

## **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 *Initially Prepared Region C Water Plan*.<sup>1</sup> 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.11.1-1. 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 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 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.

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<sup>1</sup> Freese and Nichols, June 2005, Initially Prepared 2006 Region C Water Plan.



Figure 4B.11.1-1. TRA Reuse Project to Johnson County SUD

**Table 4B.11.1-1.  
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 \$79,257,000. After taking into consideration debt service at 6 percent for 30 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 \$12,003,200. This is a unit cost of \$600 per acft (\$1.84 per 1,000 gallons) for treated water. Table 4B.11.1-2 summarizes the cost estimate.

**Table 4B.11.1-2.  
Summary of Costs for TRA Reuse Supply to Johnson County SUD**

<i>Item</i>	<i>Estimated Costs for Facilities</i>
<b>Capital Costs</b>	
Raw Water Pipeline	\$8,747,000
Treated Water Pipeline	\$12,807,000
Right of Way Easements (ROW)	\$2,205,000
Engineering & Contingencies (30%)	\$3,842,000
<b>Total Pipeline Cost</b>	<b>\$18,854,000</b>
Intake and Pump station	\$0
WTP Pump Station	\$3,225,000
Engineering & Contingencies (35%)	\$1,129,000
<b>Total Pump Station Cost</b>	<b>\$4,354,000</b>
Water Treatment Plant	\$37,900,000
Engineering & Contingencies (35%)	\$13,265,000
<b>Total Water Treatment Plant Cost</b>	<b>\$51,165,000</b>
Permitting and Mitigation	\$297,000
Interest during Construction (18 months)	\$4,587,000
<b>Total Project Cost</b>	<b>\$79,257,000</b>
<b>Annual Costs</b>	
Debt Service (6% for 30 years)	\$5,757,900
Electricity (\$0.06 kWh)	\$287,900
Operation & Maintenance - Conveyance System	\$355,400
Purchase water (\$166 per acft)	\$3,320,000
Treatment Costs	\$2,282,000
<b>Total Annual Costs</b>	<b>\$12,003,200</b>
<b>Total Project Yield (acft/yr)</b>	<b>20,000</b>
<b>Unit Costs (During Amortization)</b>	
<b>Per Acre-Foot</b>	<b>\$600</b>
<b>Per 1,000 gallons</b>	<b>\$1.84</b>

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

#### **4B.11.1.5 Implementation Issues**

This water supply option has been compared to the plan development criteria, as shown in Table 4B.11.1-3, 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;
- 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.

**Table 4B.11.1-3.  
Comparison of TRA Reuse Option to Plan Development Criteria**

<b>Impact Category</b>	<b>Comment(s)</b>
A. Water Supply 1. Quantity 2. Reliability 3. Cost	1. Sufficient quantities available 2. High reliability 3. Low to moderate
B. Environmental factors 1. Environmental Water Needs  2. Habitat  3. Cultural Resources 4. Bays and Estuaries 5. Threatened and Endangered Species 6. Wetlands	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. Low impact possible where new pipelines are constructed  3. Possible low impact 4. No substantial impact 5. No substantial impact 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

## **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 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, the largest of the Highland Lakes. The City of Cedar Park has a contract to purchase 18,000 acft/yr. Cedar Park owns and operates its own water treatment plant. The LCRA also has a contract with the City of Leander to provide 6,400 acft/yr of treated water.

This alternative evaluates the diversion of 51,200 acft/yr of raw water from Lake Travis for delivery to the City of Round Rock and the City of Cedar Park. Treated water would then be diverted from the water treatment plant in Cedar Park to Chisholm Trail SUD and the City of Liberty Hill. For this analysis, delivery and treatment capacity were sized to meet peak day demands at a peak factor of 2.0, creating a delivery capacity of 91.4 MGD.

Diversion facilities would be constructed in deep water on the main body of Lake Travis near the confluence of Sandy Creek with the main body of the lake. A raw water transmission pipeline would be constructed to either an expansion of the Round Rock treatment facility or to a new regional water treatment plant located near the Round Rock facility. This pipeline would split south of Cedar Park and divert water to either an expansion of the Cedar Park treatment facility or to a new regional water treatment plant. Treated water would then be diverted north to Chisholm Trail SUD and Liberty Hill. The general locations of the facilities are shown in Figure 4B.11.2-1.

