

BRAZOS G

WATER PLANNING GROUP

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COUNTIES

Bell
Bosque
Brazos
Burlison
Callahan
Comanche
Coryell
Eastland
Erath
Falls
Fisher
Grimes
Hamilton
Haskell
Hill
Hood
Johnson
Jones
Kent
Knox
Lampasas
Lee
Limestone
McLennan
Milam
Nolan
Palo Pinto
Robertson
Shackelford
Somervell
Stephens
Stonewall
Taylor
Throckmorton
Washington
Williamson
Young

BRAZOS RIVER AUTHORITY, Administrative Agent
P.O. Box 7555 ◊ Waco, Texas 76714-7555
(254) 761-3100 ◊ Fax (254) 761-3204

March 23, 2009

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
1700 North Congress Avenue
Austin, TX 78711-3231

RE: Amendment to the 2006 Brazos G Regional Water Plan related to the City of Waco to include specific reuse infrastructure projects for City of Waco and Waco Area Metropolitan Regional Sewage System (WMARSS) member cities

Dear Mr. Ward:

The Brazos G Regional Water Planning Group (Group) requests that the Texas Water Development Board consider a proposed amendment to the 2006 Brazos G Regional Water Plan (2006 Plan) related to the City of Waco to include specific reuse infrastructure projects for City of Waco and Waco Area Metropolitan Regional Sewage System (WMARSS) member cities. The Group met in a regularly-posted public meeting on February 18, 2009, and directed the Brazos River Authority and HDR to forward the amendment materials to you for concurrence that this amendment can be considered "minor."

The Group and the applicant, the City of Waco, believe this proposed amendment qualifies as a "minor" amendment to the 2006 Plan based on the criteria set-forth in Texas Administrative Code Rule 357.16:

- It does not result in over allocation of an existing or planned source of water. The amendment does not change the allocation of any source of supply. It simply provides greater specificity on the utilization of WMARSS reuse water supplies, which are fully accounted for in the 2006 Plan.
- It does not relate to a new reservoir. The amendment only relates to the development of treatment and transmission facilities.

Page 2 of 2
Addressee
Date

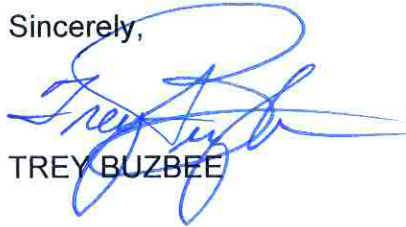
- It does not have a significant impact on instream flows, environmental flows, or freshwater flows to bays and estuaries. The 2006 Plan assumes zero discharge of effluent from the WMARSS system.
- It does not have a significant impact on water planning or previously adopted management strategies.
- It does not delete or change any legal requirements of the plan.

The proposed amendment materials are enclosed for your review.

The Brazos G Group plans to formally consider this amendment at its next meeting, scheduled for April 15, 2009. Please notify us of your decision prior to this date so that the Group can act on the matter accordingly.

Should you have any questions regarding this amendment, please contact me at (254) 761-3168 or via e-mail at tbuzbee@brazos.org. We appreciate your consideration of this request.

Sincerely,



TREY BUZBEE

Enc

BRAZOS G

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April 15, 2009

To: Interested Parties

Re: Amendment to the 2006 Brazos G Regional Water Plan related to Additional Water Management Strategies for the City of Bellmead, Hewitt, Lacy-Lakeview, Lorena and Waco.

The Brazos G Regional Water Planning Group hereby amends the 2006 Brazos G Regional Water Plan as follows:

- 1. Recommend the WMARSS Bellmead/Lacy-Lakeview Reuse Project as a Recommended Water Management Strategy for the Cities of Bellmead and Lacy-Lakeview.**

WMARSS is expanding its reuse system, and is pursuing development of the Bellmead/Lacy-Lakeview Reuse Project to supply various reuse customers within the Cities of Bellmead and Lacy-Lakeview.

- 2. Recommend the WMARSS Bull Hide Creek Reuse Project as a Recommended Water Management Strategy for the Cities of Lorena and Hewitt.**

WMARSS is expanding its reuse system, and is pursuing development of the Bull Hide Creek Reuse Project to supply various reuse customers within the Cities of Lorena and Hewitt.

- 3. Recommend the WMARSS Flat Creek Reuse Project as a Recommended Water Management Strategy for the City of Waco.**

WMARSS is expanding its reuse system, and is pursuing development of the Flat Creek Reuse Line to supply various reuse customers within the City of Waco.

The request to amend the 2006 Plan is included as Attachment A. The revised plans for the Cities of Bellmead, Hewitt, Lacy-Lakeview, Lorena and Waco are shown in Attachment B. Detailed technical evaluations of the projects comprising these amendments are included as Attachments C, D and E.

Request for Amendment to the 2006 Brazos G Regional Water Plan to Add Development of the Bellmead/Lacy-Lakeview, Bull Hide Creek, and Flat Creek Reuse Projects to Supplement Water Supplies in McLennan County

Background

On behalf of the member cities of the Waco Metropolitan Area Sewerage System (WMARSS), the City of Waco requests amendments to the *2006 Brazos G Regional Water Plan* and the *2007 State Water Plan* to incorporate three specific reuse projects that WMARSS is pursuing. The projects will provide reclaimed water from the existing WMARSS Central WWTP and the proposed WMARSS Bull Hide Creek WWTP. The projects will be capable of supplying the cities of Bellmead, Hewitt, Lacy-Lakeview, Lorena and Waco with Type 1 reuse water for industrial uses and landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. This supply would decrease demands on the Trinity Aquifer groundwater and surface water supplies held by the Cities of Waco and Lorena.

Amendment Request

The City of Waco respectfully requests that the *2006 Brazos G Regional Water Plan* be amended to add the following reuse water management strategies:

- **WMARSS Bellmead/Lacy-Lakeview Reuse**

The reclaimed water line and pump station project would provide the Cities of Bellmead and Lacy-Lakeview with up to 2 MGD (2,242 acft/yr) of reclaimed water from the WMARSS Central WWTP.

- **WMARSS Bull Hide Creek Reuse**

The Bull Hide Creek project would provide the Cities of Hewitt and Lorena with up to 1.5 MGD (1,681 acft/yr) of treated effluent from the proposed WMARSS Bull Hide Creek WWTP.

- **WMARSS Flat Creek Reuse**

The WMARSS Flat Creek Reuse project would provide the City of Waco with up to 7 MGD (7,847 acft/yr) of reclaimed water from the existing WMARSS Central WWTP.

