

Final Draft Report FHLM Regional Water Facility Planning Study



Prepared By:



SUSAN ROTH
water and wastewater consulting

In Association with:

**CDM
Smith**

**TWDB Regional Facility
Planning Grant**

Project Contract No. 144-832-1704

December 31, 2015

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FINAL REPORT
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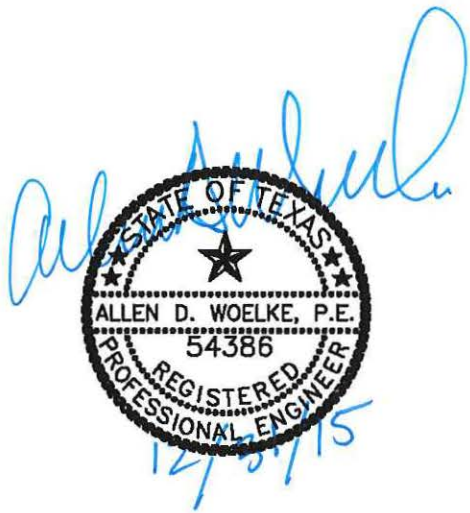


SUSAN ROTH
water and wastewater consulting

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TWDB PROJECT CONTRACT NO. 144-832-1704

FINAL REPORT
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SUSAN ROTH
water and wastewater consulting

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Section 1.0

EXECUTIVE SUMMARY

1.1 PROJECT BACKGROUND

The Falls, Hill, Limestone and McLennan Counties ('FHLM') Regional Water Facility Study was designed to evaluate the feasibility of a regional water system to replace and/or supplement the multiple smaller systems currently in service in the FHLM area. Several of the participating entities have experienced arsenic concentration violations and are in need of a water supply with arsenic levels below the Maximum Contaminant Level (MCL) of 10 parts per billion (ppb). As such, this study looks at the historic arsenic concentrations of the area's water supplies. Additionally, this master plan provides information on the population and water demand projections in Falls, Hill, Limestone and McLennan Counties through year 2040. This study also presents and evaluates water treatment and transmission alternatives for these counties to meet the arsenic MCL and their growing water demands. The participants included in this study are:

- Texas Water Development Board
- FHLM Water Supply Corporation (primary applicant)
- Falls County
- Hill County
- Limestone County
- McLennan County
- Brazos River Authority
- Southern Trinity Groundwater Conservation District
- City of Mart
- City of Marlin
- City of Mount Calm
- Axtell Water Supply Corporation
- Birome Water Supply Corporation
- Chalk Bluff Water Supply Corporation
- EOL Water Supply Corporation
- Gholson Water Supply Corporation
- H&H Water Supply Corporation
- LTG Water Supply Corporation
- M.S. Water Supply Corporation

- McLennan County Water Control and Improvement District No. 2
- Prairie Hill Water Supply Corporation
- Pure Water Supply Corporation
- RMS Water Supply Corporation
- Ross Water Supply Corporation
- Moore Water System
- Cargill Meat Solutions
- Sanderson Farms
- Heart of Texas Council of Governments

Although the City of Waco and Baylor University were not official project participants in the study, representatives from both entities attended the public meetings and contributed beneficial information.

Susan Roth Consulting, LLC and her team ('Roth Team'), including CDM Smith Inc., identified and evaluated several options for regional water transmission and treatment facilities in Falls, Hill, Limestone and McLennan Counties; this report summarizes the findings of this evaluation. Information regarding the study area, projected population and water demands, regional distribution and treatment alternatives, cost estimates, and potential funding options are also included in this study.

1.2 SOURCES OF WATER

Groundwater in FHLM is primarily derived from the Trinity Aquifer. Other minor aquifers in the study area include the Brazos River Alluvium in McLennan, Falls and Hill Counties and the Woodbine Aquifer in Hill and McLennan Counties. The Carrizo-Wilcox Aquifer is located in portions of Falls and Limestone Counties, but none of the project participants currently use water from this aquifer. Based on information prepared by the Texas Water Development Board, the Modeled Available Groundwater (MAG) for the Trinity Aquifer in McLennan County is almost entirely committed. The Desired Future Condition (DFC) for the Trinity Aquifer in McLennan County predicts a further drop in water surface elevations of more than 500 feet. Additionally, many of the participants who source their water from the Trinity Aquifer are in violation of the Maximum Contaminant Level (MCL) for arsenic.

The Southern Trinity Groundwater Conservation District (STGCD) was formed in 2007 to protect the underground water resources for the citizens of McLennan County. Small irrigation wells and domestic wells located in McLennan County are considered exempt wells and are registered with STGCD. All other wells are considered non-exempt and must obtain a permit. Permitted wells with STGCD are required to report their annual usage and pay a fixed cost per 1,000 gallons used; however, registered wells do not have this requirement.

The Prairielands Groundwater Conservation District (PGCD) was created in 2009 with a directive to conserve, protect and enhance the groundwater resources of Ellis, Johnson, Hill and Somervell Counties. PGCD does not have a well permitting system in place at this time. Rather, they register all exempt and non-exempt wells drilled after April 1, 2011. All non-exempt wells drilled prior to April 1, 2011, had to register with the District but historic exempt wells did not need to register with the District, although they were encouraged to do so. The PGCD charges a cost per 1,000 gallons to non-exempt wells. Fall and Limestone Counties do not have a groundwater conservation district at this time.

The primary surface water sources in the study area are the Brazos River and its tributaries. Lake Waco is located about two miles west of Waco in McLennan County on the Bosque River, a tributary of the Brazos River. Other sources of surface water are Lake Marlin, New Lake Mart, Lake Aquilla, Lake Whitney, Lake Limestone, Tradinghouse Creek Reservoir and other existing and proposed reservoirs. At the time of the project kick-off meeting for this study, the Brazos River Authority stated that all water rights had been completely allocated in the Brazos River Basin. In addition, the City of Waco stated during the project kick-off meeting and throughout the duration of this study that the City did not have additional water supplies to sell at this time. The Cities of Marlin and Mart have expressed interest in selling treated surface water to the participants; however, based on Region G estimates of firm yield of these cities' supply, they do not have a reliable supply to meet the demands of the participants.

1.3 POPULATION AND WATER DEMAND PROJECTIONS

The population in the study area has increased steadily over the past 10 years and is projected to continue to increase over the next 30 years. Section 4 presents a detailed discussion on the development of population projections. The population of participants is projected to grow from 30,885 in 2010 to 38,373 in 2040.

Based on the population projections, per capita water usage and annual consumption presented in Section 4, water demands for each entity were determined in five year increments through year 2040. **Table 1-1** presents the average day and maximum day water demand projections for the participants; reference **Appendix C** for a complete summary of water demand projections for the project participants.

As of now, neither Cargill Meat Solutions nor Sanderson Farms has reported plans to expand their production that would require an additional water demand; they also have not encountered any arsenic issues. Both companies participated in this study to serve as good corporate partners with FHLM.

Table 1-1: Water Demand Projections – Project Participants

Entity	Average Day Water Demands (MGD)						
	Maximum Day Water Demands (MGD)						
	2010	2015	2020	2025	2030	2035	2040
City of Mart	0.370	0.375	0.388	0.402	0.416	0.431	0.446
	0.830	0.861	0.892	0.923	0.956	0.990	1.025
City of Marlin	1.358	1.385	1.413	1.441	1.470	1.500	1.530
	2.499	2.289	2.069	1.839	1.597	1.625	1.653
City of Mount Calm	0.025	0.025	0.026	0.026	0.027	0.027	0.027
	0.050	0.051	0.051	0.052	0.053	0.054	0.055
Axtell WSC	0.159	0.166	0.172	0.178	0.185	0.192	0.199
	0.372	0.389	0.403	0.418	0.433	0.449	0.465
Birome WSC	0.086	0.089	0.091	0.094	0.097	0.100	0.103
	0.327	0.338	0.349	0.360	0.371	0.382	0.393
Chalk Bluff WSC	0.265	0.286	0.310	0.334	0.361	0.390	0.422
	0.634	0.685	0.740	0.799	0.864	0.933	1.008
EOL WSC	0.172	0.180	0.189	0.197	0.206	0.216	0.226
	0.390	0.408	0.427	0.446	0.467	0.488	0.510
Gholson WSC	0.275	0.280	0.285	0.291	0.296	0.302	0.307
	0.556	0.566	0.576	0.587	0.598	0.609	0.620
H&H WSC	0.148	0.156	0.164	0.172	0.181	0.190	0.200
	0.395	0.415	0.436	0.458	0.482	0.506	0.532
LTG WSC	0.100	0.104	0.109	0.114	0.119	0.124	0.129
	0.191	0.199	0.208	0.217	0.227	0.236	0.247
Moore Water System	0.042	0.042	0.042	0.042	0.042	0.042	0.043
	0.092	0.092	0.093	0.093	0.093	0.094	0.094
M.S. WSC	0.032	0.032	0.032	0.033	0.033	0.033	0.033
	0.070	0.070	0.071	0.071	0.071	0.072	0.072
McLennan Co. WCID No. 2	0.197	0.198	0.199	0.200	0.201	0.202	0.203
	0.350	0.352	0.354	0.356	0.357	0.359	0.361
Prairie Hill WSC	0.142	0.146	0.149	0.153	0.157	0.161	0.165
	0.412	0.423	0.433	0.444	0.455	0.467	0.479
Pure WSC	0.042	0.042	0.042	0.042	0.042	0.042	0.043
	0.092	0.092	0.093	0.093	0.093	0.094	0.094
RMS WSC	0.107	0.115	0.125	0.135	0.146	0.158	0.171
	0.213	0.231	0.250	0.270	0.292	0.316	0.342
Ross WSC	0.204	0.214	0.224	0.235	0.247	0.259	0.272
	0.407	0.427	0.449	0.471	0.494	0.519	0.544
TOTAL	3.723	3.836	3.960	4.091	4.227	4.370	4.519
	7.880	7.888	7.894	7.897	7.903	8.193	8.494

1.4 DETERMINATION OF ALTERNATIVES

Several drivers have led to the need for Falls, Hill, Limestone, and McLennan Counties to evaluate their water facilities, some of which include groundwater demands in excess of the MAG, groundwater levels below the proposed DFCs, growth in water demands and arsenic exceeding the MCL. Based on engineering judgment and input provided by the project participants, 16 preliminary alternatives were developed and presented. These alternatives are described in detail in Section 6. Subsequent discussions were held and comments were collected from the project participants concerning these alternatives with the goal of selecting the top alternatives for further evaluation. Based on the voting exercises during the screening phase, four of the alternatives were modified and chosen for further evaluation. These alternatives are summarized below and described in detail in Section 6.

