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Kent
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Lampasas
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Limestone
McLennan
Milam
Nolan
Palo Pinto
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Shackelford
Somervell
Stephens
Stonewall
Taylor
Throckmorton
Washington
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BRAZOS RIVER AUTHORITY, Administrative Agent
P.O. Box 7555 v Waco, Texas 76714-7555
(254) 761-3100 v Fax (254) 761-3204

August 16, 2017

To: Interested Parties

Re: Amendment to the 2016 Brazos G Regional Water Plan to Include City of Waco Supply to City of Riesel and McLennan County-Other Entities and for Arsenic Mitigation

The Brazos G Regional Water Planning Group hereby amends the 2016 Brazos G Regional Water Plan as follows:

1. City of Waco to supply treated water to the City of Riesel and McLennan County-Other to mitigate arsenic contamination.

The City of Waco will supply 1,407 acre-feet per year of treated water from Lake Waco to the City of Riesel and several utilities included in McLennan County-Other to mitigate high arsenic levels in those entities' existing groundwater supplies. Projects include a regional system to supply water from the City of Waco water distribution system to the City of Riesel and the McLennan County-Other utilities, and upgrades to the City of Waco distribution system that are necessary to deliver water to the take points of the regional system.

2. Change the recommended water management strategy "Upgrade Treatment for Arsenic" to be an alternative strategy for McLennan County-Other.

This amendment does not change the water management strategy "Upgrade Treatment for Arsenic" recommended for County-Other utilities in Falls, Hill and Limestone Counties.

This amendment necessitates updates to Section 4.3 Water Needs for Wholesale Water Providers, changes to the water supply plans for the City of Riesel (Section 5.24.16) and McLennan County-Other (Section 5.24.22), incorporating additional projects for the City of Waco (Section 5.38.28), updates to Section 5.39 Summary of Recommended Water Management Strategies, incorporation of additional miscellaneous water management strategies and projects to Volume II Section 12.4.10, and modification to the table of contents to reflect these changes.

The Brazos G Regional Water Planning Group received one public comment via email to the planning group's technical consultant, and that comment has been addressed in this amendment package.

The revised pages in the plan and the public comment are attached.



4.3.26 City of Waco

The City of Waco obtains raw water from Lake Waco, from a diversion authorized from Lake Brazos, and a small amount of groundwater from the Trinity Aquifer. In 2003, the City, in cooperation with the BRA and the U.S. Army Corps of Engineers, implemented a project to raise the water level in Lake Waco to provide for additional supply. With this additional supply, the City has the right to divert 79,870 acft/yr from Lake Waco for municipal, industrial, and irrigation uses. The City provides treated water to multiple neighboring communities and water supply corporations. The Waco Metropolitan Area Regional Sewerage System (WMARSS) facility is operated by the City of Waco on behalf of the member cities of Bellmead, Hewitt, Lacy Lakeview, Lorena, Robinson and Woodway. Effluent from the WMARSS is used to supply steam-electric cooling supply, and multiple other reuse projects are planned to offset potable water use for manufacturing and landscape irrigation in McLennan County. Projected demands, supplies and balances are shown in Table 4.3-26.

Table 4.3-26. Projected Demands, Supplies and Balance for City of Waco

<i>Projected Demands</i> <i>Major Water Contract Holders</i>	<i>Year (acft/yr)</i>					
	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>	<i>2070</i>
<u>Fresh Water Demands</u>						
City of Waco ¹	30,114	29,344	28,224	27,059	26,921	28,333
City of Bellmead ²	0	0	0	0	0	0
City of Hewitt ²	383	558	877	1,198	1,519	1,833
City of Lacy-Lakeview	1,120	1,120	1,120	1,120	1,120	1,120
City of Woodway ²	431	657	859	1,083	1,316	1,548
City of Beverly Hills ²	252	261	268	281	297	312
City of West	1,120	1,120	1,120	1,120	1,120	1,120
City of Robinson	560	560	560	560	560	560
Bold Springs Water Supply (McLennan C-O)	560	560	560	560	560	560
Hilltop Water Supply (McLennan C-O)	97	97	97	97	97	97
Central Bosque WSC (McLennan C-O)	70	70	70	70	70	70
McLennan County Manufacturing	2,503	2,888	3,249	3,618	3,948	4,403
Cross County WSC (Recommended Strategy)				150	150	150
City of Mart (Recommended Strategy)	250	250	250	250	250	250
North Bosque WSC (Recommended Strategy)		200	200	200	200	200
City of Riesel (Recommended Strategy)	78	78	78	78	80	82
McLennan County-Other (Recommended Strategy)³						
Axtell WSC	135	146	156	168	180	194
Birome WSC - Plant 5 Only	14	15	16	17	18	19
Elk Oak Lake WSC	163	178	194	212	232	253
H & H WSC	252	252	252	252	252	252
Leroy-Tours-Gerald WSC	79	86	94	102	111	121
Moore Water System	40	40	41	41	41	42
Meier Settlement WSC	16	16	16	16	16	16
Prairie Hill WSC	189	199	209	220	232	244
Riesel-Meier Settlement WSC	84	98	115	135	158	184
Total Fresh Water Demands	38,510	38,793	38,625	38,607	39,448	41,963