### **4B.11.2.2 Available Yield**

Under the provisions of HB 1437<sup>2</sup> 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

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<sup>2</sup> House Bill 1437, 76<sup>th</sup> Session, Texas Legislature.

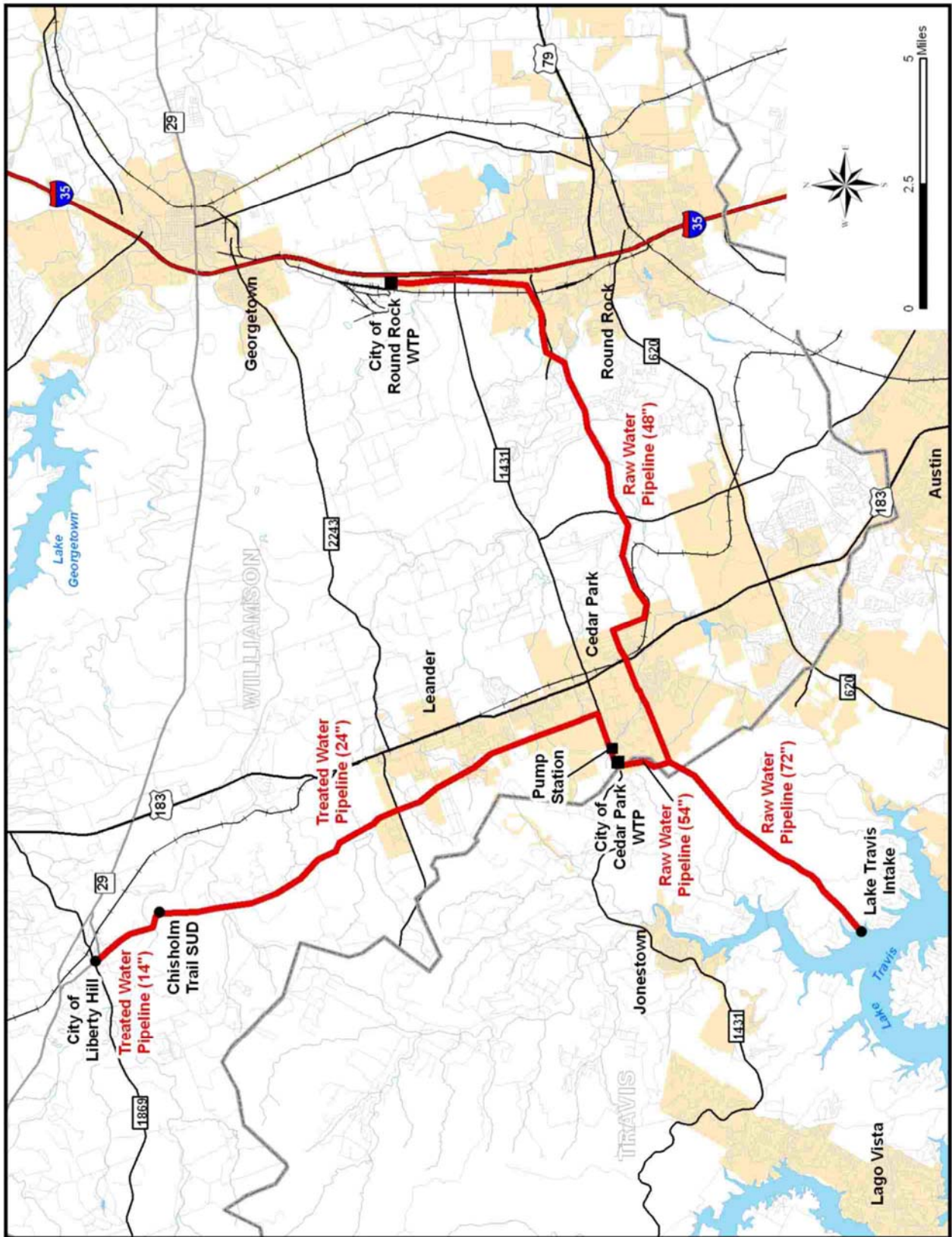


Figure 4B.11.2-1. Williamson County Supply from Lake Travis

Cedar Park and Leander. 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 54 percent of the total 94,912 acft/yr of needs in the county. It requires that either 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 the 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.