It is important to recognize that for the arsenic violators the most important aspect of an additional water supply is to decrease the arsenic concentration to less than the MCL. With this goal in mind, alternatives were developed that did not seek to completely replace the existing water supply but only to provide enough water to dilute the arsenic level below the MCL. The flow that was selected was a flow equal to the average day demand of the violators.

- **Blending of Arsenic Violation Water** – This alternative includes two water supply sources used for blending – a new well in McLennan County for the northern arsenic violators and the City of Robinson Water Treatment Plant (WTP) for the southern arsenic violators. Under this alternative, each entity would continue to utilize its existing groundwater supply during the summer months to blend with the provided water supply to meet peak summer demands.

In the northern area, LTG WSC, Pure, WSC, Axtell WSC, Birome WSC and the City of Mount Calm would be provided a 2040 average day demand of 0.5 MGD from a new well drilled in McLennan County in the portion of the Trinity Aquifer that does not have arsenic issues. New transmission pipelines required will be sized to transport the capacity needed to meet the year 2040 average day water demand and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to help transport the water through the transmission system.

In the southern area, RMS WSC, M.S. WSC, Prairie Hill WSC, EOL WSC, Moore WS and H&H WSC would be provided a 2040 average day demand of 1.0 MGD from the City of Robinson RO WTP, which receives its water from the Brazos River. Arsenic violators - RMS WSC, M.S. WSC, Prairie Hill WSC, EOL WSC, and Moore WS – would receive their average day demand, while H&H WSC would get the remaining supply up to 1.0 MGD. The City of Robinson WTP would be expanded by 2.0 MGD with 1.0 MGD in capacity interest purchased by the project participants. An additional booster pump station and ground storage tank (GST) would be constructed at the plant. New transmission pipelines required will be sized to transport the capacity needed to meet the year 2040 average day water demand and will be constructed as soon as possible.

Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to help transport the water through the transmission system.

- **Individual Treatment for Arsenic Violators** – There are nine project participants that were evaluated for individual arsenic treatment at their existing wells. In this alternative, Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, LTG WSC, M.S. WSC, City of Mount Calm, Moore WS and RMS WSC were evaluated for two options, with the iron-based adsorptive media treatment being considered the most cost effective. No new water supply, transmission pipelines, or lift stations are required, as the construction for the individual treatment units will take place at the existing well sites and each entity will continue to use its existing distribution system and groundwater wells.
- **New Surface Water Treatment Plant near Tehuacana Creek** – In this alternative, a new surface WTP will be constructed near Tehuacana Creek east of Waco to serve the 2040 average day demand for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, City of Mart, City of Marlin, Gholson WSC and Chalk Bluff WSC. The new WTP would be sized for 5.4 MGD. This alternative assumes that a new off-channel reservoir would be constructed near the WTP site at the gravel pits east of Loop 340 (further investigation into the exact location and size of the reservoir would need to be conducted if this alternative were chosen). A 20-inch raw water pipeline from the reservoir to the proposed WTP would be approximately one mile long. New transmission pipelines required will be sized to transport the capacity needed to meet the year 2040 average day water demand and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to help transport the water through the transmission system.
- **Carrizo-Wilcox Aquifer Pipeline** – In this alternative, wells will be drilled in the Carrizo-Wilcox Aquifer to serve the water demands of project participants. The aquifer can provide a maximum supply of 12,000 acre-ft/year, or 10.71 MGD. This alternative has three options: 2040 max day demand for the entities and additional supply goes to the City of Waco; 2040 average day demand for the entities (no supply for Waco); and 2040 max day demand for the entities (no supply for Waco). Each option is detailed below.
 - **Max Day Demand with Waco** – The water supply from the Carrizo-Wilcox Aquifer would be utilized first to serve the year 2040 max day water demands for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC, and Chalk Bluff WSC and the additional supply will be provided to the City of Waco. Eight 1,000-GPM wells will be drilled in the aquifer within Limestone County. New transmission pipelines required will be sized to transport the capacity needed to meet these water demands and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to help transport the water through the transmission system.

- **Average Day Demand** – The water supply from the Carrizo-Wilcox Aquifer will provide the year 2040 average day water demands for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC, and Chalk Bluff WSC. Two 1,000-GPM wells will be drilled in the aquifer within Limestone County. New transmission pipelines required will be sized to transport the capacity needed to meet these water demands and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to help transport the water through the transmission system.
- **Max Day Demand** – The water supply from the Carrizo-Wilcox Aquifer will provide the year 2040 max day water demands for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC, and Chalk Bluff WSC. Five 1,000-GPM wells will be drilled in the aquifer within Limestone County. New transmission pipelines required will be sized to transport the capacity needed to meet these water demands and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to help transport the water through the transmission system.

1.5 ECONOMIC ANALYSIS AND FINANCIAL EVALUATION

The economic and financial analysis is used as a way of comparing each alternative on an even level, based on capital and operations and maintenance (O&M) costs. The analysis included capital costs for new and expanded water treatment capacity, booster pump stations, and transmission pipelines. Capital costs for this project were determined using the Unified Cost Model (UCM) prepared by the TWDB for use in its Regional Water Planning efforts, where applicable. Costs for the blending options do not include any additional disinfection protocols that might be required for blending surface water and groundwater within the same system.

O&M costs were included from 2015 through 2040. An interest rate of 4.0 percent, an inflation rate of 2.5 percent and a period of 2015 through 2040 were used. Based on the annual expenditures and average annual water sold, a cost per 1,000 gallons was calculated for each participant. **Table 1-2** presents these results, while **Table 1-3** shows the capital costs for each alternative. Graphs showing a cost comparison of each alternative for each entity can be found in Appendix D.

Table 1-2: Cost Summary for All Alternatives (\$ per 1,000 gallons)

Entity	Blending - Robinson	Blending - McLennan County	Individual Treatment	Tehuacana Creek (New WTP)	Carrizo-Wilcox Max Day with Waco	Carrizo-Wilcox Avg Day, No Waco	Carrizo-Wilcox Max Day, No Waco
Axtell WSC	\$0.00	\$3.84	\$1.25	\$5.48	\$1.87	\$4.33	\$7.00
Birome WSC	\$0.00	\$3.84	\$2.00	\$5.48	\$1.87	\$4.33	\$7.00
Prairie Hill WSC	\$5.04	\$0.00	\$2.19	\$5.48	\$1.87	\$4.33	\$7.00
EOL WSC	\$5.04	\$0.00	\$1.44	\$5.48	\$1.87	\$4.33	\$7.00
Moore Water System	\$5.04	\$0.00	\$2.29	\$5.48	\$1.87	\$4.33	\$7.00
Pure WSC	\$0.00	\$3.84	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
LTG WSC	\$0.00	\$3.84	\$2.34	\$5.48	\$1.87	\$4.33	\$7.00
City of Mount Calm	\$0.00	\$3.84	\$4.01	\$5.48	\$1.87	\$4.33	\$7.00
M.S. WSC	\$5.04	\$0.00	\$3.21	\$5.48	\$1.87	\$4.33	\$7.00
RMS WSC	\$5.04	\$0.00	\$0.89	\$5.48	\$1.87	\$4.33	\$7.00
H&H WSC	\$5.04	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
McLennan County WCID No. 2	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
Ross WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
Gholson WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
Chalk Bluff WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
City of Mart	\$0.00	\$0.00	\$0.00	\$5.48	\$0.00	\$0.00	\$0.00
City of Marlin	\$0.00	\$0.00	\$0.00	\$5.48	\$0.00	\$0.00	\$0.00

Table 1-3: Capital Cost Summary for All Alternatives

Alternative	Capital Improvements
Blending - Robinson	\$16,160,000
Blending - McLennan County	\$8,040,000
Individual Treatment	
Axtell WSC	\$654,000
Birome WSC	\$654,000
Prairie Hill WSC	\$784,500
EOL WSC	\$1,084,500
LTG WSC	\$1,076,500
M.S. WSC	\$463,700
City of Mount Calm	\$463,700
Moore WS	\$463,700
RMS WSC	\$536,000
Tehuacana Creek (New WTP)	\$86,642,000
Carrizo-Wilcox Max Day with Waco	\$84,628,000
Carrizo-Wilcox Avg Day, No Waco	\$42,762,000
Carrizo-Wilcox Max Day, No Waco	\$69,256,000

1.6 FINAL RECOMMENDATIONS

The recommended alternative for FHLM is based on several factors: the overall economics based on a present worth analysis, a financial analysis of the impact on the cost of water to participating customers, the availability of groundwater and surface water, and the need for a water supply below the arsenic MCL. The recommended facility plan is also based on an implementation plan that allows the recommended plan to be permitted, constructed and operational in a reasonable amount of time and a facility plan that has adequate operations, management and governance.

For a true regional approach, the Roth Team recommends implementing the Carrizo-Wilcox Regional Groundwater Project since it involves securing additional long-term water supplies and diversifies the participants' water portfolio in a cost-effective manner. The Carrizo-Wilcox Regional Groundwater Project has two different approaches: one that includes only the project participants, and one that includes a potential large water user. The proposed regional project that includes only the project participants would involve constructing a pipeline from the Carrizo-Wilcox Aquifer to serve the participants' 2040 average day demands. The project that includes other potential water users is proposed to meet the max day demands of the project participants and the potential large water user would contract for the remaining supply available in Limestone County. This alternative also affords the participants the opportunity to look for other regional providers (such as City of Waco) or entities to become part of the regional facility, thereby lowering the costs. Although the Cities of Mart and Marlin are currently exploring other opportunities, they could also be included as part of this recommended alternative if interested.

This regional alternative allows for the most flexibility of participants, as well as the opportunity for a phased construction approach; the facilities for the customers who have immediate needs for arsenic removal would be constructed immediately and other participants can be phased in as needed. This project would also address the DFC situation with the Trinity Aquifer by using a different groundwater source. Additionally, with this alternative using a groundwater source, the possible issues of blending surface water and groundwater would be avoided. The Carrizo-Wilcox Regional Groundwater Project is the most cost-effective alternative for a majority of participants (total capital and O&M cost approximately \$1.87 per 1,000 gallons).

Individual Treatment provides the shortest development time period for entities under USEPA enforcement for Arsenic violations (total cost ranges from \$0.89 to \$4.01 per 1,000 gallons); however, this alternative does not address the needs of the region as a whole. The Arsenic violators should pursue negotiating an Agreed Order with USEPA to implement the Carrizo-Wilcox Regional Groundwater Project. Otherwise, these entities should pursue implementing Individual Treatment or one of the Blending Alternatives as a solution to satisfy USEPA requirements.

