4B.11 Interregional Water Management Strategies

4B.11.1 Trinity River Authority Reuse Supply through Joe Pool Lake

4B.11.1.1 Description of Option

The Trinity River Authority (TRA) owns and operates several wastewater treatment plants, and has plans to develop a number of direct and indirect reuse projects in the Trinity River Basin. The TRA could develop a project to supply indirect reuse water through Joe Pool Lake for use in Johnson County (Johnson County SUD). The wastewater effluent would be delivered from the TRA Central Wastewater Treatment Plant in Grand Prairie to Joe Pool Lake. The reuse portion of the project is assumed to be developed by TRA by 2020 in conjunction with the Dallas County Reuse Project for steam electric power. The description and costs for the portion of the project developed by TRA are discussed in the 2006 *Region C Water Plan*.[1] Johnson County SUD would develop the transmission and treatment facilities to use the water from Joe Pool Lake. A schematic of the proposed strategy is shown on Figure 4B.11-1. It is assumed that an existing intake structure on Joe Pool Lake can be utilized.

4B.11.1.2 Available Yield

Johnson County SUD would contract with the TRA for up to 20,000 acre-feet per year (acft/yr) of indirect reuse water for use in Johnson County. The pipeline and components from Joe Pool Lake to Johnson County would be sized for 36 million gallons per day (MGD) peak design capacity.

4B.11.1.3 Environmental

Environmental impacts could include:

- Possible low to moderate impacts on in-stream flows due to increased diversions.
- Possible moderate impacts to water quality in Joe Pool Lake. This can be mitigated with advanced treatment of the wastewater effluent.
- Possible low impacts on riparian corridors depending on specific locations of pipelines. Generally, it is assumed that pipelines can be routed to avoid environmentally sensitive areas.

A summary of environmental issues is presented in Table 4B.11-1.

[1] Freese and Nichols, January 2006, 2006 Region C Water Plan.