Several entities have already committed to purchase the original 25,000 acft/yr designated by HB 1437. Table 4B.11.2-1 presents the projected allocation of water under the original 25,000 acft/yr, and an additional allocation of water of 26,200 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.11.2-1.  
Allocation of New Highland Lakes Supply in Williamson County**

<b>Entity</b>	<b>Current HB 1437 Allocation (acft/yr)</b>	<b>Projected HB 1437 Allocation (acft/yr)</b>	<b>Additional Highland Lakes Supply (acft/yr)</b>	<b>Total (acft/yr)</b>
Cedar Park	0	0	25,000	25,000
Chisholm Trail SUD	3,472	3,472	0	3,472
Liberty Hill <sup>1</sup>	600	600	1,200	1,800
Round Rock	11,444	20,928	0	20,928
Georgetown	6,944	0	0	0
Unallocated	2,540	0	0	0
<b>Total</b>	<b>25,000</b>	<b>25,000</b>	<b>26,200</b>	<b>51,200</b>

<sup>1</sup> Note: In a comment letter following release of the Initially Prepared Plan, Liberty Hill informed the BGRWPG that the City has decided to pursue purchasing supply from BRA and has decided not to pursue water supply from Lake Travis. This notification was received too late to adjust the engineering and costing analysis for this option by removing the Liberty Hill portion. This would adjust some of the supplies and costs presented herein, but not substantially.

#### **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 51,200 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**

A raw water intake and pump station would be needed at Lake Travis, and 33 miles of raw and treated water transmission pipelines would take the water to a water treatment plant near the existing Round Rock Water Treatment Plant, Cedar Park, Chisholm Trail SUD and Liberty Hill. All facilities were sized for a peaking factor of 2.0.

The major facilities needed to implement this project are:

- Raw water intake and pump station at Lake Travis;
- Raw water transmission pipeline from Lake Travis to Regional Water Treatment Plants near Round Rock and Cedar Park;
- Treated water transmission pipelines to Chisholm Trail SUD and Liberty Hill; and
- Water Treatment Plants.

Delivery of 51,200 acft/yr at a peaking rate of 2.0 would have a total project cost of approximately \$211,821,000, an annual cost of \$34,065,000, and an annual unit cost of \$665 per acft, or \$2.04 per 1,000 gallons of water. These costs are broken out for each entity below, and are summarized in Table 4B.11.2-2.

Delivery to the City of Round Rock of 20,928 acft/yr at a peaking rate of 2.0 would have a cost of approximately \$101,336,000, an annual cost of \$15,084,000, and an annual unit cost of \$721 per acft, or \$2.21 per 1,000 gallons of water.

**Table 4B.11.2-2.  
Cost Estimate Summary  
Regional Surface Water Supply to Williamson County from Lake Travis  
Second Quarter 1999 Prices**