Section 2.0

INTRODUCTION

A number of communities in the Central Texas and Waco area have been faced with challenging water issues as a result of the extreme drought conditions. Planning for regional water distribution and treatment facilities is especially important in order to provide a reliable and safe water supply, system redundancy, as well as efficient sharing of resources. As a result, FHLM Water Supply Corporation, in conjunction with 26 other entities, has undertaken this study to evaluate the feasibility of developing a regional water infrastructure plan to serve existing and future populations through 2040 in the study area identified within Falls, Hill, Limestone and McLennan Counties. A complete list of the project participants is provided below:

- Texas Water Development Board
- FHLM Water Supply Corporation (primary applicant)
- Falls County
- Hill County
- Limestone County
- McLennan County
- Brazos River Authority
- Southern Trinity Groundwater Conservation District
- City of Mart
- City of Marlin
- City of Mount Calm
- Axtell Water Supply Corporation
- Birome Water Supply Corporation
- Chalk Bluff Water Supply Corporation
- EOL Water Supply Corporation
- Gholson Water Supply Corporation
- H&H Water Supply Corporation
- LTG Water Supply Corporation
- M.S. Water Supply Corporation
- McLennan County Water Control and Improvement District No. 2
- Prairie Hill Water Supply Corporation



- Pure Water Supply Corporation
- RMS Water Supply Corporation
- Ross Water Supply Corporation
- Moore Water System
- Cargill Meat Solutions
- Sanderson Farms
- Heart of Texas Council of Governments

Although the City of Waco and Baylor University were not official project participants in the study, representatives from both entities attended the public meetings and contributed beneficial information. The City of Waco provided information about their wholesale water contracts and water supply availability, and Baylor University (Geology Department, Dr. Joseph Yelderman) provided water quality data from his recent groundwater research activities focusing on the arsenic concentrations in the Trinity Aquifer.

Susan Roth Consulting, LLC and her team ('Roth Team'), including CDM Smith Inc., identified and evaluated several options for regional water transmission and treatment facilities in Falls, Hill, Limestone and McLennan Counties; this report summarizes the findings of this evaluation. Information regarding the study area, projected population and water demands, regional distribution and treatment alternatives, cost estimates, and potential funding options are also included in this study.

2.1 PROJECT BACKGROUND

In 2001, the United States Environmental Protection Agency (USEPA) adopted a new standard that reduced the Maximum Contaminant Level (MCL) for arsenic from 50 parts per billion (ppb) to 10 ppb. Water systems were given until January 23, 2006, to comply with the regulations. As a result, a number of Public Water Systems (PWSs), located primarily east of the City of Waco, were faced with compliance issues due to the naturally-occurring and elevated arsenic concentrations in their groundwater supplies. In addition to the arsenic levels, there was also an increasing concern about the declining ground water levels of the Trinity Aquifer, which is the source of water for a number of these PWSs. To reduce the over-pumping of the aquifer in the Waco area, the Texas Legislature in 2007 authorized McLennan County to create the Southern Trinity Groundwater District. The new district has been effective at limiting the installation of new wells for both residential and commercial use; however, the current removal rate of groundwater from the aquifer continues to be greater than the recharge rate to the aquifer. The long-term management of the Trinity Aquifer will require additional measures such as moving PWSs from groundwater to surface water sources where practical.

In an effort to address arsenic compliance issues and the decreasing groundwater levels of the Trinity Aquifer, the Texas Commission on Environmental Quality (TCEQ) – Drinking Water State Revolving Fund Small Systems Assistance Program funded a study in 2010 for PWSs located

east of Waco to identify and analyze alternatives in order to meet their compliance goals. A majority of the systems were located in McLennan County; however, a few of the systems were located in the adjacent counties of Falls, Hill and Limestone Counties. The results of the study, conducted by Parsons Infrastructure and Technology Group Inc. ('Parsons'), developed a conceptual option and framework of interconnecting each of the PWSs to the City of Waco water distribution system. Following the study, the participants along with the other regulatory and funding agencies (TCEQ, TWDB and USEPA) acknowledged that a regional solution should be developed rather than each PWS trying to address the problems independently depending on the availability of funding from local, state, and federal programs that support improvements to drinking water sources.

Around the time period when the regulatory requirements changed for the MCL of arsenic, several PWSs within Falls, Hill, Limestone and McLennan Counties formed the FHLM Water Supply Corporation (FHLM WSC). This entity was created to collectively represent the small PWSs located within Falls, Hill, Limestone, and McLennan Counties to address the elevated arsenic levels, groundwater compliance issues, depletion of the Trinity Aquifer, and to exchange information regarding treatment technology, operation and maintenance of the PWSs more efficiently. Also, the primary purpose of the FHLM WSC was to serve as a financing vehicle for obtaining funding to implement a regional water solution for the area.

As a result of the TCEQ Study, FHLM WSC submitted an application to the Texas Water Development Board (TWDB) in December 2013 to request funding assistance to conduct a regional water facility planning study for Falls, Hill, Limestone and McLennan Counties. TWDB awarded FHLM WSC, as the primary applicant, the planning grant funding in March 2014.

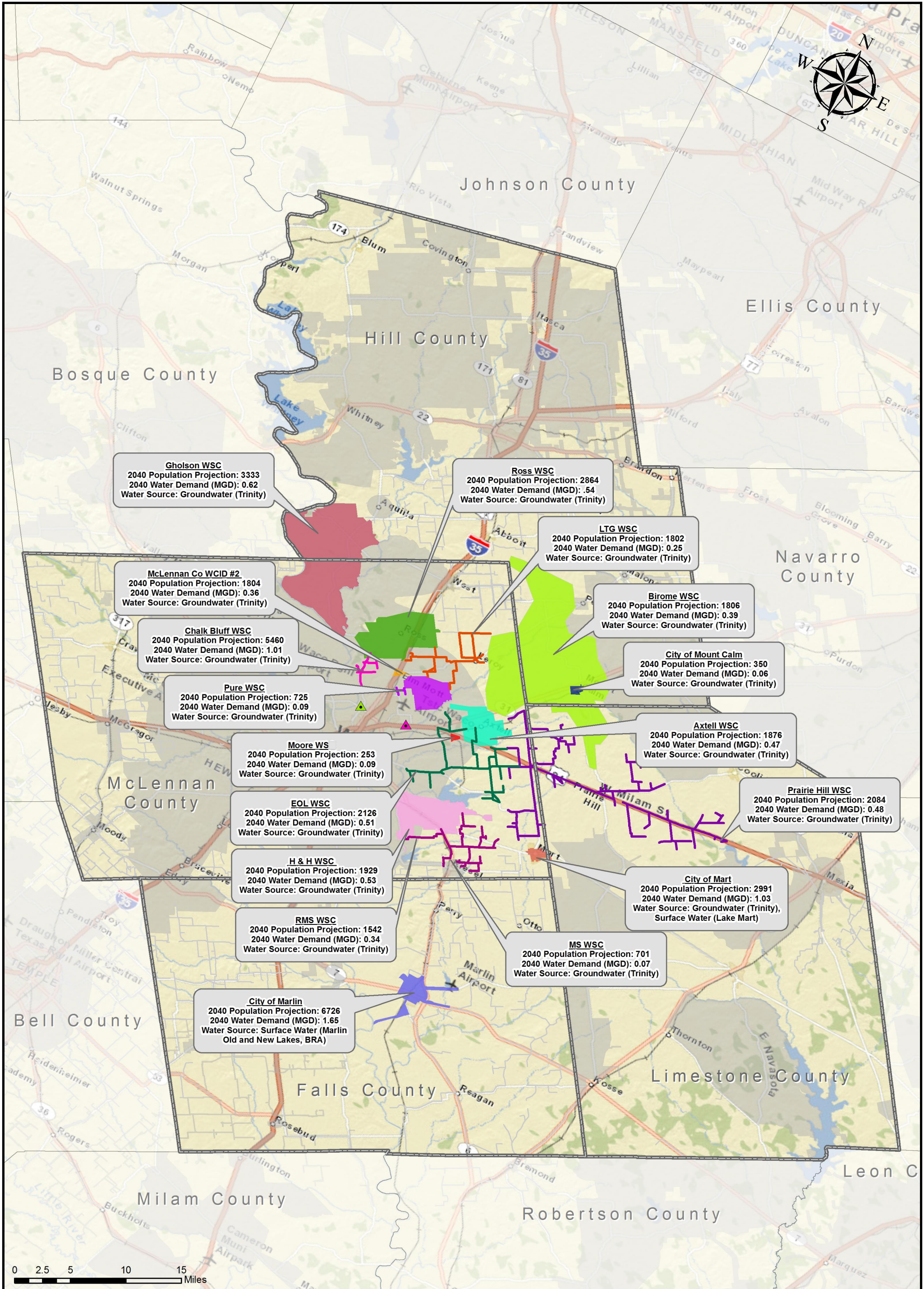
The planning study provided the project participants the opportunity to adequately evaluate and determine the following:

- Feasibility of developing a regional water system to replace and/or supplement the multiple systems currently in service;
- Investigate in more detail the water management strategies in the Region G Regional Water Plan as they apply to the FHLM Counties;
- Evaluate various options, including reuse and desalination of brackish groundwater, for the FHLM Counties to address the arsenic compliance issue and the declining groundwater levels of the Trinity Aquifer;
- Options to provide a cost-effective reliable water supply (raw and potable) to municipal and private customers;
- Interconnections of existing water systems, where needed, to provide redundancy in case of system failures; and,
- Options for smaller water systems that do not want to be in the 'water business' to connect to a larger water system.

The study area primarily includes McLennan County, as well as portions of adjacent areas in Falls, Hill and Limestone Counties; a majority of the project participants are using groundwater supplies. Reference the overview map in **Figure 2-1** for a detailed summary of all water systems included in the evaluation of this study; this map notes the water source, projected populations (2040), and projected water demand (2040) for each of the project participants. The water CCN (Certificate of Convenience and Necessity) boundaries of the project participants are also noted on this figure.

Eight of the participating entities in the study are currently under USEPA enforcement due to elevated arsenic concentrations exceeding the MCL in their groundwater supply. Water quality, water reliability and reduction of over-pumping the Trinity Aquifer in the Waco area are the primary issues in providing for a long-term water supply, particularly in this segment of the Brazos River basin.