2016 Brazos G Regional Water Plan | Volume I
 Comparison of Water Demands with Water Supplies to Determine Needs

<u>Reuse Water Demands</u>						
McLennan County SE (SCEA)	15,000	15,000	15,000	15,000	15,000	15,000
City of Bellmead (Bellmead/Lacy-Lakeview)	1,120	1,120	1,120	1,120	1,120	1,120
City of Hallsburg (Waco East)	31	31	31	31	31	31
City of Hewitt (Bullhide Creek)	1,223	1,223	1,223	1,223	1,223	1,223
City of Lacy-Lakeview (Bellmead/Lacy-Lakeview)	1,120	1,120	1,120	1,120	1,120	1,120
City of Lorena (Bullhide Creek)	448	448	448	448	448	448
City of Mart (Waco East)	134	134	134	134	134	134
City of Riesel (Alternative: Waco East)	43	43	43	43	43	43
McLennan County Manufacturing (Flat Creek)	1,600	1,700	1,800	2,000	2,200	2,500
McLennan County Mining (North Reuse)	811	811	811	811	811	811
Total Reuse Water Demands	21,530	21,630	21,730	21,930	22,130	22,430

1 – Demand includes any conservation applied to the City’s municipal demands as a WUG.

2 – Contract to provide supplies to meet needs less assumed conservation has been applied to the entity.

3 – Supplies to smaller utilities included in McLennan County-Other per 2017 amendment of 2016 Brazos G Plan to incorporate the McLennan County Arsenic Mitigation Plan.

Supply Source	Year (acft/yr)					
	2020	2030	2040	2050	2060	2070
<u>Fresh Water Supplies</u>						
Lake Waco (Municipal & Industrial)	79,877	79,877	79,877	79,877	79,877	79,877
Lake Brazos	5,600	5,600	5,600	5,600	5,600	5,600
Total Fresh Water Supplies	85,477	85,477	85,477	85,477	85,477	85,477
Constrained Fresh Water Supply¹	50,400	50,400	50,400	50,400	50,400	50,400
<u>Reuse Water Supplies (WMARSS)</u>						
McLennan County SE (SCEA)	15,000	15,000	15,000	15,000	15,000	15,000
Undeveloped WMARSS Reuse Supply	12,035	13,902	15,769	17,636	19,503	21,370
Total Reuse Supply from WMARSS²	27,035	28,902	30,769	32,636	34,503	36,370

1 – Fresh water supply has been constrained based on average annual capacity of the existing Waco treatment plant. The average annual capacity is determined as 50% of the normal rated design capacity (90 MGD).

2 – Reuse supplies are based on projected WMARSS plant flows.

Projected Balance	Year (acft/yr)					
	2020	2030	2040	2050	2060	2070
Fresh Water Balance/(Shortage)	11,890	11,607	11,775	11,793	10,952	8,437
Reuse Water Balance/(Shortage)	5,505	7,272	9,039	10,706	12,373	13,940