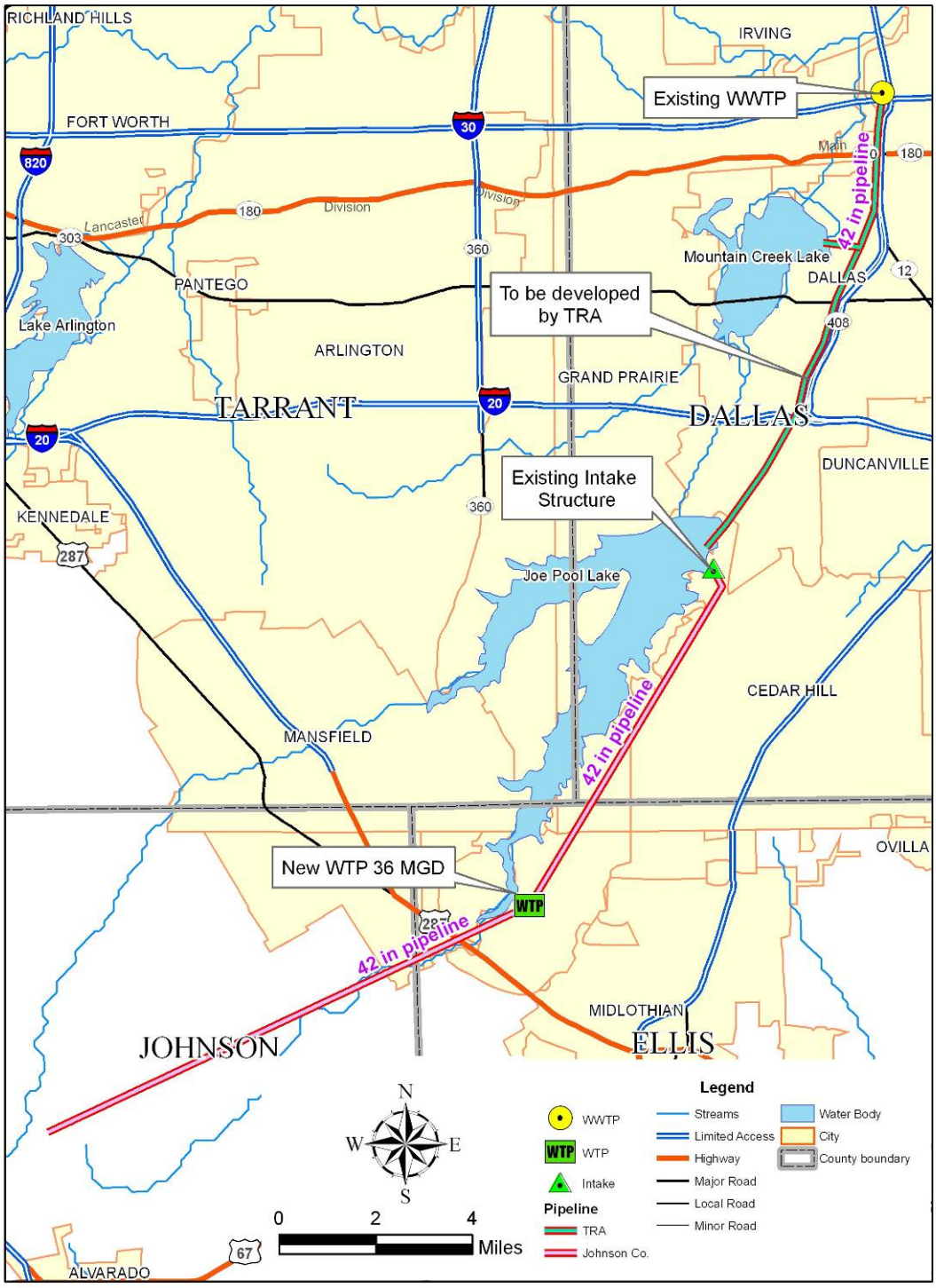

Figure 4B.11-1. TRA Reuse Project to Johnson County SUD

Table 4B.11-1.
Environmental Issues
TRA Reuse Supply to Johnson County SUD

Water Management Option	TRA Indirect reuse project to Johnson County SUD through Joe Pool Lake
Implementation Measures	Construction of pump stations, water treatment plant and approximately 20 miles of pipeline from Joe Pool Lake to Johnson County SUD. It is assumed that the infrastructure needed to move the wastewater effluent to Joe Pool Lake will be developed by TRA.
Environmental Water Needs / Instream Flows	Possible impacts on in-stream flows due to reuse of return flows. Cumulative impacts are expected to be minimal because as demands in the Dallas area increase, the net decrease in return flow due to reuse is negligible. Could impact water quality in Joe Pool Lake. This would be addressed during the reuse permitting process.
Bays and Estuaries	Negligible impact
Fish and Wildlife Habitat	Possible low to moderate impacts on riparian corridors and upland habitats depending on specific locations of pipelines.
Cultural Resources	Possible low impact
Threatened and Endangered Species	Negligible to low impacts on endangered species depending on specific locations of pipelines
Comments	Will require indirect reuse permit and possible interbasin transfer permit from the Trinity to Brazos River Basin

4B.11.1.4 Engineering and Costing

Facilities required for Johnson County SUD to deliver treated water to its customers in Johnson County include:

- Water treatment plant;
- Pump station; and
- Transmission pipeline.

Facilities required to move treated wastewater effluent to Joe Pool Lake are assumed to be developed by TRA and are not considered here. Costs associated with the TRA portion of the project are reflected in the water purchase price to Johnson County SUD.

This strategy assumes that the existing intake structure and pump station at Joe Pool Lake is sufficient to move raw water through a 42-inch pipeline to a water treatment plant located at the upstream end of the lake. The water would be treated at a new 36 MGD conventional surface water plant, and then transported approximately 12 miles to Johnson County SUD's distribution system.

The total project costs including pump stations, pipeline, water treatment plant, and other project costs are $118,783,000. After taking into consideration debt service at 6 percent for 20 years, operation and maintenance, energy costs, and purchase of raw water on a wholesale basis at $166 per acft ($0.51 per 1,000 gallons), the total annual cost of the project is $19,151,000. This is a unit cost of $958 per acft ($2.94 per 1,000 gallons) for treated water. Table 4B.11-2 summarizes the cost estimate.