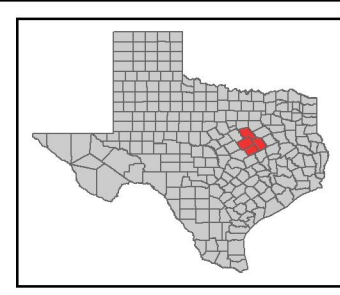
At the time of the project kick-off meeting for this study, the Brazos River Authority stated that all water rights had been completely allocated in the Brazos River Basin. In addition, the City of Waco stated during the project kick-off meeting and throughout the duration of this study that the City did not have additional water supplies to sell at this time.



Legend

- FHLM County Boundary
- Area CCN Facilities
- Area CCNs

TWDB-FHLM Regional Water Facility Study
Figure 2-1
Overview of Participating Entities



2.2 SCOPE OF WORK

The scope of work for this study involved evaluating the feasibility of developing regional water distribution and treatment facilities to serve existing and future development in Falls, Hill, Limestone and McLennan Counties. The following items were included in the study from an engineering standpoint, as well as to satisfy the requirements of the TWDB grant program:

- **Population and Water Demand Projections** – Population and growth projections, number of existing water connections, utility development agreements and additional water system information were collected from each of the entities. This data was used to develop population and water demand projections for each entity in five year increments through year 2040.
- **Regional Distribution Alternatives** – Options were developed for connecting existing water systems participating in the study into an overall regional water distribution system.
- **Regional Water Treatment Alternatives** – Various options were developed that included expanding existing infrastructure, as well as constructing new regional infrastructure to serve the study area. A desktop water quality analysis was conducted for entities needing additional water supplies for blending in order to reduce the concentration of arsenic in their groundwater supplies.
- **Implementation Schedule** – An implementation plan was developed for the phased construction of regional distribution and treatment facilities for the study area through 2040. This plan takes into consideration the existing distribution and treatment capacities, water quality issues, future developments, anticipated growth and cost-effectiveness.
- **Cost Estimates and Recommendations** – An economic analysis including the capital and O&M costs for each identified entity for the various options was performed. The capital and O&M costs for the final regional distribution and treatment system alternatives were combined and converted to present worth.
- **Funding Options** – Potential funding sources and traditional financing programs for the construction of various options of the FHLM Regional Water Systems were explored.
- **Water Conservation and Drought Contingency Plans** – TWDB requires project participants receiving grant funding through the Regional Water and Wastewater Facilities Planning Grant Program to prepare and implement water conservation and drought contingency plans. Copies of both of these plans from each of the project participants are included in Appendix A.

Information about each of the items listed in the scope of work is detailed in the following sections of the report.

Section 3.0

DESCRIPTION OF STUDY AREA

The study area for this regional water facility master plan is primarily McLennan County in addition to portions of Falls, Hill and Limestone Counties. McLennan County had a 2010 population of 234,906; this population is a 21,389 increase over the 2000 population. The projections for future growth that are discussed in Section 4 indicate that the population in all four counties will continue to grow. The remainder of this section of the report presents basic information along with sources of water for the study area.

3.1 PHYSICAL ASPECTS

Falls, Hill, Limestone and McLennan Counties are located in the Region G regional planning area. McLennan County is located in east Central Texas, bordered by Hill, Limestone, Falls, Bell, Coryell, and Bosque Counties. The City of Waco, the county seat, is located on the Brazos River at the intersection of Interstate Highway 35 and U.S Highway 84. The county's mineral resources include limestone, sand, gravel, oil, and gas.

In Falls County, the City of Marlin is the largest town and the county seat, located approximately 24 miles south of Waco. Falls County covers 765 square miles in the Blackland Prairie region. The gently rolling terrain consists of broad flatlands, with elevations ranging from 300 to 500 feet, and the Brazos River bisects the county. The main natural resource is the land, but there are a few oil and gas wells.

Hill County is located in north Central Texas. Hillsboro, the county seat and largest city within the county, is located at the junction of Interstate Highway 35 East and West, about fifty-five miles south of Fort Worth and 35 miles north of the City of Waco. Hill County comprises 1,012 square miles within the Blackland Prairie, Grand Prairie, and Eastern Cross Timbers regions. The county topography includes level plains and gently rolling hills at an elevation varying between 400 and 900 feet above sea level. Cotton, grain sorghum, and corn are the primary crops of the region and provide stability to the area economy.

Limestone County is located in Central Texas about thirty miles east of the City of Waco. The City of Mexia, the largest community in the county, is located approximately eighty miles south of Dallas; the City of Groesbeck is the county seat. The county comprises 931 square miles, primarily in the Blackland Prairies region. The natural resources of the county are clays, including kaolin and ceramic clays, limestone, industrial sand, glauconite, lignite coal, oil, and gas.

Other physical aspects discussed in the following sections include both hydrology and geology of the study area.

3.1.1 Hydrology

There are several lakes, river, and streams located in Falls, Hill, Limestone and McLennan Counties. The primary hydrologic feature is the Brazos River, which is located in the Brazos Basin. Brazos Basin is the second largest river basin by area within Texas. The Brazos River flows from the confluence of its Salt and Double Mountain forks in Stonewall County to the Gulf of Mexico. It is the state's third longest river and has the largest average annual flow volume of any river in the state.

McLennan County lies entirely within the Brazos River basin and is drained primarily by the South and Middle Bosque rivers in the west and by the Tehuacana and Aquilla creeks in the east; the Brazos River crosses the county from northwest to southeast. The average rainfall in McLennan County is approximately 33 inches per year.

In Hill County, the Nolan River, Mustang Creek, and Whiterock Creek drain into the Brazos River, which forms the county's western border. Streams in the eastern and northern parts of the county, such as Richland, Ash, and Bynum Creeks, empty into the Trinity River basin. Flood controls and water supplies for the county are provided by Lake Whitney in the west, Lake Navarro Mills in the southeast, and Lake Aquilla in the southwest. The average rainfall in Hill County is approximately 36 inches per year.

Limestone County, located on the divide between the Brazos and Trinity Rivers, is drained and divided by the Navasota River and its tributaries. Reservoirs located in Limestone include Lake Mexia, Springfield Lake, and Lake Limestone. The average rainfall in Limestone County is 38 inches per year.

3.1.2 Geology

The study area includes two major aquifers (Carrizo-Wilcox and Trinity) and two minor aquifers (Brazos River Alluvium and Woodbine). Situated partially in the Grand Prairie and partially in the Blackland Prairie, McLennan County comprises 1,031 square miles of flat to rolling terrain at elevations ranging from 400 to 850 feet above sea level. The land in the western section of the county has varied terrain surfaced by shallow, stony soils that support mountain cedar and oak. The eastern section is generally low rolling to flat, with black, waxy soils made up of clay and sand loams that support mesquite, scrub brush, and grasses. The county is bisected from southwest to northeast by the Balcones Fault, and the rolling prairie along the fault line is broken by locally steep slopes.

Aquifers of the Cretaceous age in North-Central Texas consist of three main sandy units of the Trinity Group, which also includes the Woodbine aquifer. They are the Hosston Sand, the Hensell Sand, and the Paluxy formation. The former two are often grouped with other units into the Travis Peak/Twin Mountains formation. The participants' wells located in Limestone County are completed in the Twin Mountain formation. In general, arsenic concentrations in the Trinity aquifer are low and most samples are below the arsenic MCL of 10 ppb. Groundwater wells having arsenic concentrations greater than 10 ppb are typically found in the eastern part of the aquifer in McLennan and Falls Counties.

Subsurface deposits of Hill and McLennan counties are mostly of the Cretaceous age (Klemm, *et al.* 1975; Baker, *et al.* 1990; R.W. Harden & Associates, Inc (RWHA) 2004) and overlie a Paleozoic basement located at a depth of about 800 feet in northern Hill County to more than 3,000 feet in eastern McLennan County marking the complex transition to the deeper East Texas Basin and its thick sediment accumulation. The base of the Cretaceous sediments consists of a basal conglomerate grading into sandy material (Hosston Sand) overlain by mostly calcareous rock.

The Travis Peak / Twin Mountains formation is overlain by the thick accumulation of the Glen Rose formation, itself overlain by the Paluxy Sand. All previously described sediments make up the Trinity Group. The Woodbine Sand is separated from the top of the Trinity Group (Paluxy formation) by mostly calcareous accumulations of the Fredericksburg and Wachita Groups (including the Edwards Limestone and the Del Rio Clay) that top the Lower Cretaceous. The Woodbine Sand is the first unit of the Upper Cretaceous. The Austin Chalk and other Cretaceous formations of the Taylor Group overlie the Woodbine Sand. The Nacatoch Sand of the Navarro Group forms the last sandy unit of Cretaceous age. It crops out a few miles east of McLennan and Hill Counties. In both McLennan and Hill Counties, the outcropping formations run from the Edwards Limestone on the western edges of the counties to the base of the Navarro Group on the eastern edges. Both counties are intersected by north-trending faults that impact the distribution of groundwater quality.

Major water-bearing formations are those of the Travis Peak / Twin Mountain formations and, to a lesser degree, the Paluxy formation (all from the Trinity Group) grouped under the umbrella of the Trinity aquifer (RWHA 2004) and the Woodbine formation (Woodbine Group) (Baker, *et al.* 1990). The Trinity aquifer is confined because the formations crop out farther west and in a Woodbine aquifer with an unconfined section in the outcrop area and a confined section further downdip. The thickness of the Hosston Sand ranges from 100 feet in western Hill County to more than 700 feet at the extreme eastern corner of McLennan County. The average thickness in the study area can be estimated at 250 feet (RWHA 2004, Figure 4.15). Depth to the base of the unit varies from approximately 1,000 to 3,500 feet. Thickness of the Hensell Sand ranges from 50 to 100 feet while those of the Paluxy formation range from 0 to 100 feet. The Paluxy formation does not currently extend south of McLennan County. The depth to the base of the Paluxy formation varies from 500 to 2,500 feet (RWHA 2004, Figure 4.8). The Woodbine formation is approximately 150 feet thick in Hill County.

3.2 SOURCES OF WATER

Infrastructure and water supply go hand in hand when developing a regional water facility plan. However, based on the TWDB planning grant requirements, this study focuses on evaluating regional infrastructure alternatives and utilizes water supply information provided in the *2011 TWDB Region G Water Plan*; the scope of this study does not focus on identifying new sources of water supplies to serve the area. Through TWDB's on-going regional water planning efforts, sources of water supply and water strategies are identified in the plans developed for each planning region. This section highlights information regarding existing water supply resources within the study area.

3.2.1 Surface Water Resources

The primary surface water sources in the study area are the Brazos River and its tributaries. Lake Waco is located about two miles west of Waco in McLennan County, on the Bosque River, a tributary of the Brazos River. The lake is owned by the U.S. Government and operated by the U.S. Army Corps of Engineers for purposes of municipal, industrial water supply, flood control, conservation and recreation. The water rights are allocated to the City of Waco and the Brazos River Authority.