Table 4.3-27. WWP Projected Contract Water Use by Type, County and Basin

Buyer/Use	County	Basin	Year					
			2020	2030	2040	2050	2060	2070
PALO PINTO COUNTY MWD No. 1 TOTAL			5,355	5,181	5,355	5,181	5,007	4,833
ROUND ROCK								
MANUFACTURING	WILLIAMSON	BRAZOS	565	651	780	924	1,059	1,205
MINING	WILLIAMSON	BRAZOS	3	3	3	3	3	3
MUNICIPAL	WILLIAMSON	BRAZOS	3,916	4,199	4,572	5,290	6,315	7,370
MUNICIPAL	WILLIAMSON	COLORADO	165	195	235	373	457	552
ROUND ROCK TOTAL			4,649	5,048	4,649	5,048	5,590	6,590
STAMFORD								
MUNICIPAL	HASKELL	BRAZOS	160	160	160	160	160	160
MUNICIPAL	JONES	BRAZOS	89	89	89	89	89	89
STEAM- ELECTRIC	HASKELL	BRAZOS	2,200	2,200	2,200	2,200	2,200	2,200
STAMFORD TOTAL			2,449	2,449	2,449	2,449	2,449	2,449
SWEETWATER								
MANUFACTURING	NOLAN	BRAZOS	368	368	368	368	368	368
MUNICIPAL	FISHER	BRAZOS	538	533	528	525	521	519
MUNICIPAL	NOLAN	BRAZOS	272	277	282	285	289	291
MUNICIPAL	TAYLOR	BRAZOS	187	187	187	187	187	187
SWEETWATER TOTAL			1,365	1,365	1,365	1,365	1,365	1,365
TEMPLE								
MANUFACTURING	BELL	BRAZOS	481	481	481	481	481	481
MUNICIPAL	BELL	BRAZOS	3,540	3,540	3,540	3,540	3,540	3,540
TEMPLE TOTAL			4,021	4,021	4,021	4,021	4,021	4,021
UPPER LEON MWD								
MUNICIPAL	COMANCHE	BRAZOS	996	985	972	910	893	867
MUNICIPAL	EASTLAND	BRAZOS	169	168	166	156	153	149
MUNICIPAL	ERATH	BRAZOS	2,383	2,366	2,344	2,234	2,206	2,160
MUNICIPAL	HAMILTON	BRAZOS	673	665	654	599	584	562
UPPER LEON MWD TOTAL			4,221	4,184	4,221	4,184	4,136	3,899
WACO								
MANUFACTURING	MCLENNAN	BRAZOS	2,503	2,888	3,249	3,618	3,948	4,403
MUNICIPAL	MCLENNAN	BRAZOS	5,498	5,966	6,557	7,185	7,834	8,482
STEAM- ELECTRIC	MCLENNAN	BRAZOS	15,000	15,000	15,000	15,000	15,000	15,000
WACO TOTAL			23,001	23,854	24,806	25,803	26,782	27,885



Table 5.24-11. Recommended Plan Costs by Decade for North Bosque WSC

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) (acft/yr)</i>	(14)	(146)	(265)	(385)	(507)	(628)
Conservation						
Supply From Plan Element (acft/yr)	33	99	183	280	390	452
Annual Cost (\$/yr)	\$16,476	\$49,108	\$90,667	\$138,754	\$193,295	\$224,365
<i>Projected Surplus/(Shortage) after Conservation (acft/yr)</i>	20	(47)	(82)	(105)	(117)	(175)
Purchase Water Supply from City of Waco						
Supply From Plan Element (acft/yr)	—	200	200	200	200	200
Annual Cost (\$/yr)	—	\$465,000	\$465,000	\$281,000	\$281,000	\$281,000
Unit Cost (\$/yr)	—	\$2,325	\$2,325	\$1,405	\$1,405	\$1,405

5.24.16 City of Riesel

Description of Supply

The City of Riesel obtains its water supply from the Trinity Aquifer. Based on the available groundwater supply, the City of Riesel is projected to have a shortage through the year 2070.

Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water management strategies are recommended for the City of Riesel. Associated costs are included for each strategy.

a. Additional Purchase from RMS WSC

- Cost Source: Volume II, Chapter 12
- Date to be Implemented: 2020
- Annual Cost: \$19,540
- Unit Cost: \$977/acft (RMS WSC wholesale water rate)

b. Purchase Supply from City of Waco (McLennan County Arsenic Mitigation)

- Cost Source: Volume II, Chapter 12.4
- Date to be Implemented: 2020
- Project Cost: \$1,000,000
- Unit Cost: \$2,179/acft

c. Alternative: Purchase reuse water from WMARSS (Waco East 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.

- Cost Source: Volume II, Chapter 3
- Date to be Implemented: 2020
- Project Cost:\$348,000 (City's portion)
- Unit Cost: \$869/acft

Conservation was also considered; however, the entity's current per capita use rate is below the selected target rate of 140 gpcd.

Table 5.24-12. Recommended Plan Costs by Decade for City of Riesel

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) (acft/yr)</i>	(11)	(11)	(11)	(12)	(15)	(19)
Conservation						
Supply From Plan Element (acft/yr)	—	—	—	—	—	—
Annual Cost (\$/yr)	—	—	—	—	—	—
<i>Projected Surplus/(Shortage) after Conservation</i>	(11)	(11)	(11)	(12)	(15)	(19)
Purchase Water Supply from RMS WSC						
Supply From Plan Element (acft/yr)	20	20	20	20	20	20
Annual Cost (\$/yr)	\$19,540	\$19,540	\$19,540	\$19,540	\$19,540	\$19,540
Unit Cost (\$/yr)	\$977	\$977	\$977	\$977	\$977	\$977
Purchase Water Supply from City of Waco (McLennan County Arsenic Mitigation)						
Supply From Plan Element (acft/yr)	78	78	78	78	80	82
Annual Cost (\$/yr)	\$170,000	\$170,000	\$86,000	\$86,000	\$88,000	\$90,000
Unit Cost (\$/yr)	\$2,179	\$2,179	\$1,103	\$1,103	\$1,100	\$1,098
Alternative: WMARSS East Reuse						
Supply From Plan Element (acft/yr)	43	43	43	43	43	43
Annual Cost (\$/yr)	\$37,000	\$37,000	\$8,000	\$8,000	\$8,000	\$8,000
Unit Cost (\$/yr)	\$869	\$869	\$191	\$191	\$191	\$191