4B.11.1.5 Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 4B.11-3, and the option meets each criterion. To implement this option, TRA would need to obtain an indirect reuse permit to Joe Pool Lake. Currently this strategy is proposed to meet the needs of Johnson County SUD's customers in the Trinity River Basin. If this water is used for customers in the Brazos River Basin, an interbasin transfer permit will also be needed. Other permits that may be required as part of the construction are identified below.

4B.11.1.6 Regulatory Permits Required

Requirements specific to pipelines needed to link existing sources to users will include:

- U.S. Army Corps of Engineers Section 404 permit(s) for pipeline stream crossings; discharges of fill into wetlands and waters of the U.S. for construction; and other activities;
- NPDES Storm Water Pollution Prevention Plan; and
- TPWD Sand, Shell, Gravel and Marl permit for construction in state-owned streambeds.

4B.11.1.7 Mitigation Funding and Other

Mitigation requirements would vary depending on impacts, but could include vegetation restoration, wetland creation or enhancement, or additional land acquisition.

4B.11.2 Regional Surface Water Supply to Williamson County from Lake Travis

4B.11.2.1 Description of Option

The Lower Colorado River Authority (LCRA) owns and operates five reservoirs which, along with Lake Austin, are known as the Highland Lakes. Two of the Highland Lakes, Lakes Buchanan and Travis, are water supply reservoirs and have dedicated conservation storage. The

Table 4B.11-2.
Summary of Costs for TRA Reuse Supply to Johnson County SUD

Item	*Estimated Costs for Facilities (Sept 2008)*
Capital Costs	
Raw Water Pipeline	$11,448,161
Treated Water Pipeline	$16,761,930
Right of Way Easements (ROW)	$2,426,000
Engineering & Contingencies (30%)	$8,463,027
Total Pipeline Cost	**$39,099,118**
WTP Pump Station	$4,221,000
Engineering & Contingencies (35%)	$1,477,350
Total Pump Station Cost	**$5,698,350**
Water Treatment Plant	$49,604,000
Engineering & Contingencies (35%)	$17,361,000
Total Water Treatment Plant Cost	**$66,965,000**
Permitting and Mitigation	$297,000
Interest during Construction (18 months)	$6,724,000
Total Project Cost	**$118,783,000**
Annual Costs	
Debt Service (6% for 20 years)	$10,356,000
Electricity	$432,000
Operation & Maintenance - Conveyance System	$388,000
Purchase water ($166 per acft)[1]	$3,320,000
Treatment Costs	$4,655,000
Total Annual Costs	**$19,151,000**
Total Project Yield (acft/yr)	**20,000**
Unit Costs (During Amortization)	
Per Acre-Foot	**$958**
Per 1,000 gallons	**$2.94**

1 - Cost to purchase reuse water is based on costs for TRA to develop the reuse project to Joe Pool Lake.

Table 4B.11-3.
Comparison of TRA Reuse Option to Plan Development Criteria

Impact Category	*Comment(s)*
A. Water Supply	
1. Quantity	1. Sufficient quantities available
2. Reliability	2. High reliability
3. Cost	3. Low to moderate
B. Environmental factors	
1. Environmental Water Needs	1. Possible low to moderate impact. Possible water quality impacts in Joe Pool Lake from discharge of treated effluent. This can be mitigated through treatment.
2. Habitat	2. Low impact possible where new pipelines are constructed
3. Cultural Resources	3. Possible low impact
4. Bays and Estuaries	4. No substantial impact
5. Threatened and Endangered Species	5. No substantial impact
6. Wetlands	6. Low impact possible where new pipelines are constructed
C. Impact on Other State Water Resources	• No apparent negative impacts on state water resources; no effect on navigation
D. Threats to Agriculture and Natural Resources	• No apparent negative impacts on agriculture or natural resources
E. Equitable Comparison of Strategies Deemed Feasible	• Option is considered to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	• May require interbasin transfer from the Trinity River Basin to supply customers in the Brazos River Basin. This would be an exempt IBT since Johnson County is partially located in the Trinity River Basin.
G. Third Party Social and Economic Impacts from Voluntary Redistribution	• None