These reuse projects are reflected in revised individual water supply plans for each city, as shown in the amended Sections 4C.24.1, 4C.24.9, 4C.24.10, 4C.24.11, 4C.24.18 and 4C.38.17 of the *2006 Brazos G Regional Water Plan*.

4C.24.1 City of Bellmead

4C.24.1.1 Description of Supply

The City of Bellmead obtains its water supply from groundwater from the Trinity Aquifer. The City of Bellmead also has contracted with the City of Waco for supplemental surface water supply from Lake Waco. No shortages are projected for the City of Bellmead; however, the City of Waco and the City of Bellmead are currently negotiating a contract for water supply in order to reduce Bellmead's dependence on Trinity Aquifer groundwater. The purchase of supplemental reuse water from WMARSS is also recommended to reduce demands on Trinity Aquifer groundwater.

4C.24.1.2 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended for the City of Bellmead:

- Purchase water from the City of Waco. In order to reduce demands on the Trinity Aquifer, provide for future growth, and coordinate with the City of Waco's plans, water purchased from the City of Waco is in excess of projected future demands for this WUG.
- Purchase reuse water from WMARSS (Bellmead/Lacy-Lakeview Reuse). The reuse supply will reduce demands for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers

4C.24.1.3 Costs

Costs of the Recommended Plan for the City of Bellmead.

- a. Water Supply from City of Waco:
 - Date to be Implemented: before 2010
 - Unit Cost: assumed unit cost of \$815/acft (\$2.50/1,000 gallons) for wholesale treated water, including transmission costs
 - Annual Cost: \$2,609,630
- b. Reuse Water Supply from WMARSS (Bellmead/Lacy-Lakeview Reuse)
 - Date to be Implemented: before 2010
 - Unit Cost: assumed unit cost of \$240/acft (\$0.74/1,000 gallons) for wholesale treated reuse water, including transmission costs
 - Annual Cost: \$269,000

**Table 4C.24-2.
 Recommended Plan Costs by Decade for the City of Bellmead**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	113	113	113	113	113	113
Water Supply from City of Waco						
Supply From Plan Element (acft/yr)	2,622	2,751	2,873	2,984	3,065	3,202
Annual Cost (\$/yr)	\$2,136,930	\$2,242,065	\$2,341,495	\$2,431,960	\$2,497,975	\$2,609,630
Unit Cost (\$/acft)	\$815	\$815	\$815	\$815	\$815	\$815
Reuse Water Supply (WMARSS Bellmead/Lacy-Lakeview Reuse)						
Supply From Plan Element (acft/yr)	1,121	1,121	1,121	1,121	1,121	1,121
Annual Cost (\$/yr)	\$269,000	\$269,000	\$269,000	\$269,000	\$269,000	\$269,000
Unit Cost (\$/acft)	\$240	\$240	\$240	\$240	\$240	\$240

4C.24.9 City of Hewitt

4C.24.9.1 Description of Supply

The City of Hewitt obtains its water supply from groundwater from the Trinity Aquifer. The City also has contracted with the City of Waco for supplemental surface water supply from Lake Waco. No shortages are projected for the City of Hewitt, however, purchase of supplemental reuse water from WMARSS is recommended to reduce demands on water supplied by the City of Waco and groundwater from the Trinity Aquifer.

4C.24.9.2 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended for the City of Hewitt:

- Purchase reuse water from WMARSS (Bull Hide Creek Reuse). The reuse supply will reduce demands for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers

4C.24.9.3 Costs

Costs of the Recommended Plan for the City of Hewitt

- a. Reuse Water Supply from WMARSS (Bull Hide Creek Reuse)
 - Date to be Implemented: before 2010
 - Unit Cost: assumed unit cost of \$798/acft (\$2.45/1,000 gallons) for wholesale treated reuse water, including transmission costs
 - Annual Cost: \$984,000

**Table 4C.24-2.
Recommended Plan Costs by Decade for the City of Hewitt**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	123	123	123	123	123	123
Reuse Water Supply (WMARSS Bull Hide Creek Reuse)						
Supply From Plan Element (acft/yr)	1,233	1,233	1,233	1,233	1,233	1,233
Annual Cost (\$/yr)	\$984,000	\$984,000	\$984,000	\$984,000	\$984,000	\$984,000
Unit Cost (\$/acft)	\$798	\$798	\$798	\$798	\$798	\$798

4C.24.10 City of Lacy-Lakeview

4C.24.10.1 Description of Supply

The City of Lacy-Lakeview obtains its water supply from the City of Waco. No shortages are projected for the City of Lacy-Lakeview, however, purchase of supplemental reuse water from WMARSS is recommended to reduce demands on water supplied by the City of Waco.

4C.24.10.2 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended for the City of Lacy-Lakeview:

- Purchase reuse water from WMARSS (Bellmead/Lacy-Lakeview Reuse). The reuse supply will reduce demands for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers

4C.24.10.3 Costs

Costs of the Recommended Plan for the City of Lacy-Lakeview

- a. Reuse Water Supply from WMARSS (Bellmead/Lacy-Lakeview Reuse)
 - Date to be Implemented: before 2010
 - Unit Cost: assumed unit cost of \$240/acft (\$0.74/1,000 gallons) for wholesale treated reuse water, including transmission costs
 - Annual Cost: \$269,000

**Table 4C.24-2.
Recommended Plan Costs by Decade for the City of Lacy-Lakeview**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	0	0	0	0	0	0
Reuse Water Supply (WMARSS Bellmead/Lacy-Lakeview Reuse)						
Supply From Plan Element (acft/yr)	1,121	1,121	1,121	1,121	1,121	1,121
Annual Cost (\$/yr)	\$269,000	\$269,000	\$269,000	\$269,000	\$269,000	\$269,000
Unit Cost (\$/acft)	\$240	\$240	\$240	\$240	\$240	\$240

4C.24.11 City of Lorena

4C.24.11.1 Description of Supply

The City of Lorena obtains its water supply from groundwater from the Trinity Aquifer and run-of-river rights. No shortages are projected for the City of Lorena, however, purchase of supplemental reuse water from WMARSS is recommended to reduce demands on water supplied by the run-of-river rights and groundwater from the Trinity Aquifer.