5.24.17 City of Robinson

Description of Supply

The City of Robinson obtains its water supply from the Trinity Aquifer, the Brazos River and the City of Waco. Western Brazos WSC also serves some customers within the city limits of Robinson, which is considered a supply for the City's demand. The city also has a 140 acft/yr contract to provide treated supply to the City of Lorena, which utilizes Lorena's contract with the BRA. Based on the constrained supply amounts, the City of Robinson is projected to have shortages. Although the City has sufficient raw water

The recommended strategy is to purchase water from the City of Waco to blend with water having large arsenic concentrations to reduce the total arsenic concentration to acceptable levels.

The recommended alternative strategy is to provide for arsenic treatment for individual entities. This strategy does not provide new supply. Surpluses are projected through the year 2070.

Conservation was considered; however, the entity’s current per capita use rate is below the selected target rate of 140 gpcd.

Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water management strategies are recommended for McLennan County-Other.

a. Purchase from City of Waco (McLennan County Arsenic Mitigation)

Entities within County-Other participating in this strategy include Axtell WSC, Birome WSC (Plant 5 only), Elk Oak Lake WSC, H & H WSC, Leroy-Tours-Gerald WSC, Moore Water System, Meier Settlement WSC, Prairie Hill WSC, and Riesel-Meier Settlement WSC. Note that H & H WSC has not experienced elevated levels of arsenic, but has chosen to participate to augment existing supplies.

- Cost Source: Volume II, Chapter 12.4
- Date to be Implemented: 2020
- Project Cost: \$14,802,000
- Unit Cost: \$2,425/acft

b. **Alternative:** Upgrade Treatment for Arsenic

Entities within County-Other for which Arsenic treatment is recommended include EOL WSC, LTG WSC, MS WSC, and RMS WSC. This is a treatment strategy and does not increase the supply available to these entities. Total treatment is estimated at 917 acft/yr.

- Cost Source: Volume II, Chapter 12.5
- Date to be Implemented: 2020
- Project Cost: \$3,811,000

Unit Cost: \$1,021/acft

Table 5.24-16. Recommended Plan Costs by Decade for the McLennan County – Other

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) (acft/yr)</i>	84	204	301	344	349	340
Conservation						
Supply From Plan Element (acft/yr)	—	—	—	—	—	—
Annual Cost (\$/yr)	—	—	—	—	—	—



Table 5.24-16. Recommended Plan Costs by Decade for the McLennan County – Other

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) after Conservation</i>	84	204	301	344	349	340
Purchase Water from City of Waco (McLennan County Arsenic Mitigation)						
Supply From Plan Element (acft/yr)	971	1,029	1,092	1,163	1,239	1,325
Annual Cost (\$/yr)	\$2,357,000	\$2,417,400	\$1,236,000	\$1,306,000	\$1,381,000	\$1,465,000
Unit Cost (\$/yr)	\$2,425	\$2,347	\$1,132	\$1,123	\$1,114	\$1,106
Alternative: Upgrade Treatment for Arsenic						
Supply From Plan Element (acft/yr)	—	—	—	—	—	—
Annual Cost (\$/yr)	\$936,000	\$936,000	\$617,000	\$617,000	\$617,000	\$617,000
Unit Cost (\$/yr)	\$1,021	\$1,021	\$673	\$673	\$673	\$673

5.24.23 Manufacturing

Description of Supply

Water supply for manufacturing in McLennan County is obtained by purchase from a city or water supply corporation, from Trinity Aquifer wells operated by the manufacturing entity, and from run-of-river rights and Lake Waco. McLennan County Manufacturing is projected to have shortages beginning in 2020. However, purchase of supplemental reuse water from WMARSS is recommended to reduce demands on water supplied by the run-of-river rights, Lake Waco and groundwater from the Trinity Aquifer

Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water management strategies are recommended to meet water needs for McLennan County Manufacturing.

a. Conservation

- Cost Source: Volume II, Chapter 2
- Date to be Implemented: before 2020
- Annual Cost: Not determined

b. WMARSS Flat Creek Reuse Project

- Cost Source: Volume II, Chapter 3
- Date to be Implemented: 2020
- Project Cost: None. City of Waco is the project sponsor. Entity will purchase from the City.
- Unit Cost: \$205/acft

Table 5.38-1. Wholesale Water Provider Surplus/(Shortage)

Wholesale Water Provider	Surplus/(Shortage) ^{1,2}		Comment
	2040 (acft/yr)	2070 (acft/yr)	
City of Sweetwater	(2,544)	(3,184)	Projected shortage – see plan below
City of Temple	(4,554)	(13,518)	Projected shortage – see plan below
City of Waco	4,757	(4,117)	Projected shortage – see plan below

1 - From Chapter 4.3 – Water Needs for Wholesale Water Providers

2 - Shortages shown above often include shortages from other WWPs. The shortages shown for individual WWPs should not be summed to a regional total.