other four reservoirs in the Highland Lakes chain are constant level lakes and are not considered water supply reservoirs. The LCRA, which supplies water primarily in the Colorado River Basin (Region K), currently has contracts to supply water to two cities in Williamson County from Lake Travis. LCRA currently has contracts to provide 18,000 acft/yr of raw water to the City of Cedar Park, and 6,400 acft/yr of treated water to the City of Leander. The City of Round Rock has a contract with BRA for supply from the LCRA for 20,928 acft/yr of raw water but does not have the infrastructure to receive the water currently.

The cities of Round Rock, Cedar Park and Leander / LCRA have entered into agreements to participate in the Brushy Creek Regional Utility Authority (BCRUA) that would ultimately provide 105.8 MGD of treated water capacity and 39.5 MGD of raw water. Portions of this project have been designed and are set to be constructed by 2010. This project will provide peaking capacity for system demands including 15 MGD to Cedar Park, 40.8 MGD to Round Rock and 50 MGD to LCRA/Leander. Although, the system will be designed for peaking capacity, average annual supplies from this project will be approximately 50 percent of the peaking capacity. In addition the project will provide raw water to Cedar Park's existing 26 MGD water treatment plant, LCRA/Leander's 12 MGD water treatment plant and 0.9 MGD to the Twin Creeks golf course.

The BCRUA will utilize the existing 30 MGD intake structure of the Cedar Park WTP initially, until a deep water 141.7 MGD intake structure can be constructed near Volente. The deep water intake will provide access to water during a severe drought. The floating intake conveys raw water through a new pipeline in an existing easement to the new regional water treatment plant to be located near the western edge of Cedar Park and Leander. A raw water transmission pipeline will be constructed to the new regional 105.8 MGD WTP. Treated water will then be delivered to Cedar Park (15 MGD), Leander (50 MGD) and Round Rock (40.8 MGD). The general locations of the facilities are shown in Figure 4B.11-2. The allocation of supplies for the proposed regional system is detailed in Table 4B.11-4.

4B.11.2.2 Available Yield

Under the provisions of HB 1437[2] and by agreement between the Brazos River Authority (BRA) and LCRA, 25,000 acft/yr of stored water in the Highland Lakes can be sold by LCRA (through the BRA) to entities in Williamson County in addition to the existing contracts with Cedar Park and Leander. Currently, 21,528 acft/yr is committed. However, the 25,000 acft/yr allowed under HB 1437 does not meet the 2060 needs in Williamson County. Sufficient quantity of uncommitted stored water exists in the Highland Lakes to meet a large portion of Williamson County's projected 2060 shortages, and this supply option as conceptualized here is sized to meet 100 percent of the total 108,039 acft/yr of needs in the county. It requires that either

[2] House Bill 1437, 76th Session, Texas Legislature.