Other sources of surface water are Lake Aquilla, Lake Whitney, Lake Limestone and other existing and proposed reservoirs. Lake Aquilla is located approximately twenty-three miles north of Waco in Hill County, on Aquilla Creek and Hackberry Creek, tributaries of the Brazos River. Lake Whitney and Whitney Dam are located on the boundary line of Hill County and Bosque County on the Brazos River main stem. Lake Limestone is located mainly in Limestone County on the Navasota River, a tributary of the Brazos River; the Brazos River Authority owns and operates the lake facility for water supply and recreational purposes.

Some of the existing surface water supplies being used in the study area include Lake Waco by the City of Waco and its wholesale customers, the Brazos River by the City of Robinson, Lake Marlin by the City of Marlin and New Lake Mart by the City of Mart. Both Lake Marlin and New Lake Mart are privately owned by their respective cities; these reservoirs are not operated by the U.S. Army Corps of Engineers under contract with the Brazos River Authority for water supply, flood control, and recreation purposes.

Another surface water supply in the study area is Tradinghouse Creek Reservoir. This reservoir is located about nine miles east of Waco in McLennan County, on Tradinghouse Creek, a tributary of Tehuacana Creek which is a tributary to the Brazos River. The reservoir is currently owned and operated by Luminant for industrial (cooling and condensing for electric generating plant) and recreational purposes. Based on the Brazos River Authority's guidelines, Luminant is allowed to pump water from the Brazos River in the event when the water level of the reservoir is too low to operate.

3.2.2 Groundwater Resources

Groundwater resources play an important role in the overall evaluation of water resources and alternatives to diversify an entity's water supply portfolio. Two of the four counties in the study area, Hill and McLennan Counties, have groundwater conservation districts that regulate the withdrawal and use of groundwater resources within their respective counties based on their adopted groundwater management plans. In Falls and Limestone Counties, groundwater conservation districts have not been created at this time.

The Southern Trinity Groundwater Conservation District (STGCD) was formed in 2007 to protect the underground water resources for the citizens of McLennan County. Small irrigation wells and domestic wells located in McLennan County are considered exempt wells and are registered with STGCD. All other wells are considered non-exempt and must obtain a permit. Permitted wells

with STGCD are required to report their annual usage and pay a fixed cost per 1,000 gallons used; however, registered wells do not have this requirement.

The Prairielands Groundwater Conservation District (PGCD) was created in 2009 with a directive to conserve, protect and enhance the groundwater resources of Ellis, Johnson, Hill and Somervell Counties. PGCD does not have a well permitting system in place at this time. Rather, they register all exempt and non-exempt wells drilled after April 1, 2011. All non-exempt wells drilled prior to April 1, 2011 had to register with the District but historic exempt wells did not need to register with the District, although they were encouraged to do so. The PGCD charges a cost per 1,000 gallons to non-exempt wells.

The FHLM study area is located in Groundwater Management Area 8 (GMA-8), and TCEQ has designated a large area over the Trinity Aquifer from the Red River to Central Texas as a Priority Groundwater Management Area (PGMA) due to the critical groundwater declines facing the area. The preferred state of an aquifer over the ensuing 50 years is called the desired future condition. Based on GMA-8 Desired Future Conditions (DFC), the water levels in the Trinity Aquifer will drop over 500 feet by 2050 (approximately 10 feet per year).

The modeled available groundwater (MAG) is the amount of groundwater pumping that will achieve the desired future conditions. The MAG is an annual rate used for issuing permits and is included in the regional water plans as the groundwater availability. Based on the *2011 TWDB Region G Water Plan*, McLennan County has a MAG of 35,717 acre-feet per year of groundwater available. Since only 1,600 acre-feet per year of the MAG remains for McLennan County, the STCGD is only permitting new wells on a case-by-case basis. Population projections show that groundwater usage, without alternatives, will continue to increase well beyond the MAG.

Major aquifers are defined by TWDB as aquifers that are capable of producing yields greater than 500 gallons per minute to wells or that produce groundwater over a large area. Minor aquifers are defined by TWDB as aquifers that may be capable of producing only limited yields (less than 100 gallons per minute) to wells or that produce groundwater over a limited area. The following major and minor aquifers are located within the study area (reference **Figure 3-1**).

- Trinity Aquifer (major)
- Carrizo-Wilcox Aquifer (major)
- Brazos River Alluvium Aquifer (minor)
- Woodbine Aquifer (minor)

3.2.2.1 Major Aquifers

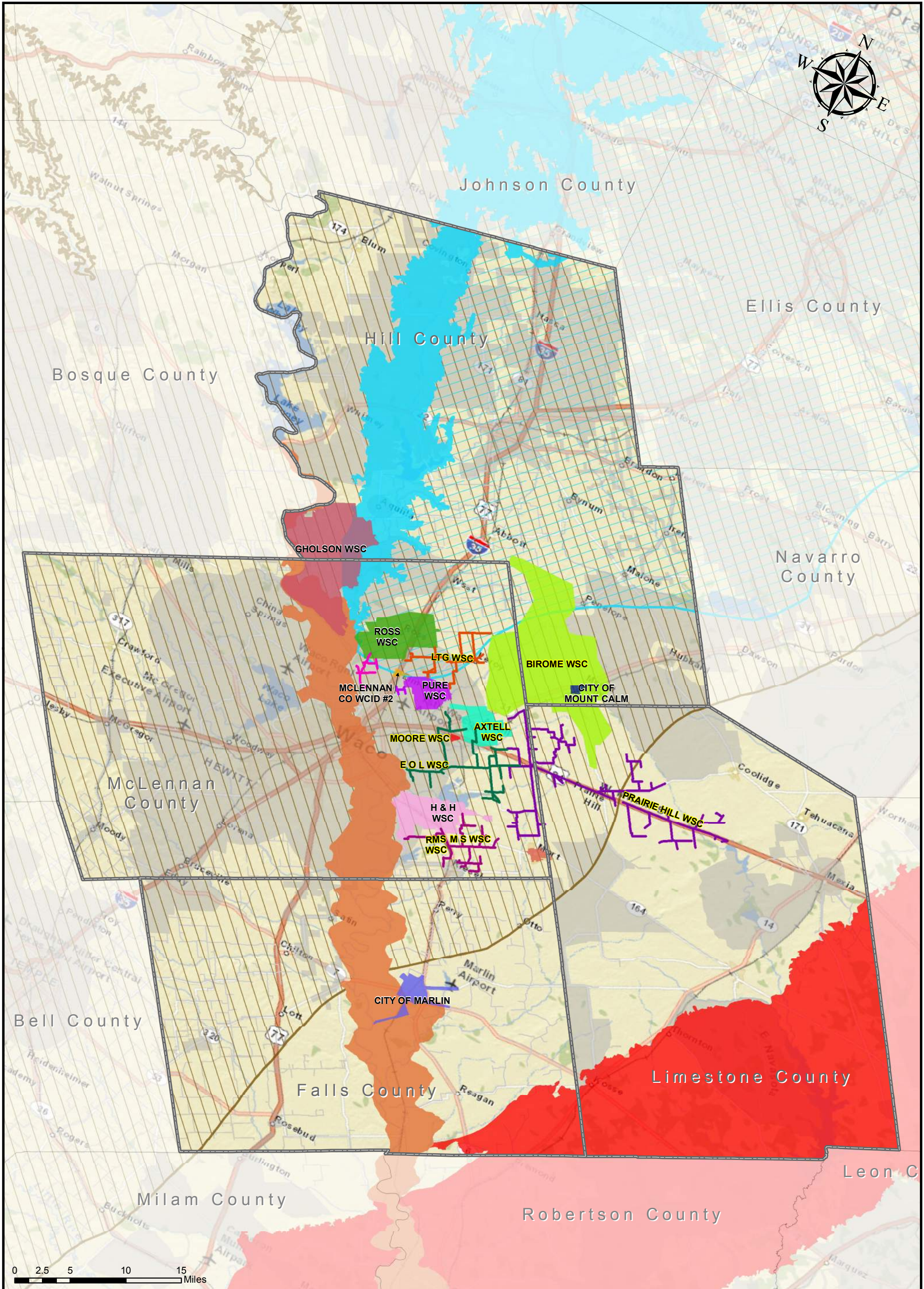
Two major aquifers have been identified in the study area: the Trinity and the Carrizo-Wilcox Aquifers. The Trinity Aquifer extends across much of the central and northeastern part of the state, including the FHLM Counties. The Trinity Aquifer is composed of three subdivisions; the Upper Trinity; the Middle Trinity and the Lower Trinity aquifers. The Upper Trinity aquifer is composed of the Paluxy Sand and Glen Rose Formation; the Middle Trinity aquifer is composed of the Hensell Sand and Cow Creek Limestone; and the Lower Trinity aquifer is composed of the

Sligo Limestone and Hosston Sand. The study area is primarily in the subsurface area of the Trinity and has limited outcrops in the FHLM Counties. The availability of groundwater from the Trinity aquifer is based on the management of aquifer pumping to maintain the resulting draw down within acceptable limits.

The second major aquifer is the Carrizo-Wilcox Aquifer, with the outcrop located in the southeast portion of Falls and Limestone Counties. The Carrizo-Wilcox Aquifer is a major aquifer extending from the Louisiana border to the border of Mexico in a wide band adjacent to and northwest of the Gulf Coast Aquifer. It consists of the Wilcox Group and the overlying Carrizo Formation of the Claiborne Group. The aquifer is primarily composed of sand locally interbedded with gravel, silt, clay, and lignite. Although the Carrizo-Wilcox Aquifer reaches 3,000 feet in thickness, the freshwater saturated thickness of the sands averages 670 feet. The groundwater is generally fresh and typically contains less than 500 milligrams per liter of total dissolved solids in the outcrop, whereas softer groundwater with total dissolved solids of more than 1,000 milligrams per liter occurs in the subsurface. The *2011 TWDB Region G Water Plan* shows that the Carrizo-Wilcox Aquifer has a groundwater availability estimate of 12,178 acre-feet per year in Limestone County.