4C.24.11.2 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended for the City of Lorena:

- Purchase reuse water from WMARSS (Bull Hide Creek Reuse). The reuse supply will reduce demands for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers

4C.24.11.3 Costs

Costs of the Recommended Plan for the City of Lorena

a. Reuse Water Supply from WMARSS (Bull Hide Creek Reuse)

- Date to be Implemented: before 2010
- Unit Cost: assumed unit cost of \$798/acft (\$2.45/1,000 gallons) for wholesale treated reuse water, including transmission costs
- Annual Cost: \$357,000

**Table 4C.24-2.
Recommended Plan Costs by Decade for the City of Lorena**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	662	623	591	556	534	498
Reuse Water Supply (WMARSS Bull Hide Creek Reuse)						
Supply From Plan Element (acft/yr)	448	448	448	448	448	448
Annual Cost (\$/yr)	\$357,000	\$357,000	\$357,000	\$357,000	\$357,000	\$357,000
Unit Cost (\$/acft)	\$798	\$798	\$798	\$798	\$798	\$798

4C.24.18 City of Waco

The City of Waco obtains its water supply from surface water from Lake Waco, for which it owns water rights. The City supplies several neighboring communities and projected wholesale water sales are projected to cause a shortage before 2050. Refer to Section 4C.38.17 for the City’s plan as a Wholesale Water Provider. The City of Waco’s plan as a Wholesale Water Provider has been amended.

4C.38.17 City of Waco (Wholesale Water Provider)**4C.38.17.1 Description of Supply**

The City of Waco obtains its water supply from surface water from Lake Waco, in which it owns water rights, and from Lake Brazos on the Brazos River. The City supplies several neighboring communities and has sufficient water supply to meet its municipal and regional needs through the year 2030, but is projected to experience shortages prior to year 2050. The City has demonstrated a commitment to provide regional water supply in McLennan County, and could extend regional water supplies beyond the 2060 planning horizon by actively pursuing a reuse program. The City has recently entered into a contract to supply up to 16,000 acft of reuse water per year to LS Power to provide cooling water for steam electric power generation, and is exploring other potential reuse water sales.

4C.38.17.2 Water Supply Plan

The Brazos G RWPG recommends that the City of Waco continue to pursue direct and indirect reuse as a water management strategy in order to diversify and extend regional water supplies in the McLennan County area. Accordingly, the following water supply plan is recommended for the City of Waco:

- **Develop Reuse Supplies to Extend Lake Waco and Trinity Aquifer Supplies.**

4C.38.17.3 Costs

Costs of the Recommended Plan for the City of Waco.

- a. WMARSS Reuse Water Supply (Flat Creek Reuse):
 - Cost Source: Evaluation of strategy evaluation added through plan amendment, adjusted for cost of purchased water
 - Date to be Implemented: ongoing
- b. Other WMARSS Reuse Water Supply:
 - Cost Source: Volume II, Section 4B.3
 - Date to be Implemented: ongoing
 - Unit Cost: Unit costs range widely, depending upon quantity used and type of use:
 - \$1,025/acft (average) for small-quantity municipal irrigation use
 - \$111/acft for industrial use (steam-electric)
 - Based here on a projected average of \$200/acft.

**Table 4C.38-12.
 Recommended Plan Costs by Decade for the City of Waco**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	28,072	23,619	7,729	2,235	(4,612)	(11,941)
Reuse Water Supply (WMARSS Flat Creek Reuse)						
Supply From Plan Element (acft/yr) ¹	5,319	6,918	7,847	7,847	7,847	7,847
Annual Cost (\$/yr)	\$1,140,000	\$1,204,000	\$1,241,000	\$1,241,000	\$1,241,000	\$1,241,000
Unit Cost (\$/acft)	\$214.35	\$174.03	\$158.16	\$158.16	\$158.16	\$158.16
Other WMARSS Reuse Water Supply						
Supply From Plan Element ¹ (acft/yr)	--	--	420	1,817	2,705	3,995
Annual Cost (\$/yr)	--	--	\$84,000	\$363,500	\$541,000	\$798,900
Unit Cost (\$/acft)	--	--	\$200.00	\$200.00	\$200.00	\$200.00

¹ Remaining projected WMARSS flows available after meeting the demands of LS Power Station (Section 4B.3.1.9) and other WMARSS reuse projects.

WMARSS Bellmead/Lacy-Lakeview Reuse

Description of Option

The Waco Metropolitan Area Regional Sewerage System (WMARSS) is currently pursuing the development of a wastewater reuse system to supply reuse water to customers within the Cities of Bellmead and Lacy-Lakeview. This option consists of an integrated reuse project to deliver Type 1 reuse water from the existing WMARSS Central Wastewater Treatment Plant (WWTP) located southeast of Waco along the Brazos River. Treated reuse water would be transported to the industrial and municipal sectors of Bellmead and Lacy Lakeview. Locations of the WMARSS Central WWTP plant, and proposed transmission pipelines, ground storage tanks, and pump stations are shown in Figure 1.

The transmission system will be capable of delivering 2 MGD (2,242 acft/yr) of treated reuse water from the WMARSS Central WWTP. Supplies to the two cities is divided equally at 50% of the planned system capacity. This Type 1 reuse water may be utilized for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers.

Available Supply

The planned capacity of the WMARSS Bellmead/Lacy Lakeview Reuse project is 2 MGD (2,242 acft/yr).

Environmental Issues

Environmental impacts could include:

- Possible low impact on instream flows below discharge points due to reduced effluent return flow rates;
- Possible increased water quality to remaining stream flows; and
- Possible negative impact to fish and wildlife habitat with substantially reduced stream flows.

A summary of environmental issues is presented in Table 1.