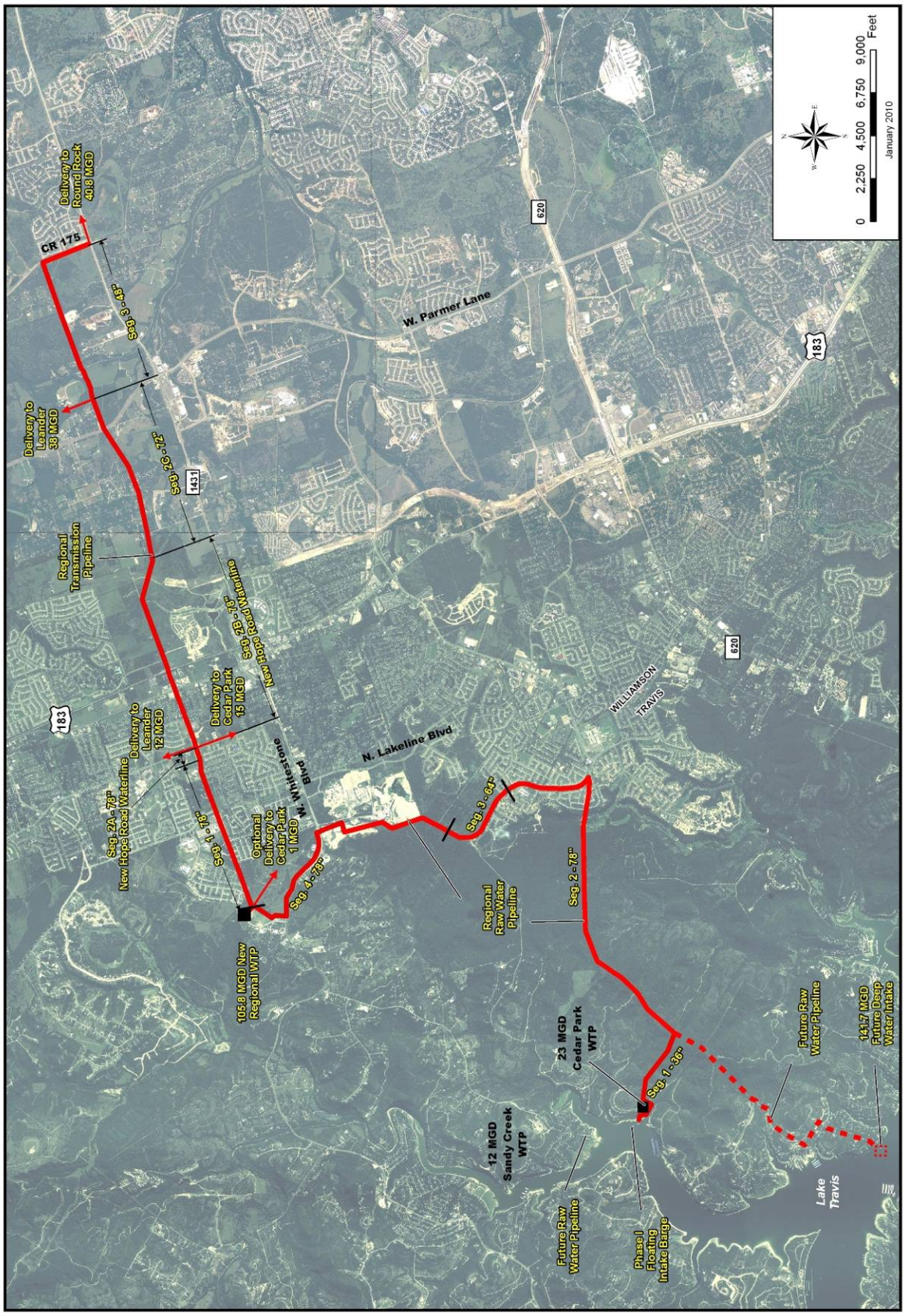

Figure 4B.11-2. BCRUA Water Supply Project

Table 4B.11-4.
Brushy Creek Regional Utility Authority System Participation

	Cedar Park	*Round Rock*	*LCRA/ Leander*	*Total*
Treated Water Allocation (acft/yr)	16,800	45,700	56,000	118,500
Treated Water %	14.18%	38.56%	47.26%	100%
With Deep Water Intake (acft/yr)	43,568	45,700	69,440	158,708
Deep Water Intake %	27.45%	28.79%	43.75%	100%

HB 1437 be amended by the legislature to allow the sale of additional water, or other administrative measures such as a TCEQ interbasin transfer permit would be required to deliver any quantity above 25,000 acft/yr.

HB 1437 also provides that a 25 percent surcharge be added to the cost of water from the Colorado River basin delivered to Williamson County to pay for development of replacement supplies in the Colorado River Basin. This is subject to an adjustment by the LCRA Board of Directors.

Several entities have already committed to purchase the original 25,000 acft/yr designated by HB 1437. Table 4B.11-5 presents the projected allocation of water under the original 25,000 acft/yr, and an additional allocation of water of 118,500 acft/yr. Currently, only 2,540 acft/yr of the HB 1437 water remains uncommitted. This plan assumes that the city of Round Rock will obtain the portion of the HB 1437 water currently allocated to Georgetown and the currently unallocated amount. Cedar Park and Liberty Hill would obtain additional supply above the original HB 1437 amount.