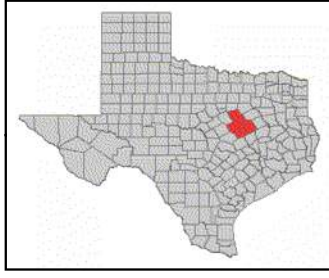
3.2.2.2 Minor Aquifers

Additional groundwater sources that are also important to the FHLM Counties are two minor aquifers in the area, which include the Brazos River Alluvium and the Woodbine Aquifers. The Brazos River Alluvium Aquifer is a minor aquifer found along the Brazos River in Falls, Hill and McLennan Counties. The aquifer is approximately 7 miles wide and extends from southern Bosque County to eastern Fort Bend County. Groundwater is contained in alluvial floodplain and terrace deposits. The quality of the water in the aquifer is very hard and fresh to slightly saline, generally containing less than 1,000 milligrams per liter of total dissolved solids but ranging to as much as 3,000 milligrams per liter in some wells. The aquifer is under water table conditions in most places and is used primarily for irrigation. The majority of the wells typically yield from 250 to 500 gallons per minute; however, some wells can yield as much as 1,000 gallons per minute. New wells in the Brazos River Alluvium can be permitted (exempt) by STGCD; reports show groundwater availability estimates ranging from approximately 12,000 to 18,000 acre-feet per year for McLennan County.



Legend	
	FHLM County Boundary
	Area CCN Facilities
	Area CCNs
	EPA Arsenic Violations
Aquifers	
	Brazos River Alluvium
	Woodbine (outcrop)
	Woodbine (subcrop)
	Carrizo - Wilcox (outcrop)
	Trinity (subcrop)

TWDB-FHLM Regional Water Facility Study
Figure 3-1
Groundwater Resources



The Woodbine Aquifer is a minor aquifer located in Hill and McLennan Counties. The aquifer overlies the Trinity Aquifer and consists of sandstone interbedded with shale and clay that form three distinct water-bearing zones. The Woodbine Aquifer reaches 600 feet in thickness in subsurface areas, and freshwater saturated thickness averages about 160 feet. In general, water to a depth of 1,500 feet is fresh, containing less than 1,000 milligrams per liter of total dissolved solids. Water at depths below 1,500 feet is slightly to moderately saline, containing from 1,000 to 4,000 milligrams per liter of total dissolved solids. The aquifer provides water for municipal, industrial, domestic, livestock, and small irrigation supplies. The *2011 TWDB Region G Water Plan* shows that the Woodbine Aquifer has a groundwater availability estimate of approximately 2,261 acre-feet per year in Hill County.

3.3 REGIONAL STUDY WATER SUPPLIES

The participants in the study area primarily obtain their water supplies from the Trinity Aquifer. In eastern McLennan County, wells that tap the Trinity Aquifer are quite deep and there is naturally occurring arsenic in the groundwater. For several participants, the concentration in their groundwater is greater than the Maximum Contaminant Level (MCL) for arsenic. Furthermore, the DFC for the Trinity Aquifer in eastern McLennan County shows a water level drop of over 500 feet over the next 50 years. For many of the well owners, this drop in water level will require at a minimum resetting of the pumps and an increase of motor horsepower and electrical service. For some well owners, it may require deepening the well casing or going to a smaller pump that will fit in the well casing at the depth of the water. This section discusses the available water supplies in the study area and how they could be utilized to meet the participant's water needs.

3.3.1 Groundwater

Groundwater supplies in addition to the Trinity Aquifer consist of the Carrizo-Wilcox Aquifer (major aquifer) in southeastern Falls and Limestone Counties and the Brazos Alluvium Aquifer (minor aquifer) in McLennan, Falls and Hill Counties and the Woodbine Aquifer (minor aquifer) in Hill and McLennan Counties. Consideration was given to each of these water supplies. The possibility of using these aquifers was presented in the initial screening of alternatives public meeting.

The concern of the participants regarding the Brazos Alluvium was the availability to the participants and the water quality, which can be slightly saline. The Woodbine Aquifer was not discussed in great detail because of the proximity to the participants; the aquifer is located in the Prairielands Groundwater Conservation District and the MAG for this aquifer in Hill County is already exceeded. The participants were interested in the water available from the Carrizo-Wilcox Aquifer in Limestone County. According to the Groundwater Availability Model, there is approximately 12,000 ac-ft/yr available from the Carrizo-Wilcox Aquifer in Limestone County and only a portion of that modeled available groundwater is currently being utilized. As stated above, the water quality in the Carrizo-Wilcox Aquifer is generally good and the wells can yield significant quantities of water.

3.3.2 Surface Water

There are several surface water sources that are potentially available as water supplies in the study area. The study area is completely in the Brazos River basin and the surface water supplies are either from the Brazos River or its tributaries. At the time of the preparation of this facility plan, the Brazos River Authority's system wide permit has not been approved. If approved by the TCEQ, the system wide permit may make surface water available for contract sales to the study participants. Surface water options discussed in subsequent sections are contingent upon the system wide permit being approved. Some of the existing surface water supplies being used in the study area include Lake Waco by the City of Waco and its wholesale customers, the Brazos River by the City of Robinson, Lake Marlin by the City of Marlin and New Lake Mart by the City of Mart. Another surface water supply in the study area is Tradinghouse Creek Reservoir. This supply from this reservoir is currently allocated as steam-electric to meet the cooling needs of power plants. Early in the study, contact was made with the owner of the reservoir to discuss the availability of water supply. Upon initial contact, there appeared to be available surface water that could be contracted. As the study progressed, however, the owner of the reservoir entered bankruptcy and the availability of surface water from that reservoir was no longer considered a viable option for this study. Proposed surface water supplies include Brushy Creek Reservoir which would be an additional supply for the City of Marlin.

As mentioned above, this facility plan is not scoped to investigate supplies but is to rely on the supplies reported in the *TWDB 2011 Region G Water Plan*. As such, the supply from Lake Marlin and New Lake Mart are not considered because according to the *TWDB 2011 Region G Water Plan*, these reservoirs are not adequate to meet the needs of their owning community. Likewise, Brushy Creek Reservoir which is sponsored by the City of Marlin only firms up the future water supply needs of the City of Marlin. In previous studies of options to provide supplemental or replacement water for the systems that are violating the arsenic MCL, water from the City of Waco was considered. At the start of this study, the City of Waco stated that surface water would not be available at this time.

In addition, wastewater reuse was evaluated as an additional water supply source for blending purposes for the arsenic violators. However, a majority of the project participants, including all of the water supply corporations and City of Mount Calm, use individual septic systems. The Cities of Mart and Marlin each have a centralized wastewater treatment system; however, the limited amount of effluent available and location of the treatment facilities in relation to the other project participants cause reuse to not be a viable alternative for the study.

Since the drought of 2011 and the senior calls for surface water in the Brazos River basin, the City of Waco has become concerned that it may not have sufficient supply to meet demands beyond their demands and what is currently contracted with their wholesale customers. It is possible that the City of Waco would have surface water to sell to the study participants if their reclaimed water program progresses to the point that the use of reclaimed water by industrial customers frees up surface water to sell to the study participants. This may be a long term program to implement the reclaimed water system and the accompanying availability of surface

water. This may not fit within the timeframe needed for the study participants to address their arsenic issues.

Section 4.0

GROWTH PROJECTIONS

4.1 POPULATION PROJECTIONS

The population in the study area has increased steadily over the past 10 years and is projected to continue to increase over the next 30 years. In order to accurately capture the population growth of the study area, the following information was collected from each participant:

- Current population and growth projections;
- Number of existing water connections;
- Water system information;
- Utility development agreements for planned developments; and
- Build-out schedules and conceptual plans of planned developments.

During the project kick-off meeting, a data request handout was provided to the project participants to collect detailed information about their service area and water system in order to initiate the engineering analysis. As part of their in-kind service contributions, project participants provided their existing population (2010 Census and 2014), average annual growth rate including supporting data, and information on any large developments planned for their area or its vicinity. Project participants also provided population projection data prepared by or for their entity.

In addition, individual discussions were held with the two industrial project participants to obtain system and water demand information. Separate discussions were also held with the Southern Trinity Groundwater Conservation District to obtain groundwater usage data for McLennan County.

This information, along with population and growth projection data obtained from the 2010 U.S. Census Bureau, *TWDB 2011 Region G Water Plan*, Texas State Data Center (TSDC), Rice University – Hobby Center for the Study of Texas, and the Texas Transportation Institute for Heart of Texas Council of Governments (HOTCOG) was used to develop population projections for each entity in five year increments through a 2040 planning horizon. **Table 4-1** summarizes the population and growth projections from the sources cited above; this data was used for comparison purposes.

In **Figures 4-1** through **4-4**, targeted areas for population growth identified by the U.S. Census data forecast for the FHLM Counties are shown below. The area representing the highest population density in 2010 is highlighted in bright red in Figure 4-1. In Figures 4-2 and 4-3, the greatest amount of change in population density from 2010 to 2020 is represented by the yellowish-green shaded area (Hill County) and then shown with a sage green area (Falls

County) for the greatest population change from 2010 to 2030. The population change from 2010 to 2040 in Figure 4-4 is not very substantial. The population density shown in these figures was used for information purposes only as a visual representation for the participants during the project meetings.

Table 4-1: FHLM Counties – Population & Growth Projections

Reference	Year 2010	Year 2040	Annual Growth Projection
FALLS COUNTY			
2010 U.S. Census Bureau	17,866	---	---
TWDB 2011 Region G Water Plan	19,600	23,350	0.59%
Texas State Data Center*	17,866	18,953	0.20%
HILL COUNTY			
2010 U.S. Census Bureau	35,089	---	---
TWDB 2011 Region G Water Plan	33,416	38,407	0.47%
Texas State Data Center*	35,089	41,786	0.58%
LIMESTONE COUNTY			
2010 U.S. Census Bureau	23,386	---	---
TWDB 2011 Region G Water Plan	23,322	26,505	0.43%
Texas State Data Center*	23,386	27,792	0.58%
MCLENNAN COUNTY			
2010 U.S. Census Bureau	234,906	---	---
TWDB 2011 Region G Water Plan	231,882	282,177	0.66%
Texas State Data Center*	234,906	289,707	0.70%