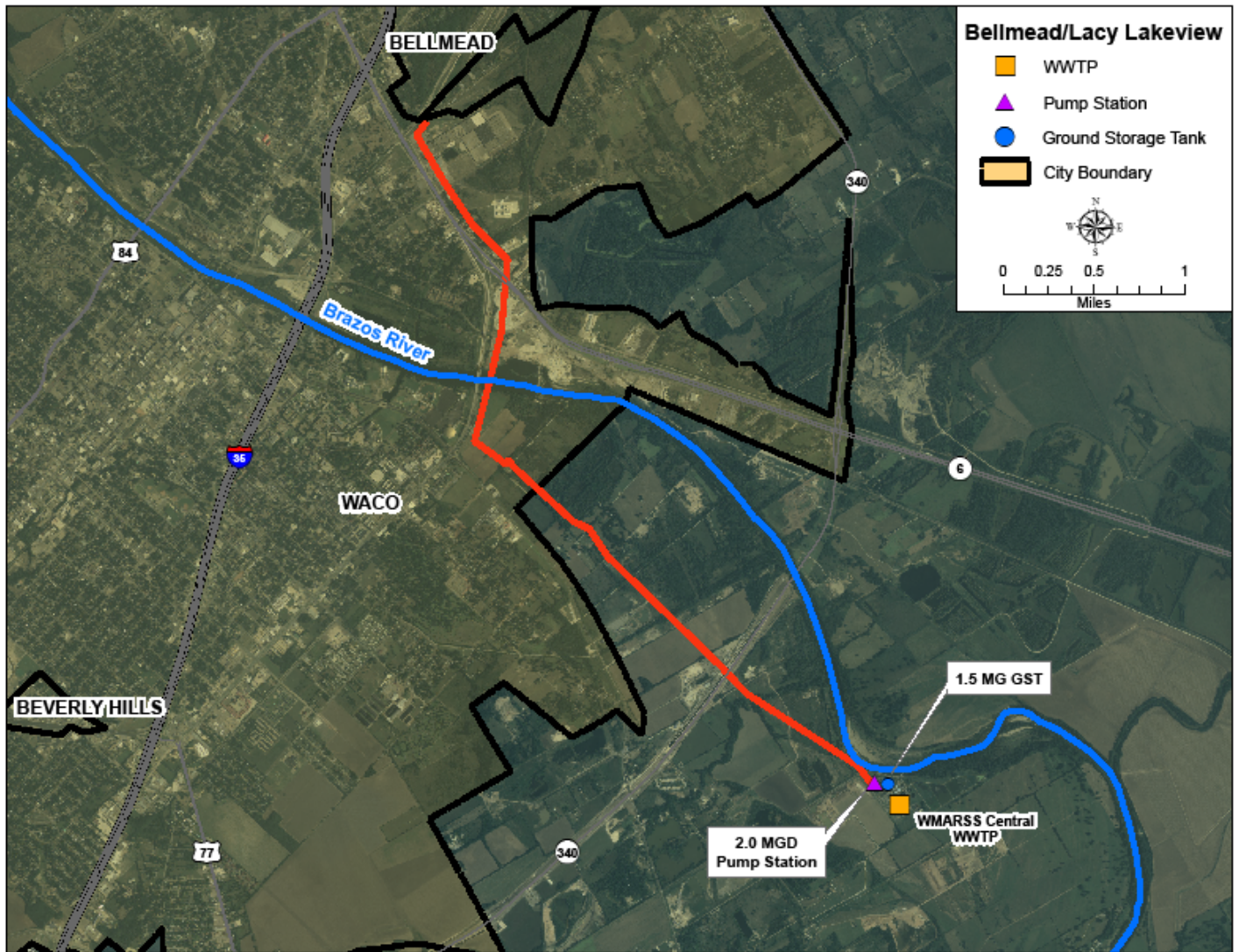


Figure 1. WMARSS Bellmead/Lacy-Lakeview Reuse

Table 1.
Environmental Issues: WMARSS Bellmead/Lacy-Lakeview Reuse

Implementation Measures	Development of additional wastewater treatment plant facilities, distribution pipelines, and pump stations
Environmental Water Needs / Instream Flows	Possible low impact on in-stream flows due to decreased effluent return flows; possible increased water quality to remaining stream flows
Bays and Estuaries	Possible low negative impact
Fish and Wildlife Habitat	Possible variable impacts depending on changes in volume of effluent return flows; possible negative impact to fish and wildlife habitat due to reduced stream flows
Cultural Resources	Possible low impact
Threatened and Endangered Species	Negligible impact
Comments	Assumes needed infrastructure will be in urbanized areas

Engineering and Costing

The required improvements to implement a wastewater reuse supply for Bellmead and Lacy-Lakeview are summarized in Table 2. The project requires a 2 MGD pump station along with a 1.5 MG storage tank located at the WMARSS Central WWTP. A 5 mile, 12-inch diameter pipe would deliver the reuse supply to the Bellmead city limits. Distribution lines not included in this cost estimate would deliver supply to Lacy-Lakeview and customers of the two cities.

Costs presented in Table 3 provide the total option costs for developing a wastewater reuse supply for Bellmead and Lacy-Lakeview. The project will have an estimated total capital cost of \$3,354,000 and an annual cost of \$538,000. This cost translates to a \$240 per acft or \$0.74 per 1,000 gallons unit cost of the reuse water.

The cost to each City for the use of the reclaimed water from the Bellmead/Lacy-Lakeview Project is shown in Table 4. The costs are divided between the cities based on the quantity of water supplied to each.

Table 2.
Required Facilities – WMARSS Bellmead/Lacy-Lakeview Reuse

Facility	Description
Pump Stations	124 HP at WMARSS Central WWTP; 2 MGD capacity to deliver at uniform rate to Bellmead
Storage Tanks	1.5 MG; balancing storage at WMARSS Central WWTP
Pipelines	51,000 ft of 20-inch pipe; from WMARSS Central WWTP to I-35 Pump Station
Available Project Yield	2.0 MGD (2,242 acft/yr); total yield for all Bellmead/Lacy-Lakeview projects supplied

Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 5, and the option meets each criterion. Before pursuing wastewater reuse, the WMARSS entities will need to investigate concerns that would include at a minimum:

- Amount and timing of treated effluent available.
- Potential users, primarily individual large-scale users that could utilize non-potable water (e.g., certain industries) and irrigated lands (e.g., golf courses and park areas).
- Capital costs of constructing needed distribution systems connecting the transmission facilities to the ultimate points of end use.

Supply of reuse wastewater requires a TCEQ permit. Requirements specific to pipelines needed to link wastewater treatment facilities to reuse water users may include:

- TCEQ authorization to reuse domestic wastewater under 30 TAC Chapter 210 (“210 authorization”);
- U.S. Army Corps of Engineers Section 404 permit(s) for pipeline stream crossings; discharges of fill into wetlands and waters of the United States 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.