Table 4B.11-5.
Allocation of New Highland Lakes Supply in Williamson County

Entity	*Current HB 1437 Allocation (acft/yr)*	*Projected HB 1437 Allocation (acft/yr)*	*Additional Highland Lakes Supply (acft/yr)*	*Total (acft/yr)*
Cedar Park	0	0	16,800	16,800
Chisholm Trail SUD[1]	3,472	3,472	0	3,472
Liberty Hill	600	600	0	600
Round Rock	11,444	20,928	45,700	66,628
LCRA/Leander	0	0	56,000	56,000
Georgetown	6,944	0	0	0
Unallocated	3,472	0	0	0
Total	25,000	25,000	118,500	143,500

[1] Chisholm Trail SUD currently has expressed no plans to use this supply.

4B.11.2.3 Environmental

The construction of a new intake structure on Lake Travis and transmission pipeline to Williamson County would entail low to moderate environmental effects, depending on the quantity of water diverted, and the specific alignment of the pipelines.

- The diversion of up to 118,500 acft/yr or more could have a low impact below Lake Travis on environmental water needs, instream flows and Matagorda Bay, depending on the quantity and timing of diversions.
- The pipeline construction could have moderate to high impacts on karst invertebrates in Travis and Williamson Counties and other wildlife in the Travis County portion of route, where the pipeline would not follow existing highway rights-of-way.
- Low impacts could occur on three federally listed endangered bird species. Moderate to high impacts would be possible for seven federally listed endangered invertebrates.

4B.11.2.4 Engineering and Costing

The project is planned in three phases with the first to be completed by 2010 and the final phase to be completed by 2023. The first phase of the project will provide 30 MGD of treated water. Total projected costs for Phase I is $143,732,900

The major facilities needed to implement Phase I of this project are:

- Expansion of the raw water intake and pump station at Cedar Park Water Treatment Plant;
- Raw water transmission pipeline from Lake Travis to Regional Water Treatment Plant;
- Construction of a new 30 MGD water treatment plant; and.
- Treated water transmission pipelines to Cedar Park, Leander and Round Rock.

The second phase will be constructed to provide a treated water capacity of 70 MGD. Total projected cost for Phase II is $136,987,600. The major facilities planned for Phase II of the project are:

- Construction of a new deep water intake near Volente with a capacity of 105.9 MGD
- Raw water transmission pipelines from the deep water intake; and
- 40 MGD expansion of the regional water treatment plant constructed in Phase I.

The final phase of the project will increase the deep water intake capacity and regional water treatment plant to meet ultimate needs by 2050. Total projected costs for Phase III are $48,801,500. Major facilities include:

- Increase deep water intake capacity to 141.7 MGD
- 35.8 MGD expansion at the regional water treatment plant for total capacity of 105.8 MGD.

Costs for the regional system and the share of the facilities costs have been developed from the Cedar Park – Round Rock – LCRA/Leander Regional Water Supply Project Preliminary Engineering Report, January 2007 and are represented in Table 4B.11-6.

4B.11.2.5 Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 4B.11-7, and the option meets each criterion.

The transfer of water from Lake Travis to Williamson County in excess of the 25,000 acft/yr specified in HB 1437 would constitute an interbasin transfer, but would be exempted from interbasin transfer rules if supplied to Cedar Park. TCEQ permit amendments might be needed to add a point of diversion at Lake Travis.

4B.11.2.5.1 Requirements Specific to Pipelines

1. Necessary permits:
   a. U.S. Army Corps of Engineers Section 404 dredge and fill permit for stream crossings and lake intake impacting wetlands or navigable water of the United States.
   b. GLO Sand and Gravel Removal permits.
   c. TPWD Sand, Gravel and Marl permit for construction in state-owned streambeds.
2. Right-of-way and easement acquisition.
3. Crossings:
   a. Highways and Railroads.
   b. Creeks and Rivers.
   c. Other Utilities.
4. Mitigation requirements would vary depending on impacts, but could include vegetation restoration, wetland creation or enhancement, or additional land acquisition.