* Population projections represent 0.5 Migration Scenario

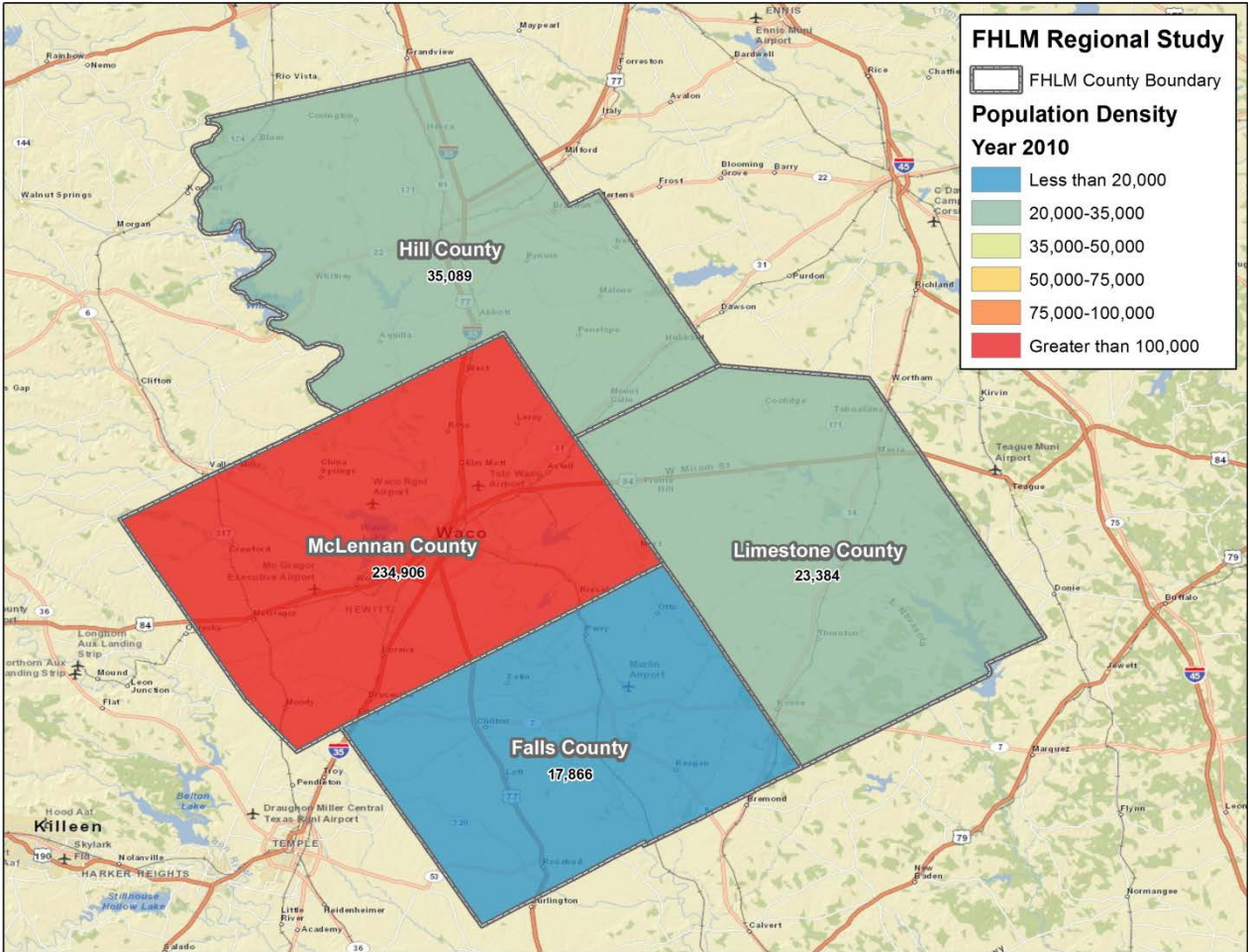


Figure 4-1: FHLM Counties – 2010 Population Density

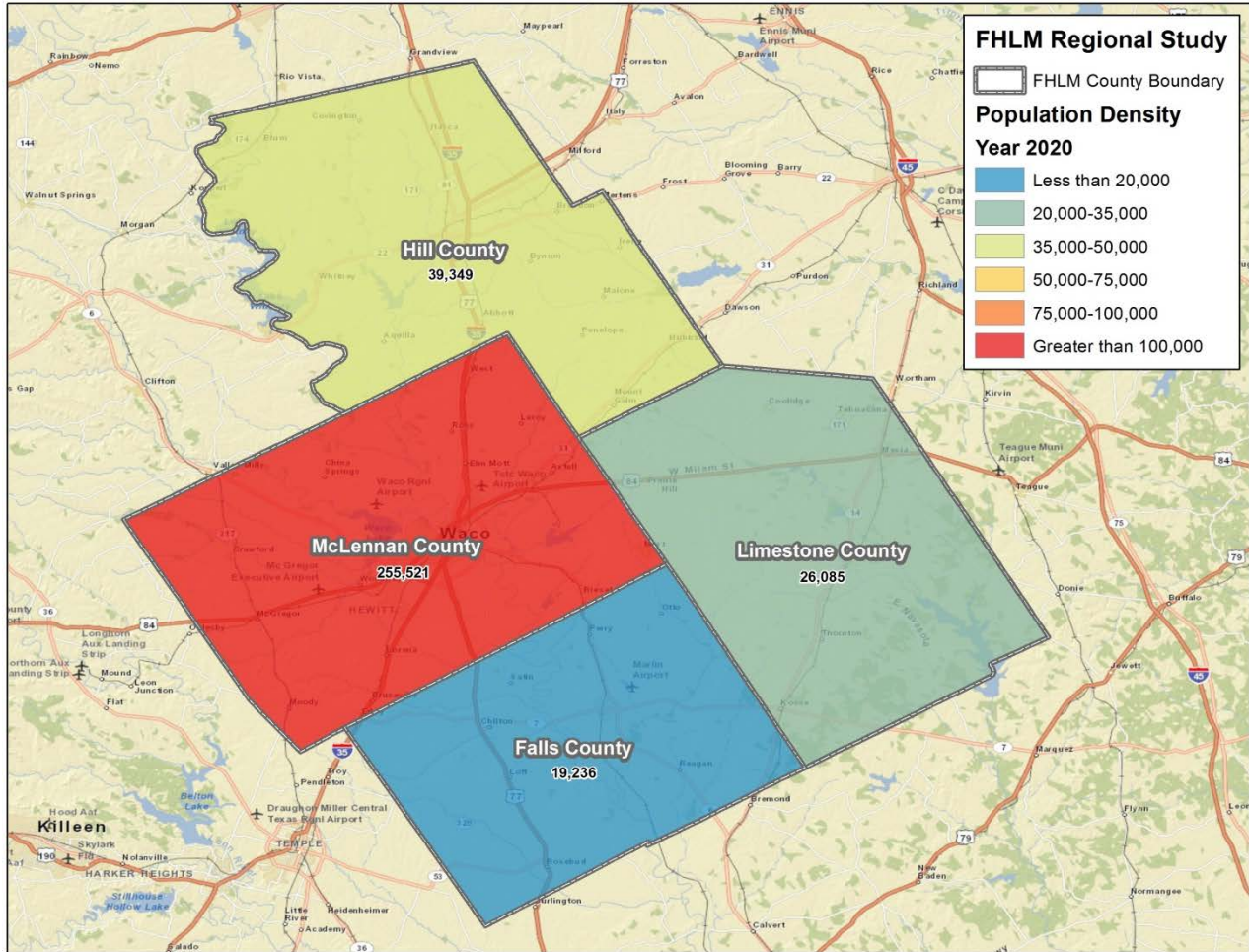


Figure 4-2: FHLM Counties – Change in Population Density (2010-2020)

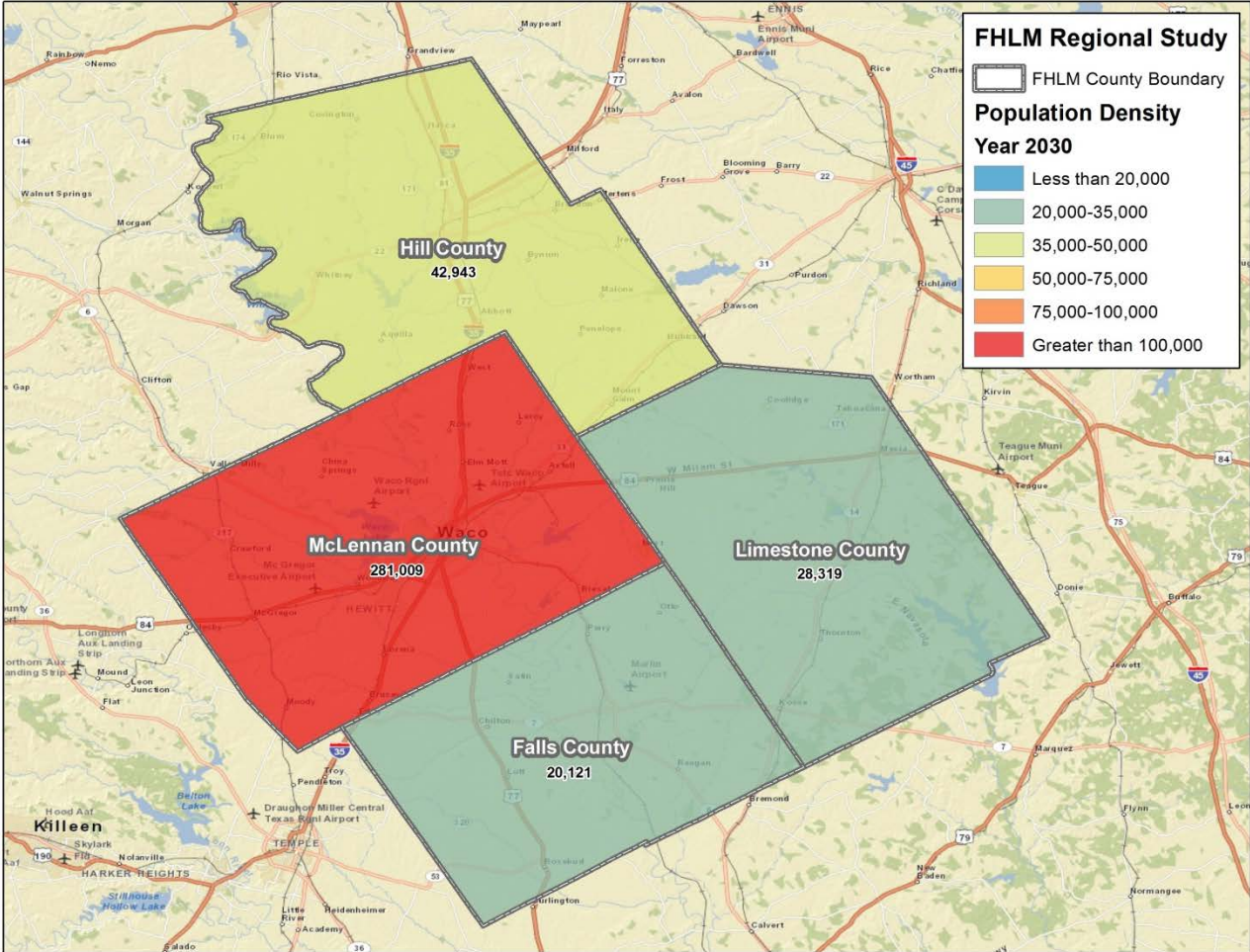


Figure 4-3: FHLM Counties – Change in Population Density (2010-2030)