Table 3.
Cost Estimate Summary
WMARSS Bellmead/Lacy Lakeview Reuse
Second Quarter 2002 Prices

<i>Item</i>	<i>Estimated Costs for Facilities</i>
Capital Costs	
Pump Station (2.0 MGD)	\$817,000
Ground Storage Tank (1.5 MG)	\$780,000
Transmission Pipeline (12 in dia., 5 miles)	\$1,757,000
Total Capital Cost	\$3,354,000
Engineering, Legal Costs and Contingencies	\$1,086,000
Environmental & Archaeology Studies and Mitigation	\$121,000
Land Acquisition and Surveying (22 acres)	\$169,000
Interest During Construction (1 year)	<u>\$190,000</u>
Total Project Cost	\$4,920,000
Annual Costs	
Debt Service (6 percent, 30 years)	\$357,000
Operation and Maintenance	
Intake, Pipeline, Pump Station	\$46,000
Pumping Energy Costs (770,073 kW-hr @ 0.06 \$/kW-hr)	\$46,000
Purchase of Water (2,242 acft/yr @ 39.75 \$/acft)	<u>\$89,000</u>
Total Annual Cost	\$538,000
Available Project Yield (acft/yr)	2,242
Annual Cost of Water (\$ per acft)	\$240
Annual Cost of Water (\$ per 1,000 gallons)	\$0.74

Table 4.
Cost to each City
WMARSS Bellmead and Lacy-Lakeview Reuse

City	Reuse Water Demand (acft/yr)	Unit Cost (\$/acft)	Annual Cost (\$/yr)
City of Bellmead	1,121	\$240	\$269,000
City of Lacy Lakeview	1,121	\$240	\$269,000
Total	2,242		\$538,000

Table 5.
Comparison of WMARSS Bellmead/Lacy-Lakeview Reuse Option to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient for intended uses 2. Highly reliable 3. Reasonable
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Reduces instream flows—possible low impact 2. Possible low impact 3. None or low impact 4. None or low impact
C. Impact on Other State Water Resources	• No apparent negative impacts on state water resources; benefit accrues to demand centers by more efficient use of available water supplies; no effect on navigation
D. Threats to Agriculture and Natural Resources	• Generally positive effect to agriculture and natural resources by avoiding need for new supplies
E. Equitable Comparison of Strategies Deemed Feasible	• Option is considered to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	• Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	• Could offset the need for voluntary redistribution of other supplies

WMARSS Bull Hide Creek Reuse

Description of Option

The Waco Metropolitan Area Regional Sewerage System (WMARSS) is currently pursuing the development of a wastewater reuse system to supply reuse water to customers within the Cities of Hewitt and Lorena. This option consists of an integrated reuse project to deliver Type 1 reuse water from the proposed WMARSS Bull Hide Creek Wastewater Treatment Plant located approximately 1.2 miles southeast of I-35 on Bull Hide Creek. Treated reuse water from this satellite plant would be transported to the industrial and municipal sectors of Hewitt and Lorena. Locations of the proposed reuse treatment plant, transmission pipelines, ground storage tanks, and pump stations are shown in Figure 1.

The potential reuse water demand for the City of Hewitt and Lorena is based upon hydraulic constraints of the transmission system. The transmission system will be capable of delivering 1.5 MGD (1,681 acft/yr) of treated reuse water from the proposed WMARSS Bull Hide Creek WWTP. The planned system provides Hewitt with 1,233 acft/yr (1.1 MGD) of reuse water and 448 acft/yr (0.4 MGD) of reuse water to Lorena. This Type 1 reuse water may be utilized for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers.

Available Supply

The planned capacity for the WMARSS Bull Hide Creek WWTP is 1.5 MGD (1,681 acft/yr).

Environmental Issues

Environmental impacts could include:

- Possible low impact on instream flows below discharge points due to reduced effluent return flow rates;
- Possible increased water quality to remaining stream flows; and
- Possible negative impact to fish and wildlife habitat due to reduced stream flows.

A summary of environmental issues is presented in Table 1.