3 - Includes demands from Region H.

5.38.1 Brazos River Authority (Lake Aquilla System)

Description of Supply

The Brazos River Authority (Lake Aquilla System) obtains water supply from Lake Aquilla. Based on the available surface water supply, the Lake Aquilla System is projected to have a surplus of 1,912 acft/yr in the year 2020 decreasing to 696 acft/yr by year 2070. Table 3.1-3 in Chapter 3 includes additional information on contracts and water supplies for the Lake Aquilla System. Due to the estimated reliable supply, surpluses are expected through 2070.

Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG, the following water supply plan is recommended for the Lake Aquilla System:

- a. Lake Aquilla Reallocation (Volume II, Chapter 7.6)
 - Cost Source: Volume II, Chapter 7.6
 - Date to be Implemented: Before 2020
 - Total Project Cost: \$21,887,000
 - Unit Cost: Max of \$865/acft

Table 5.38-2. Recommended Plan Costs by Decade for BRA Lake Aquilla System

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) (acft/yr)</i>	1,912	1,669	1,426	1,182	939	696
Lake Aquilla Reallocation (Volume II, Chapter 7.6)						
Supply From Plan Element (acft/yr)	2,400	2,400	2,400	2,400	2,400	2,400
Annual Cost (\$/yr)	\$2,075,000	\$2,075,000	\$244,800	\$244,800	\$244,800	\$244,800
Unit Cost (\$/yr)	\$865	\$865	\$102	\$102	\$102	\$102



2030. The City has a contract to supply effluent from its wastewater treatment plan to a new generating station owned by Panda Power.

The City of Temple is projected to have supply shortages through 2070. Table 4.3-25 in Chapter 4 includes additional information on contracts and water supplies for the City of Temple.

Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water management strategies are recommended to meet water needs for the City of Temple.

- a. Conservation
 - Cost Source: Volume II, Chapter 2
 - Date to be Implemented: Before 2020
 - Unit Cost: \$474 / acft
- b. Firm up of Supplies through BRA Little River System Strategies-see Section 5.38.2
 - Cost Source: Section 5.38.2
 - Date to be Implemented: 2020
 - Total Project Cost: borne by BRA
 - Unit Cost: already contracted supplies

Table 5.38-29. Recommended Plan Costs by Decade for the City of Temple

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) (acft/yr)</i>	2,223	(2,084)	(4,554)	(8,448)	(11,780)	(13,518)
Conservation(Volume II, Chapter 2)						
Supply From Plan Element (acft/yr)	914	2,740	5,015	7,724	10,771	11,850
Annual Cost (\$/yr)	\$433,105	\$1,298,837	\$2,376,991	\$3,660,947	\$5,105,344	\$5,616,738
<i>Projected Surplus/(Shortage) after Conservation</i>	3,137	656	461	(724)	(1,009)	(1,668)
Firm up of Supplies through BRA Little River System Strategies-see Section 5.38.2						
Supply From Plan Element (acft/yr)	6,563	8,021	7,497	8,221	8,357	6,929
Annual Cost (\$/yr)	\$0	\$0	\$0	\$0	\$0	\$0
Unit Cost (\$/acft)	\$0	\$0	\$0	\$0	\$0	\$0

5.38.28 City of Waco

Description of Supply

The City of Waco obtains its surface water supply 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 without conservation through 2060. Waco has a projected shortage of

2,730 acft in 2070, which can be eliminated fully with conservation. Table 4.3-26 in Chapter 4 includes additional information on contracts and water supplies for the City of Waco. Through an amendment of this plan in August 2017, this includes Waco's intention to supply water to several neighboring McLennan County utilities to mitigate arsenic contamination in those systems' primary water supplies.

The City has demonstrated a commitment to provide regional water supply in McLennan County, and has plans to extend regional water supplies beyond the 2070 planning horizon by actively pursuing a reuse program. Since the 2011 Brazos G Regional Plan, Waco Metropolitan Area Regional Sewerage System (WMARSS) has constructed the Sandy Creek Energy Associates (SCEA) Project which provides 15,000 acft/yr of treated effluent from the WMARSS Central Wastewater Treatment Plant to the SCEA power plant. WMARSS continues to pursue the development of four wastewater reuse systems to supply reuse water to customers. The Year 2011 effluent from WMARSS was 25,355 acft/yr (22.6 MGD). The Year 2070 estimated effluent available from WMARSS is projected to be 36,370 acft/yr (32.5 MGD), which includes the 15,000 acft/yr of sales to the Sandy Creek Project.

Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water management strategies are recommended to meet water needs for the City of Waco.

a. Conservation

- Cost Source: Volume II, Chapter 2
- Date to be Implemented: Before 2020
- Unit Cost: \$474 / acft

b. McLennan County ASR

- Cost Source: Volume II, Chapter 10.5
- Date to be Implemented: 2020
- Total Project Cost: \$43,940,000
- Unit Cost: \$677/ acft

c. Waco System Improvements to Deliver Supplies for Arsenic Mitigation

- Cost Source: Volume II, Chapter 12.4.10
- Date to be Implemented: 2020
- Total Project Cost: \$28,076,000
- Unit Cost: \$1,860 / acft



Table 5.38-30. Recommended Plan Costs by Decade for the City of Waco

Plan Element	2020	2030	2040	2050	2060	2070
<i>Projected Surplus/(Shortage) (acft/yr)</i>	10,070	7,274	4,757	1,846	(1,075)	(4,117)
Conservation (Volume II, Chapter 2)						
Supply From Plan Element (acft/yr)	1,462	4,033	6,781	9,781	11,940	12,554
Annual Cost (\$/yr)	\$692,979	\$1,911,441	\$3,214,161	\$4,636,431	\$5,659,560	\$5,950,518
<i>Projected Surplus/(Shortage) after Conservation</i>	11,890	11,607	11,775	11,793	10,952	8,437
McLennan County ASR (Volume II, Chapter 10.5)						
Supply From Plan Element (acft/yr)	8,000	8,000	8,000	8,000	8,000	8,000
Annual Cost (\$/yr)	\$5,416,000	\$5,416,000	\$1,744,000	\$1,744,000	\$1,744,000	\$1,744,000
Unit Cost (\$/yr)	\$677	\$677	\$218	\$218	\$218	\$218
Waco System Improvements to Deliver Supplies for Arsenic Mitigation (Volume II, Chapter 12.4.10)						
Supply from Plan Element (acft/yr)	1,407	1,407	1,407	1,407	1,407	1,407
Annual Cost (\$/yr)	\$2,617,000	\$2,617,000	\$268,000	\$268,000	\$268,000	\$268,000
Unit Cost (\$/acft)	\$1,860	\$1,860	\$190	\$190	\$190	\$190

Reuse Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water management strategies are recommended to meet water needs for the City of Waco:

- a. WMARSS- Bullhide Creek Reuse
 - Cost Source: Volume II, Chapter 3
 - Date to be Implemented: 2020
 - Total Project Cost: \$4,657,000
 - Unit Cost: \$381/acft
- b. WMARSS- Bellmead/Lacy-Lakeview Reuse
 - Cost Source: Volume II, Chapter 3
 - Date to be Implemented: 2020
 - Total Project Cost: \$ \$5,768,000
 - Unit Cost: \$324/acft
- c. WMARSS- Flat Creek Reuse
 - Cost Source: Volume II, Chapter 3
 - Date to be Implemented: 2020
 - Total Project Cost: \$9,371,000
 - Unit Cost: \$205/acft



5.39 Summary of Recommended and Alternative Water Management Strategies

5.39.1 Recommended and Alternative Water Management Strategies and Unmet Needs

Recommended Water Management Strategies as applied to the Water User Groups (Section 5.1 – 5.37) and the Wholesale Water Provider (Section 5.38) are summarized in Table 5.39-1 and listed in Table 5.39-2. A summary of the Alternative Water Management Strategies as applied to the Water User Groups (Section 5.1 – 5.37) and the Wholesale Water Provider (Section 5.38) is listed in Table 5.39-3. A full description of each of these strategies is included in Volume II.

A total of 15 Water User Groups are recommended to not have needs met from the DB17 application includes a summary of unmet needs by Water User Group.

From previous amendment adding capital costs for conservation strategies.

