per production differences. JR to UVWTP. Salaries are increased by 50%.

Energy Costs

Energy costs were estimated for the two regulating reservoir options identified for the New Mexico - Texas Aqueduct closed conduit system. The first regulating reservoir option requires that water be lifted a total of 7 feet from the Mesilla Dam into the Westside Regulating Reservoir, while the second option requires water be lifted a total of 14 feet from the dam into the Westside Regulating Reservoir. Under either option the 72-inch diameter transmission waterline is of sufficient size for its 22.4 mile proposed route considering the elevation difference between the Westside Regulating Reservoir and UVWTP to provide a gravity system requiring no additional pumping. Energy costs for the New Mexico - Texas Aqueduct system were calculated based on 90 percent of 80 MGD throughout the year at a lift of 14 feet, utilizing the worst case, at an electric cost of $0.065/kWh.

Energy costs were estimated for the UVWTP on-site treatment plan process, beginning with the low lift pump station required to pump raw water into the presedimentation basins at a rate of 80 MGD 90 percent of the time, from the presedimentation basins into the treatment plant, through the treatment plant process, to the finished water storage reservoirs, and finally from the UVWTP at a rate of 60 MGD 90 percent of the time, to the first EPUW Westside distribution system storage facility, in this particular case Anthony 1A Reservoir and 20 MGD 90 percent of the time, to EPWU's Westside Canutillo Transmission Pipeline System. The 90 percent number represents an annualized average of pumping assuming that 25 percent of the facility will be out of service for three months of the year for maintenance.

Once the water is pumped from the UVWTP to the Anthony 1A Reservoir, energy costs were calculated for pumping at a rate of 90 percent of 60 MGD rate for the entire year, between the Anthony 1A site and Anthony Gap Summit Reservoirs, assuming a 60-inch transmission line between the two sites.

Once water is delivered into the El Paso Aqueduct's Anthony Gap Summit Reservoirs, there is no further energy requirement in transporting the treated water from that site into any of the other proposed improvements of the El Paso Aqueduct and/or Northeast El Paso ASR System since the Anthony Gap Summit Reservoirs are the highpoint of the system and the transmission line system is sized for gravity flow delivery conditions.

There is also sufficient system pressure created by the El Paso Aqueduct to allow water to be injected into any of the Northeast El Paso ASR System facilities. However, any water that must be reclaimed from the ASR System facilities must be pumped from the wells. Energy costs for this activity were based on pumping water from an average depth below ground level of 450 feet with column losses equal to the maximum head loss allowed per AWWA standards and an average discharge pressure weighted by the number, location, and discharge point of the five ASR well fields of 18 psi. The quantity of recovery water was estimated to be 90 percent of a 20-MGD rate with recovery activities occurring four months per year.

Manpower Requirements

EPWU operations staff input was solicited in determining the number and skill level of personnel required for the various improvement components of the El Paso – Las Cruces Regional Sustainable Water Project.

It was determined that neither the New Mexico - Texas Aqueduct nor the UVWTP Diversion Structure will require personnel in addition to those required for the UVWTP; any routine activities will be handled by the UVWTP personnel.

The El Paso Aqueduct System, which would include the ASR System wells in addition to pump stations and reservoirs other than the UVWTP site itself, will require an additional two electronic technicians in addition to eight additional operators to provide routine maintenance and assure the facilities are visited at least once a day and to provide 24-hour availability.

The Jonathan Rogers Water Treatment Plant Expansion from 40 MGD to 60 MGD as covered by the Phase 1 improvement components of the El Paso – Las Cruces Regional Sustainable Water Project will not incur additional personnel requirements. Although considered to be Phase 2 improvements and therefore not covered by this Technical Memorandum, four operators/mechanics and one electronic technician will be added to the existing EPWU operation and maintenance staff when the treatment plant capacity is again increased from 60 MGD to 80 MGD.

The Riverside/Bisque Regulating Reservoir will require no additional staff.

Operations and Maintenance

The New Mexico - Texas Aqueduct comprises one low lift booster station at Mesilla Dam, the Westside Regulating Reservoir and approximately 22.4 miles of 72-inch diameter fiberglass pipe. UVWTP personnel as needed will provide maintenance for the low lift booster station. Materials and supplies for the low lift booster station were estimated at 1 percent per year of its capital cost. The Westside Regulating Reservoir will serve as a presedimentation basin for the 22.4-mile long aqueduct. Maintenance for the Westside Regulating Reservoir is estimated to be silt removal and disposal once per year of approximately 300,000 cubic yards of material. Flush valves will be installed in the low points of the aqueduct to allow removal from the aqueduct of any particulates not removed at the Westside Regulating Reservoir. It was assumed that the flush valves would be operated once each three years.

In the event the UVWTP Diversion Structure is constructed in lieu of the New Mexico - Texas Aqueduct, UVWTP personnel and the costs of those activities borne in the UVWTP operations and maintenance costs will perform operations and maintenance activities.

The operations and maintenance costs of operating the El Paso Aqueduct, which includes booster stations, reservoirs, transmission lines, and the 71 ASR wells, exclusive of the energy costs and

manpower requirements described previously, were apportioned in accordance with well production costs incurred be EPWU for their other similar type facilities, described as well production in their historical operation and maintenance cost records.

Summary

Predicated on the discussions provided in this Technical Memorandum, operations and maintenance costs for the New Mexico - Texas Aqueduct, the El Paso Aqueduct/ASR System and the Riverside/Bosque Regulating Reservoir are summarized in annual cost in Table 8.

Table 8
El Paso Water Utilities Estimated Annual Operations and Maintenance Costs

Operations & Maintenance Category	New Mexico – Texas Aqueduct	El Paso Aqueduct/ ASR	Riverside/Bosque Regulating Reservoir
Water Plant Superintendent			
Water Plant Maintenance Supervisor			
Water Plant Oper. Supervisor			
Electronics Control Specialist			
Electronics Technician		2	
Maintenance Mechanic II			
Water Plant Operator III			
Water Plant Operator II		8	
Equipment Operator II			
Plant Operator I			
Trades Helper			
Laborer			
Total		10	
Average		$29,570	
Salaries Total	**N/A**	**$295,696**	
Materials and Supplies Total	**N/A**	**$147,168**	
Maintenance Total	**$206,897**	**1,595,196**	
Utility Total	**$98,473**	**$3,278,961**	
Miscellaneous Total	**N/A**	**$244,404**	
Subtotal	**$305,369**	**$5,561,425**	
Cost/1,000 Gallons	**$0.012**	**$0.254**	

Note: All utility costs and resulting cost/1,000 gallons assume full capacity average of 90% of time