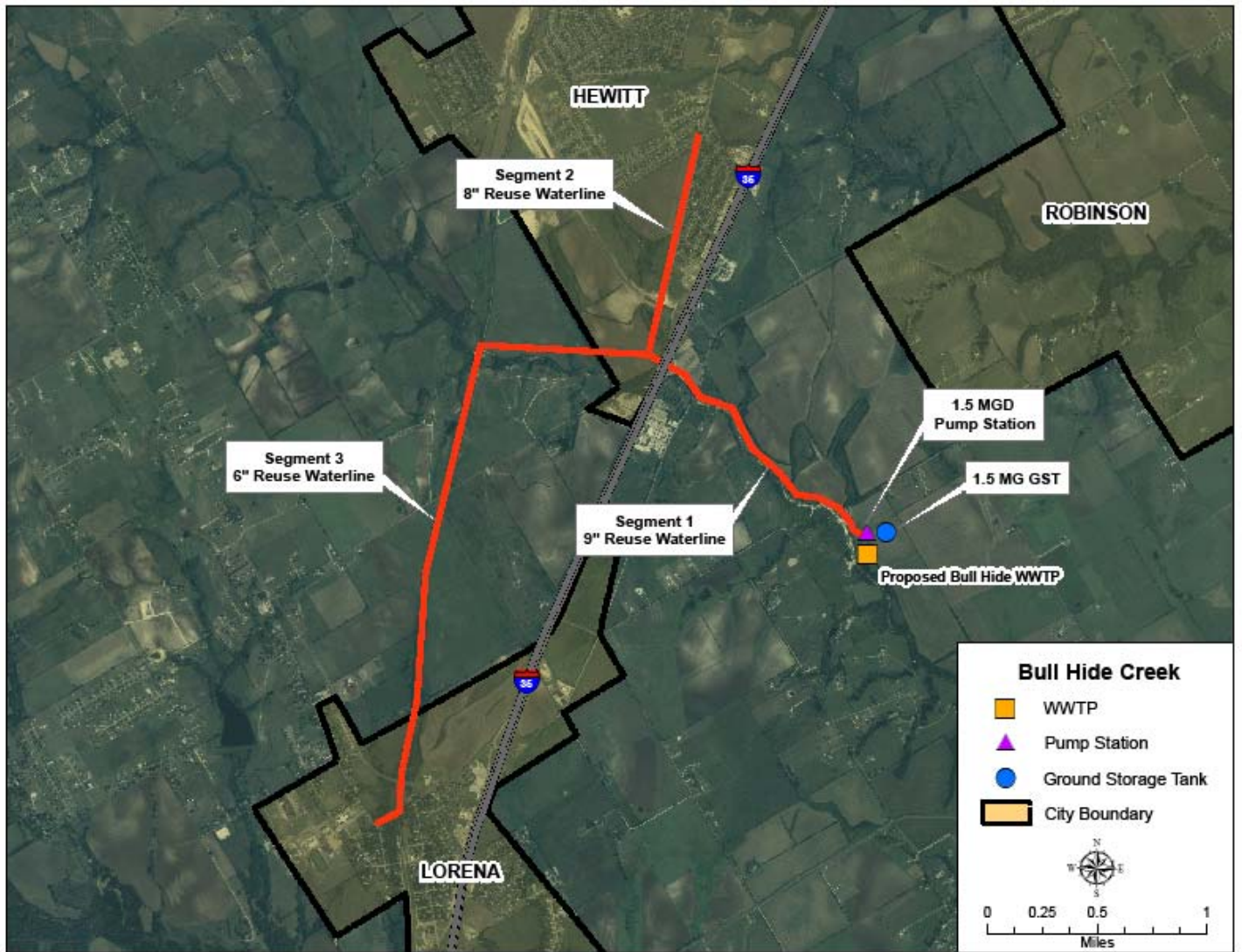


Figure 1. WMARSS Bull Hide Creek Reuse

Table 1.
Environmental Issues: WMARSS Bull Hide Creek Reuse

Implementation Measures	Development of additional wastewater treatment plant facilities, distribution pipelines, and pump stations
Environmental Water Needs / Instream Flows	Possible low impact on in-stream flows due to decreased effluent return flows; possible increased water quality to remaining stream flows
Bays and Estuaries	Possible low negative impact
Fish and Wildlife Habitat	Possible variable impacts depending on changes in volume of effluent return flows; possible negative impact to fish and wildlife habitat due to reduced stream flows
Cultural Resources	Possible low impact
Threatened and Endangered Species	Negligible impact
Comments	Assumes needed infrastructure will be in urbanized areas

Engineering and Costing

The required improvements to implement a wastewater reuse supply for Hewitt and Lorena are summarized in Table 2. The project requires a 1.5 MGD pump station along with a 1.5 MG storage tank located at the proposed WMARSS Bull Hide Creek WWTP site. The transmission pipeline system is separated into three separate components. The first segment is a 9-inch pipe capable of transporting 1.5 MGD of reuse water from the proposed WWTP site. Segment 2 is an 8-inch pipe that splits off from the main line to provide reuse water to the City of Hewitt. Segment 2 is capable of delivering 1.1 MGD based on hydraulic constraints of the system. Segment 3 transports the remaining 0.4 MGD of reuse water through a 6-inch pipe to the City of Lorena.

Costs presented in Table 3 provide the total option costs for developing a wastewater reuse supply for Hewitt and Lorena. The project will have an estimated total capital cost of \$11,207,000 and an annual cost of \$1,341,000. This cost translates to a \$798 per acft or \$2.45 per 1,000 gallons unit cost of the reuse water.

The cost to each City for the use of the reclaimed water from the Bull Hide Creek WWTP is shown in Table 4. The costs are divided between the cities based on the quantity of water supplied to each.

Table 2.
Required Facilities – WMARSS Bull Hide Creek Reuse

Facility	Description
WWTP	1.5 MGD proposed WMARSS Bull Hide Creek WWTP
Pump Stations	129 HP at proposed WMARSS Bull Hide Creek WWTP; 1.5 MGD capacity to deliver at uniform rate to Hewitt and Lorena
Storage Tanks	1.5 MG; balancing storage at WMARSS Central WWTP
Pipelines	Segment 1; 1.3 miles of 9-inch pipe; from proposed WMARSS Bull Hide Creek WWTP to Segment 2/Segment 3 intersection Segment 2; 1.0 mile of 8-inch pipe; from Segment 1 intersection to Hewitt Segment 3; 3.0 miles of 6-inch pipe from Segment 1 intersection to Lorena
Available Project Yield	1.5 MGD (1,681 acft/yr); total yield for all Hewitt and Lorena projects supplied

Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 5, and the option meets each criterion. Before pursuing wastewater reuse, the WMARSS entities will need to investigate concerns that would include at a minimum:

- Amount and timing of treated effluent available.
- Potential users, primarily individual large-scale users that could utilize non-potable water (e.g., certain industries) and irrigated lands (e.g., golf courses and park areas).
- Capital costs of constructing needed distribution systems connecting the treatment and transmission facilities to the ultimate points of end use.

Supply of reuse wastewater requires a TCEQ permit. Requirements specific to pipelines needed to link wastewater treatment facilities to reuse water users may include:

- TCEQ authorization to reuse domestic wastewater under 30 TAC Chapter 210 (“210 authorization”);
- U.S. Army Corps of Engineers Section 404 permit(s) for pipeline stream crossings; discharges of fill into wetlands and waters of the United States 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.

Table 3.
Cost Estimate Summary
WMARSS Bull Hide Creek Reuse
Second Quarter 2002 Prices

<i>Item</i>	<i>Estimated Costs for Facilities</i>
Capital Costs	
Waste Water Treatment Plant (1.5 MGD)	\$8,534,000
Intake and Pump Station (1.5 MGD)	\$817,000
Ground Storage Tank (1.5 MG)	\$780,000
Segment 1 Transmission Pipeline (9 in dia., 1.3 miles)	\$383,000
Segment 2 Transmission Pipeline (8 in dia., 1.0 miles)	\$177,000
Segment 3 Transmission Pipeline (6 in dia., 3.0 miles)	<u>\$516,000</u>
Total Capital Cost	\$11,207,000
Engineering, Legal Costs and Contingencies	\$3,869,000
Environmental & Archaeology Studies and Mitigation	\$139,000
Land Acquisition and Surveying (25 acres)	\$192,000
Interest During Construction (1 years)	<u>\$617,000</u>
Total Project Cost	\$16,024,000
Annual Costs	
Debt Service (6 percent, 30 years)	\$1,164,000
Operation and Maintenance	
Intake, Pipeline, Pump Station	\$39,000
Water Treatment Plant	\$23,000
Pumping Energy Costs (802,985 kW-hr @ 0.06 \$/kW-hr)	\$48,000
Purchase of Water (1,681 acft/yr @ 39.75 \$/acft)	<u>\$67,000</u>
Total Annual Cost	\$1,341,000
Available Project Yield (acft/yr)	1,681
Annual Cost of Water (\$ per acft)	\$798
Annual Cost of Water (\$ per 1,000 gallons)	\$2.45

Table 4.
Cost to each City
WMARSS Bull Hide Creek Reuse

City	Reuse Water Demand (acft/yr)	Unit Cost (\$/acft)	Annual Cost (\$/yr)
City of Hewitt	1,233	\$798	\$984,000
City of Lorena	448	\$798	\$357,000
Total	1,681		\$1,341,000