Table 5.39-1. Summary of Recommended Strategies Applied to WUG and/or WWPs

Recommended Strategies	WUG/ WWP using Strategy 1	1st Decade Average Annual Unit Cost (\$/acft)	Supply Developed						Total Project Cost
			2020	2030	2040	2050	2060	2070	
Municipal Conservation	93	\$478	10,845	30,658	46,765	61,587	73,849	81,664	\$324,373,000
Irrigation Conservation	10	\$230	4,431	7,168	9,739	9,453	9,175	8,940	NA
Industrial Conservation	19	ND	2,399	6,684	12,564	14,853	16,081	17,526	ND
Advanced Conservation	6	\$470	39	81	1,233	4,036	9,700	17,909	\$70,696,000
Advanced Industrial Conservation	2	ND	5,279	5,279	5,279	5,279	6,690	16,817	NA
Voluntary Redistribution	5	ND	1,205	1,676	1,262	1,547	2,043	2,574	NA
Leave Needs Unmet	15	ND	56,916	59,998	58,116	61,814	72,014	85,347	NA
Purchase Additional Water	27	\$903	12,180	21,818	21,327	21,247	20,971	21,065	NA
Increase WTP Capacity	7	\$1,000	18,983	30,436	32,981	33,946	35,273	36,554	\$122,634,000
Reuse	21	\$635	35,077	35,833	36,785	38,794	41,957	46,662	\$76,898,000
Millers Creek Reservoir Augmentation	7	\$740	2,833	3,013	3,194	3,374	3,554	3,735	\$99,896,000
Throckmorton Reservoir	1	\$601	3,540	3,540	3,540	3,540	3,540	3,540	\$28,041,000
Turkey Peak Reservoir	1	\$643	8,100	8,100	8,100	8,100	8,100	8,100	\$83,363,000
Little River OCR	4	\$800	0	56,150	56,150	56,150	56,150	56,150	\$487,611,000
Blaine Groundwater	3	\$887	876	876	876	876	876	876	\$6,093,000
Brazos River Alluvium Groundwater	2	\$530	4,000	4,000	4,000	4,700	4,700	5,100	\$23,948,000



Table 5.39-1. Summary of Recommended Strategies Applied to WUG and/or WWPs

Recommended Strategies	WUG/ WWP using Strategy 1	1st Decade Average Annual Unit Cost (\$/acft)	Supply Developed						Total Project Cost
			2020	2030	2040	2050	2060	2070	
Somervell County Water Supply Project	2	\$4,305	900	900	1,084	1,084	1,084	1,084	\$35,249,000
East Williamson County Water Project	5	\$1,173	8,400	8,400	8,400	8,400	8,400	8,400	\$42,127,000
BCRUA Water Supply Project	4	\$994	67,000	67,000	67,000	67,000	67,000	67,000	\$314,847,000
BRA System Operation	6	\$20	95,223	101,871	109,174	125,682	155,969	166,952	\$23,582,000
Restructure Contracts	1	ND	890	1,028	167	1,306	1,444	1,583	NA
McLennan County Arsenic Mitigation	3	\$5,139	1,049	1,107	1,170	1,241	1,319	1,407	\$43,878,000

ND - costs and/or supply from strategy not determined

1 – Number of WUG/WWPs that are using the strategy in the final adopted regional water plan

WUG: City of Riesel
Strategy: Additional Purchase from RMS WSC
Source: RMS WSC (Trinity Groundwater)
Facilities: None, existing infrastructure assumed sufficient
Total Capital Cost: N/A
Total Project Cost: N/A
Total Annual Cost: \$19,540
Available Project Yield: 20 acft/yr
Annual Cost of Water: \$ 977 per acft/yr or \$ 3.03 per 1,000 gal (RMS-WSC Wholesale Costs)

This project will include a contract increase of up to 20 additional acft/yr utilizing existing infrastructure from RMS WSC to the City of Riesel.

WUG: City of Woodway
Strategy: Additional Purchase from Bluebonnet WSC
Source: Bluebonnet WSC
Facilities: None, existing infrastructure assumed sufficient
Total Capital Cost: N/A
Total Project Cost: N/A
Total Annual Cost: \$51,500
Available Project Yield: 103 acft/yr
Annual Cost of Water: \$ 500 per acft/yr or \$ 1.55 per 1,000 gal (Bluebonnet WSC Wholesale Costs)

This project will include a contract increase of up to 103 additional acft/yr utilizing existing infrastructure from Bluebonnet WSC to the City of Woodway.

WUG:	McLennan County-Other (various utilities) and City of Riesel	
Strategy:	Purchase treated water from City of Waco (McLennan County Arsenic Mitigation)	
Source:	City of Waco (Lake Waco)	
Facilities:	Pump Stations, storage tanks, transmission pipelines	
WUG:	McLennan County-Other	City of Riesel
Total Capital Cost:	\$9,756,000	\$643,000
Total Project Cost:	\$14,802,000	\$1,000,000
Total Annual Cost:	\$2,604,000	\$170,000
Available Project Yield (2020):	972	78
Annual Cost of Water:	\$2,678 per acft/yr or \$8.22 per 1,000 gal	\$2,179 per acft/yr or \$6.69 per 1,000 gal



This project will include an interconnection from the City of Waco to the City of Riesel and to several smaller utilities included in McLennan County-Other (Axtell WSC, Birome WSC (Plant 5 only), Elk Oak Lake WSC, H & H WSC, Leroy-Tours-Gerald WSC, Moore Water System, Meier Settlement WSC, Prairie Hill WSC, and Riesel-Meier Settlement WSC). This strategy will provide blending water to mitigate elevated concentrations of arsenic in existing water supplies. Note that H & H WSC has not experienced elevated levels of arsenic, but has chosen to participate to augment existing supplies. Infrastructure needs include 36 miles of 6-, 8-, and 12-inch diameter transmission pipelines, three pump stations and three storage tanks. Water will be purchased from the City of Waco at an estimated wholesale rate of \$979/acft.