<i>Item</i>	<i>Estimated Total Costs for Facilities</i>	<i>Round Rock</i>	<i>Cedar Park</i>	<i>Chisholm Trail SUD</i>	<i>Liberty Hill</i>
<b>Capital Costs</b>					
Intake and Pump Station (96.2 MGD)	\$16,498,000	\$6,748,000	\$8,051,000	\$1,122,000	\$577,000
Transmission Pipeline (33 miles)	39,591,000	26,234,000	6,310,000	4,374,000	2,672,000
Transmission Pump Stations	1,818,000	0	0	1,198,000	620,000
Two WTPs (56.9 and 39.3 MGD)	<u>87,127,000</u>	<u>36,622,000</u>	<u>41,717,000</u>	<u>5,808,000</u>	<u>2,980,000</u>
<b>Total Capital Cost</b>	<b>\$145,034,000</b>	<b>\$69,604,000</b>	<b>\$56,078,000</b>	<b>\$12,502,000</b>	<b>\$6,849,000</b>
<b>Engineering, Legal Costs and Contingencies</b>					
Environmental & Archaeology Studies and Mitigation	\$48,782,000	\$23,050,000	\$19,312,000	\$4,157,000	\$2,264,000
Land Acquisition and Surveying (167 acres)	878,000	418,000	113,000	202,000	144,000
Interest During Construction (2 years)	1,436,000	758,000	190,000	285,000	203,000
	<u>15,991,000</u>	<u>7,506,000</u>	<u>6,055,000</u>	<u>1,372,000</u>	<u>757,000</u>
<b>Total Project Cost</b>	<b>\$211,821,000</b>	<b>\$101,336,000</b>	<b>\$81,748,000</b>	<b>\$18,518,000</b>	<b>\$10,217,000</b>
<b>Annual Costs</b>					
Debt Service (6 percent, 30 years)	\$15,388,000	\$7,362,000	\$5,939,000	\$1,345,000	\$742,000
Operation and Maintenance:					
Intake, Pipeline, Pump Station	849,000	431,000	264,000	98,000	55,000
Water Treatment Plant	8,376,000	3,427,000	4,088,000	569,000	292,000
Pumping Energy Costs (\$0.06 /kW-hr)	2,092,000	856,000	1,021,000	142,000	73,000
Purchase of Water - LCRA (\$115 /acft)	3,594,000	0	3,594,000	0	0
Purchase of Water - LCRA/BRA-Alliance (\$61.53/acft)	<u>3,766,000</u>	<u>3,008,000</u>	<u>0</u>	<u>499,000</u>	<u>259,000</u>
<b>Total Annual Cost</b>	<b>\$34,065,000</b>	<b>\$15,084,000</b>	<b>\$14,906,000</b>	<b>\$2,653,000</b>	<b>\$1,421,000</b>
<b>Available Project Yield (acft/yr)</b>	<b>51,197</b>	<b>20,928</b>	<b>25,000</b>	<b>3,472</b>	<b>1,800</b>
<b>Annual Cost of Water (\$ per acft)</b>	<b>\$665</b>	<b>\$721</b>	<b>\$596</b>	<b>\$764</b>	<b>\$789</b>
<b>Annual Cost of Water (\$ per 1,000 gallons)</b>	<b>\$2.04</b>	<b>\$2.21</b>	<b>\$1.83</b>	<b>\$2.34</b>	<b>\$2.42</b>

Delivery to the City of Cedar Park of 25,000 acft/yr at a peaking rate of 2.0 would have a cost of approximately \$81,748,000, an annual cost of \$14,906,000, and an annual unit cost of \$596 per acft, or \$1.83 per 1,000 gallons of water.

Delivery to the Chisholm Trail SUD of 3,472 acft/yr at a peaking rate of 2.0 would have a cost of approximately \$18,518,000, an annual cost of \$2,653,000, and an annual unit cost of \$764 per acft, or \$2.34 per 1,000 gallons of water.

Delivery to the City of Liberty Hill of 1,800 acft/yr at a peaking rate of 2.0 would have a cost of approximately \$10,217,000, an annual cost of \$1,369,000, and an annual unit cost of \$761 per acft, or \$2.34 per 1,000 gallons of water.

#### **4B.11.2.5 Implementation Issues**

This water supply option has been compared to the plan development criteria, as shown in Table 4B.11.2-3, and the option meets each criterion.

**Table 4B.11.2-3.  
Comparison of Lake Travis Supply to Williamson County  
Option to Plan Development Criteria**

<b>Impact Category</b>	<b>Comment(s)</b>
A. Water Supply 1. Quantity 2. Reliability 3. Cost	1. Sufficient to meet needs 2. High reliability 3. Reasonable (moderate to high)
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries 5. Threatened and Endangered Species 6. Wetlands	1. Low impact 2. Moderate to high impact along pipeline routes 3. Low to moderate impact 4. Low impact 5. Moderate impact along pipeline routes 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

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.

***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.

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