Table 5.
Comparison of WMARSS Bull Hide Creek Reuse Option to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient for intended uses 2. Highly reliable 3. Reasonable
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Reduces instream flows—possible low impact 2. Possible low impact 3. None or low impact 4. None or low impact
C. Impact on Other State Water Resources	• No apparent negative impacts on state water resources; benefit accrues to demand centers by more efficient use of available water supplies; no effect on navigation
D. Threats to Agriculture and Natural Resources	• Generally positive effect to agriculture and natural resources by avoiding need for new supplies
E. Equitable Comparison of Strategies Deemed Feasible	• Option is considered to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	• Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	• Could offset the need for voluntary redistribution of other supplies

WMARSS Flat Creek Reuse

Description of Option

The Waco Metropolitan Area Regional Sewerage System (WMARSS) is currently pursuing the development of a wastewater reuse system to supply reuse water to customers within the City of Waco. This option consists of an integrated reuse project to deliver Type 1 reuse water from the existing WMARSS Central Wastewater Treatment Plant located southeast of Waco along the Brazos River. Treated reuse water from the WMARSS Central WWTP would be transported to the industrial and municipal sectors of Waco and the Cottonwood Creek Golf Course. Locations of the existing reuse treatment plant, and proposed transmission pipelines, ground storage tanks, and pump stations are shown in Figure 1.

The potential reuse water demand for the City of Waco is assumed to be the entire amount of available yield (7,847 acft/yr) from the WMARSS Central WWTP. This Type 1 reuse water may be utilized for landscape irrigation at existing or future parks, schools, ball fields, and other green spaces. Reuse water may also potentially supply existing or future industrial customers. The transmission system will be capable of delivering 7 MGD (7,847 acft/yr) of treated reuse water from the WMARSS Central WWTP.

Available Supply

The WMARSS system will supply 16,000 acft/yr (14.3 MGD) of the treated effluent from the WMARSS system to the Sandy Creek Project (LS Power) (Section 4B.3.1.9 of the 2006 Plan). An additional 3,920 acft/yr (3.5 MGD) would be supplied through the Bullhide Creek and Bellmead/Lacy Lakeview reuse projects. The Year 2000 estimated effluent from WMARSS is 24,575 acft/yr (21.92 MGD) (Table 3.2-1 of the 2006 Plan). The Year 2060 estimated effluent from WMARSS is 31,779 acft/yr (28.4 MGD) (Section 4B.3 of the 2006 Plan). Assuming simultaneous implementation of the other reuse projects, potential available supply from the Flat Creek Reuse Project would be 5,319 acft/yr in 2010, 6,918 acft/yr in 2020, and the full 7,847 acft/yr (7 MGD) capacity sometime prior to 2030.

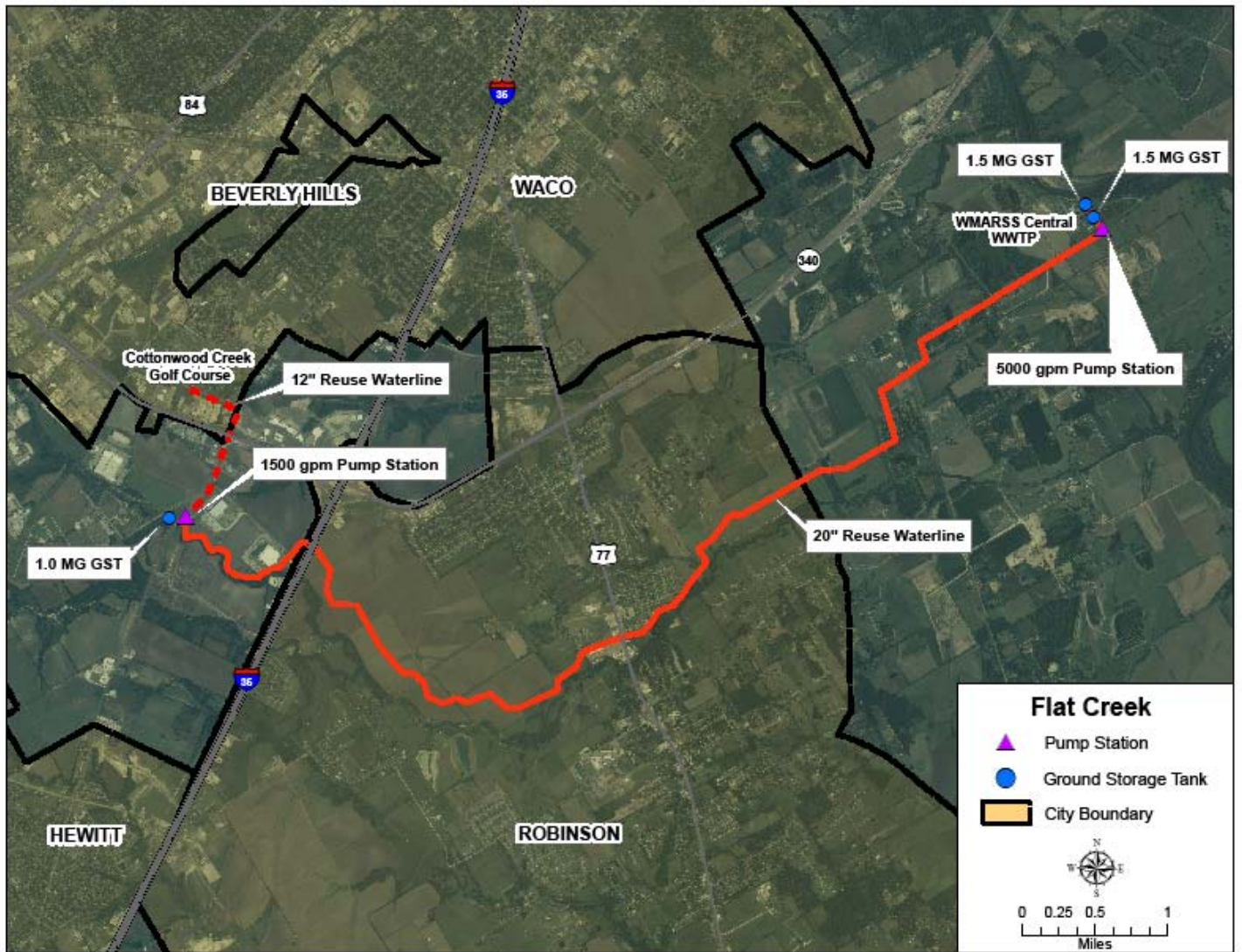


Figure 1. WMARSS Flat Creek Reuse

Environmental Issues

Environmental impacts could include:

- Possible low impact on instream flows below discharge points due to reduced effluent return flow rates;
- Possible increased water quality to remaining stream flows; and
- Possible negative impact to fish and wildlife habitat due to reduced stream flows.