The strategy will have no adverse environmental impacts because all facilities will be designed to avoid sensitive environmental areas. Existing supplies from Lake Waco will be utilized, resulting in no additional impacts to instream flows or discharges into bays and estuaries.

WWP: City of Waco

Strategy: Waco System Improvements to Deliver Supplies for Arsenic Mitigation

Source: City of Waco (Lake Waco)

Facilities: Pump Stations, storage tanks, transmission pipelines, treatment

Total Capital Cost: \$20,287,000

Total Project Cost: \$28,076,000

Total Annual Cost: \$2,617,000

Available Project Yield: 1,407 acft/yr

Annual Cost of Water: \$1,860 per acft/yr or \$5.71 per 1,000 gal

In order for the City of Waco to deliver supplies to the McLennan County-Other utilities and the City of Riesel for arsenic mitigation, several improvements to the Waco water system are needed. These include the following infrastructure improvements, which are pre-requisites for Waco to deliver water through its water distribution system to the delivery points for these entities. These are considered to be one inclusive project for purposes of documenting project costs in the water planning database.

Riverside High Service Pump Station Improvements

The City needs to separate out pumping to a new demand center and deliver flows to the Gholson Road Pump Station (GRPS). The existing pump station will be redesigned to accommodate delivery to multiple demand centers and additional dedicated discharge piping to the GRPS pipeline and to the Hillcrest Ground Storage Tank pipeline.

Riverside to Gholson Transmission Water Line

This project consists of installing approximately 19,000 linear feet of 30-inch waterline from the connection to the Riverside High Service Pump Station to the Gholson Road Pump Station, plus necessary appurtenances and road crossings.

TSTC Elevated Storage Tank Improvements

In order for Waco to deliver water from its distribution system to the McLennan County-Other utilities for arsenic mitigation, the elevated storage tank located at the Texas State Technical College must be raised 25 feet.

North IH35 Ground Storage and Pump Station Improvements

In order to deliver flows to the Leroy-Tours-Gerald WSC at sufficient pressure, improvements are necessary to the existing system including a new 250,000 gallon ground storage tank and a new 1,400 gallons per minute pump station.

Elm Mott and Gholson Road Ground Storage and Pump Station Improvements

Delivering supply to the McLennan County-Other utilities will require additional pumping capacity at the Elm Mott Pump Station and the Gholson Road Pump Station.

Riverside Water Treatment Plant Chemical Feed System Improvements

Additional chemical feed systems at the Riverside Water Treatment Plant is necessary to ensure that the Lake Waco water quality is optimized to prevent corrosive conditions when combined with the existing groundwater supplies of the McLennan County-Other utilities.

The above projects will have no adverse environmental impacts because all facilities will be designed to avoid sensitive environmental areas, and most will be located in an urban environment and/or in existing rights of way. Existing supplies from Lake Waco will be utilized, resulting in no additional impacts to instream flows or discharges into bays and estuaries.

12.4.11 Nolan County

WUG: City of Sweetwater

Strategy: Purchase water from City of Abilene

Source: City of Abilene

Facilities: Pump Station, storage tank, transmission pipeline

Total Capital Cost: \$8,311,000

Total Project Cost: \$13,036,000

Total Annual Cost: \$1,448,000

Available Project Yield: 1,777 acft/yr

Annual Cost of Water: \$ 815 per acft/yr or \$ 2.50 per 1,000 gal

This project will include an interconnection between the City of Abilene and the City of Sweetwater including 40 miles of 6 inch diameter transmission pipeline, a pump station and storage tank. Water will be purchased from the City of Abilene at an estimated wholesale rate of \$100/acft. Project costs to be shared between the two entities.

WUG: Nolan County-Other

Strategy: Additional Purchase from the City of Sweetwater

Source: Oak Creek Reservoir

Facilities: None, existing infrastructure assumed sufficient

Total Capital Cost: N/A

Total Project Cost: N/A

Total Annual Cost: \$173,208

Available Project Yield: firm up existing contract of 168 acft/yr



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Dunn, David

From: Lisa Tyer <LisaT@wacotx.gov>
Sent: Monday, August 14, 2017 4:23 PM
To: Dunn, David
Subject: Region G Amendment - Public Comment - Arsenic Mitigation

Mr. Dunn,

Additional system improvements to Waco's plants, storage and distribution system will be required in order for the City of Waco to be able to provide water to assist the communities with arsenic mitigation.

Please add these necessary improvements to any plans that involve the City of Waco providing water for this project.

Thank you,

Lisa Tyer
Director of Water Utility Services
City of Waco