Table 4B.11-6.
Summary of Costs for BCRUA Water Supply Project (Phases I- III)
September 2008 Prices

Item	*Estimated Costs for Facilities*	*Cedar Park*	*Round Rock (BRA/LCRA Alliance)*	*Leander/LCRA*
Capital Costs				
Floating Intake (30 MGD)	$5,173,000	$1,490,000	$1,339,000	$2,344,000
Deep Water Intake and Pump Station (141.7 MGD)	$41,362,000	$11,442,000	$11,709,000	$18,211,000
Raw Water Pipeline	$54,292,000	$10,459,000	$18,863,000	$24,970,000
Transmission Pipeline	$38,800,000	$1,649,000	$23,187,000	$13,964,000
Water Treatment Plant (105.8 MGD)	$116,674,000	$16,542,000	$44,993,000	$55,139,000
Total Capital Cost	**$256,301,000**	**$41,582,000**	**$100,091,000**	**$114,628,000**
Engineering, Legal Costs and Contingencies	$103,020,000	$16,986,000	$40,023,000	$46,010,000
Land Acquisition and Surveying	$4,398,000	$911,000	$1,485,000	$2,003,000
Interest During Construction (3 years)[1]	$14,550,000	$2,379,000	$5,665,000	$6,506,000
Total Project Cost	**$378,269,000**	**$61,858,000**	**$147,264,000**	**$169,147,000**
Annual Costs				
Debt Service (6 percent, 20 years)[2]	$32,979,000	$5,393,000	$12,839,000	$14,747,000
Operation and Maintenance				
Intake, Pipeline, Pump Station	$2,094,000	$424,000	$769,000	$901,000
Water Treatment Plant	$14,261,000	$2,022,000	$5,500,000	$6,740,000
Pumping Energy Costs (194,984,825 kW-hr @$0.09/kW-hr)	$17,549,000	$4,818,000	$5,053,000	$7,678,000
Purchase of Water ($157.5/acft)	$3,937,500	$0	$3,843,000	$94,500
Purchase of Water ($126/acft)	$5,292,000	$2,268,000	$0	$3,024,000
Total Annual Cost	**$76,112,500**	**$14,925,000**	**$28,004,000**	**$33,184,500**
Available Project Yield (acft/yr)[3,4]	67,000	18,000	24,400	24,600
Annual Cost of Water ($ per acft)	$1,136	$829	$1,148	$1,349
Annual Cost of Water ($ per 1,000 gallons)	$3.49	$2.54	$3.52	$4.14

Costs developed from Cedar Park-Round Rock - LCRA/Leander Regional Water Supply Project, PER, Jan. 2007
1 - Interest during construction is calculated by phase and then summarized.
2 - Debt service is calculated by phase and summarized.
3 -Project yield includes the ultimate deep water intake capacity (141.7 MGD). Treated capacity is 105.8 MGD.
4 -Yield is limited to the available supply from the Highland Lakes

Table 4B.11-7.
Comparison of Lake Travis Supply to Williamson County
Option to Plan Development Criteria

Impact Category	*Comment(s)*
A. Water Supply	
1. Quantity	1. Sufficient to meet needs
2. Reliability	2. High reliability
3. Cost	3. Reasonable (moderate to high)
B. Environmental factors	
1. Environmental Water Needs	1. Low impact
2. Habitat	2. Moderate to high impact along pipeline routes
3. Cultural Resources	3. Low to moderate impact
4. Bays and Estuaries	4. Low impact
5. Threatened and Endangered Species	5. Moderate impact along pipeline routes
6. Wetlands	6. Low impact
C. Impact on Other State Water Resources	• No apparent negative impacts on state water resources; no effect on navigation
D. Threats to Agriculture and Natural Resources	• Low to none
E. Equitable Comparison of Strategies Deemed Feasible	• Option is considered to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	• Sales from LCRA to Cedar Park are exempted from interbasin transfer requirements
G. Third Party Social and Economic Impacts from Voluntary Redistribution	• None

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