A summary of environmental issues is presented in Table 1.

Table 1.
Environmental Issues: WMARSS Flat Creek Reuse

Implementation Measures	Development of additional wastewater treatment plant facilities, distribution pipelines, and pump stations
Environmental Water Needs / Instream Flows	Possible low impact on in-stream flows due to decreased effluent return flows; possible increased water quality to remaining stream flows
Bays and Estuaries	Possible low negative impact
Fish and Wildlife Habitat	Possible variable impacts depending on changes in volume of effluent return flows; possible negative impact to fish and wildlife habitat due to reduced stream flows
Cultural Resources	Possible low impact
Threatened and Endangered Species	Negligible impact
Comments	Assumes needed infrastructure will be in urbanized areas

Engineering and Costing

The required improvements to implement a wastewater reuse supply for Waco are summarized in Table 2. The project requires a 7 MGD pump station along with two 1.5 MG storage tanks located at the WMARSS Central WWTP. A 51,000 ft, 20-inch diameter pipe connects the pump station to a 1 MG storage tank located west of I-35. Distribution lines to connect the 20-inch pipeline to industrial customers within the City of Waco are not included in this cost estimate. At the I-35 site, a 1500 gpm pump station would deliver up to 2 MGD of reuse water through a 6,720 ft, 12-inch diameter pipe to Cottonwood Creek Golf Course for irrigation purposes.

Table 2.
Required Facilities – WMARSS Flat Creek Reuse

Facility	Description
Pump Stations	5000 gpm at WMARSS Central WWTP; 7 MGD capacity to deliver at uniform rate to Waco and Storage Tanks at I-35 Pump Station 1500 gpm at I-35 Site; 2 MGD capacity to deliver at uniform rate to Cottonwood Creek Golf Course
Storage Tanks	2, 1.5 MG tanks to provide balancing storage at WMARSS Central WWTP 1 MG tank to provide balancing storage at I-35 Pump Station
Pipelines	51,000 ft of 20-inch pipe; from WMARSS Central WWTP to I-35 Pump Station 6,720 ft of 12-in pipe; from I-35 Pump Station to Cottonwood Creek Golf Course
Available Project Yield	7.0 MGD (7,847 acft/yr); total yield for all Flat Creek projects supplied

Costs presented in Table 3 provide the total option costs for developing a wastewater reuse supply for Waco and Cottonwood Creek Golf Course. The project will have an estimated total capital cost of \$6,298,000 and an annual cost of \$1,241,000. This cost translates to a \$158.15 per acft or \$0.49 per 1,000 gallons unit cost of the reuse water, upon utilization of the full 7 MGD (7,847 acft/yr).

Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 4, and the option meets each criterion. Before pursuing wastewater reuse, the WMARSS entities will need to investigate concerns that would include at a minimum:

- Amount and timing of treated effluent available.
- Potential users, primarily individual large-scale users that could utilize non-potable water (e.g., certain industries) and irrigated lands (e.g., golf courses and park areas).
- Capital costs of constructing needed distribution systems connecting the treatment facilities to the areas of reuse.

Supply of reuse wastewater requires a TCEQ permit. Requirements specific to pipelines needed to link wastewater treatment facilities to reuse water users may include:

- TCEQ authorization to reuse domestic wastewater under 30 TAC Chapter 210 (“210 authorization”);
- U.S. Army Corps of Engineers Section 404 permit(s) for pipeline stream crossings; discharges of fill into wetlands and waters of the United States 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.

**Table 3.
Cost Estimate Summary
WMARSS Flat Creek Reuse
Second Quarter 2002 Prices**

<i>Item</i>	<i>Estimated Costs for Facilities 2Q 2002 Prices</i>
Intake and Pump Station @ WMARSS (3,000 gpm)	\$1,126,000
Ground Storage Tank @ WMARSS (1.5 MG)	\$684,000
Transmission Pipeline (20 in dia., 51,000 feet)	\$2,087,000
Transmission Pipeline (12 in dia., 6,720 feet)	\$332,000
Pump Station @ I-35 (1,500 gpm)	\$805,000
Second Ground Storage Tank @ WMARSS (1.5 MG)	\$684,000
Ground Storage Tank @ I-35 (1 MG)	<u>\$580,000</u>
Total Capital Cost	\$6,298,000
Engineering, Legal Costs and Contingencies	\$2,084,000
Environmental & Archaeology Studies and Mitigation	\$36,000
Land Acquisition and Surveying (13 acres)	\$49,000
Interest During Construction (1 years)	<u>\$339,000</u>
Total Project Cost	\$8,806,000
Annual Costs	
Debt Service (6 percent, 30 years)	\$640,000
Operation and Maintenance	
Intake, Pipeline, Pump Station	\$86,000
Pumping Energy Costs (3,384,493 kW-hr @ 0.06 \$/kW-hr)	\$203,000
Purchase of Water (7,847 acft/yr @ 39.75 \$/acft)	<u>\$312,000</u>
Total Annual Cost	\$1,241,000
Available Project Yield (acft/yr)	7,847
Annual Cost of Water (\$ per acft)	\$158.16
Annual Cost of Water (\$ per 1,000 gallons)	\$0.49

Table 4.
Comparison of Flat Creek Reuse Option to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient for intended uses 2. Highly reliable 3. Reasonable
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Reduces instream flows—possible low impact 2. Possible low impact 3. None or low impact 4. None or low impact
C. Impact on Other State Water Resources	<ul style="list-style-type: none"> No apparent negative impacts on state water resources; benefit accrues to demand centers by more efficient use of available water supplies; no effect on navigation
D. Threats to Agriculture and Natural Resources	<ul style="list-style-type: none"> Generally positive effect to agriculture and natural resources by avoiding need for new supplies
E. Equitable Comparison of Strategies Deemed Feasible	<ul style="list-style-type: none"> Option is considered to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	<ul style="list-style-type: none"> Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	<ul style="list-style-type: none"> Could offset the need for voluntary redistribution of other supplies