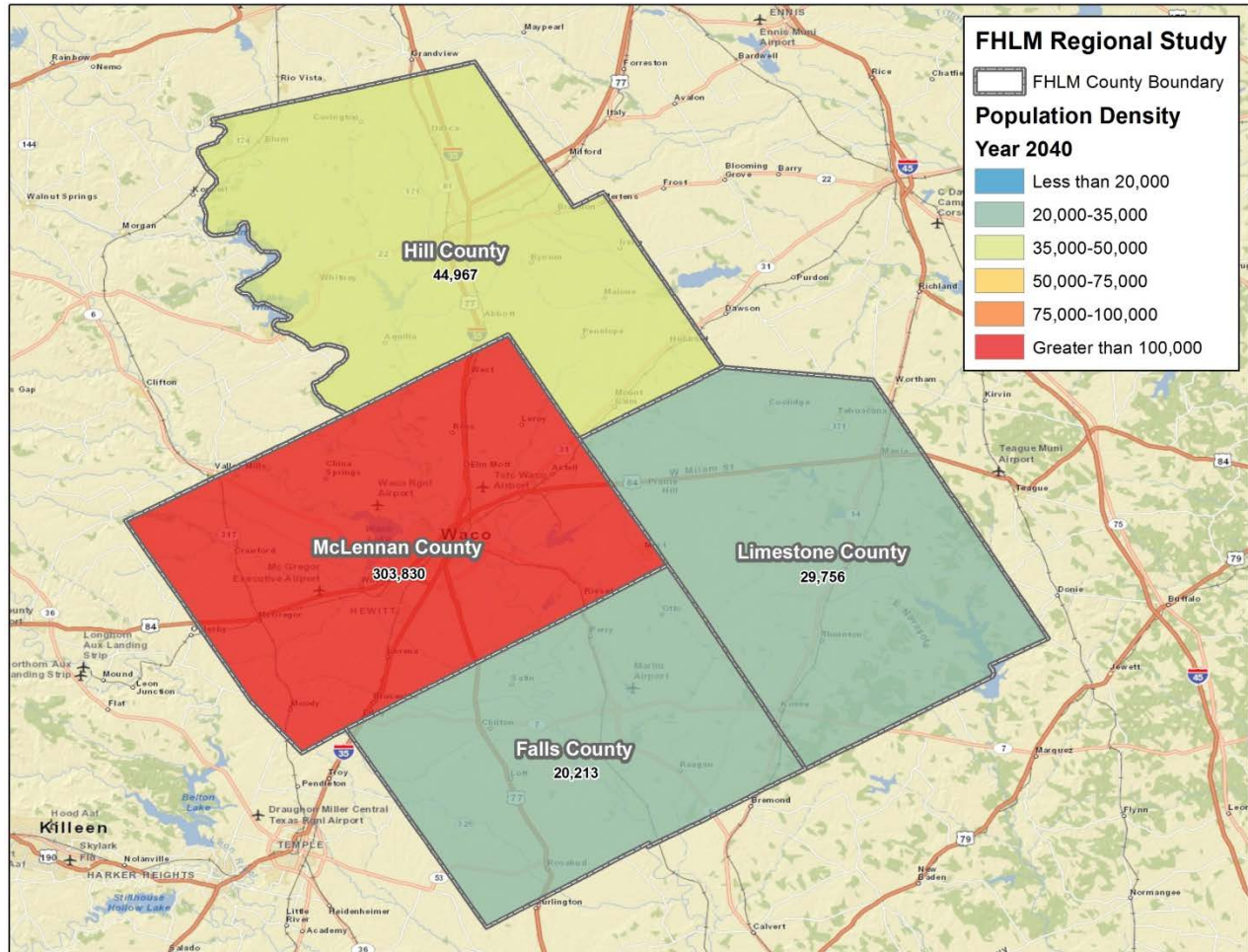


Figure 4-4: FHLM Counties – Change in Population Density (2010-2040)

Based on the information collected at the beginning of the study, population projections were developed for each entity; these projections were based on the 2010 U.S. Census Bureau figures, each entity’s population and growth rate data, and/or growth rates outlined in the *TWDB 2011 Region G Water Plan*. **Table 4-2** summarizes population projections in five year increments from 2010 through 2040 for the participating cities and water supply corporations located in the study area. These population projections were calculated by multiplying the 2010 U.S. Census population values by the average annual growth rates provided by the participants during the initial data collection exercise and then projected through the 30-year planning period based on the available service area for ultimate buildout. Reference Appendix B for a complete summary of population projections for the project participants.

Table 4-2: Population Projections – Project Participant Data

Entity	Population Projections						
	2010	2015	2020	2025	2030	2035	2040
City of Mart	2426	2512	2601	2694	2789	2888	2991
City of Marlin	5967	6087	6210	6335	6463	6593	6726
City of Mount Calm	320	325	330	335	340	345	350
Axtell WSC	1513	1574	1634	1695	1755	1816	1876
Birome WSC	1506	1556	1606	1656	1706	1756	1806
Chalk Bluff WSC	3432	3660	3960	4335	4710	5085	5460
EOL WSC	1625	1699	1777	1858	1944	2033	2126
Gholson WSC	2985	3033	3093	3153	3213	3273	3333
H&H WSC	1431	1504	1581	1661	1746	1835	1929
LTG WSC	1396	1466	1533	1601	1668	1735	1802
Moore Water System	246	247	248	250	251	252	253
M.S. WSC	681	684	687	691	694	697	701
McLennan Co WCID 2	1751	1760	1769	1778	1787	1795	1804
Prairie Hill WSC	1794	1840	1886	1934	1982	2032	2084
Pure WSC	707	707	711	715	718	722	725
RMS WSC	960	1039	1124	1217	1317	1425	1542
Ross WSC	2144	2250	2361	2478	2601	2729	2864
TOTAL	30,885	31,944	33,113	34,384	35,683	37,012	38,373

Figure 4-5 represents a comparison of data sources for the annual growth rate projections for the seventeen participating cities, water supply corporations and water systems located in the study area; projections for the MUDs, WUGs, and 'County Other' are not included in the figure. The TSDC projections use a complex model that follows population cohorts as they age and adds and subtracts from the population by modeling the demographic processes of birth, death, and migration. Based on the latest estimates from the U.S. Census, the 0.5 Migration Scenario represents a conservative estimate for the study area. The annual growth rate projection over the entire study period is 0.7 percent for both the TSDC data (0.5 Migration Scenario) and the project participant data. This similar data trend verifies the methodology used and that the projections are reasonable.

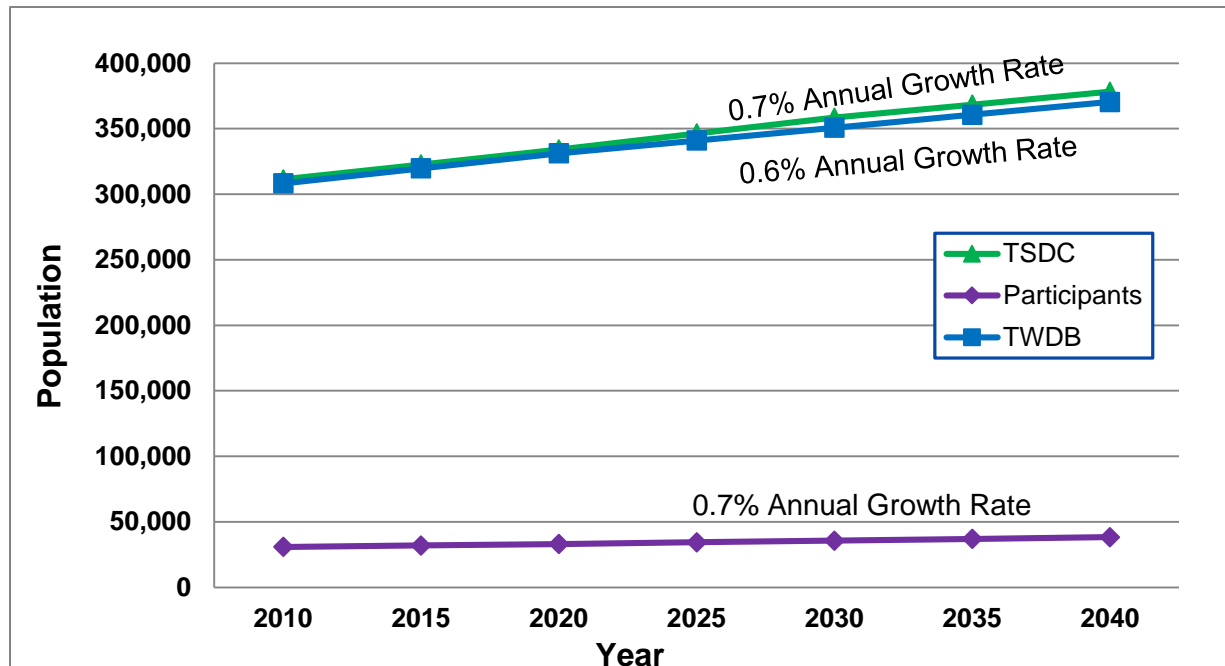


Figure 4-5: Comparison of TSDC, Entity and TWDB Annual Growth Rates

Since each entity was able to justify the increase or decrease in population data and average annual growth rate for their area, this data was used instead of the TWDB data to size the proposed regional water infrastructure. This methodology, used by the project team, was approved by TWDB staff on March 31, 2015. The population projections for each of the entities were used to calculate water demands for the study area.

4.2 PLANNING AND DESIGN CRITERIA

Primary design criteria used for planning and evaluating water supply systems are listed below, along with a description of how these criteria are used in the sizing of the various water system components:

- Average yearly water demand: Used for estimating long-term surface water and groundwater withdrawal rates and for estimating yearly operational costs.
- Maximum daily demand: Used for sizing wells, raw water intakes, treatment plants, and major transmission mains (for example, between treatment plants and storage facilities).
- Peak hour demand: Used for sizing pumps and hydro-pneumatic tanks that supply water directly into the distribution system, and for distribution piping. Peak hour demands are also involved in sizing elevated water storage tanks.
- Minimum and maximum pressures: Dictate the elevations of elevated storage tanks, pipe sizing, service areas for each elevated or hydro-pneumatic tank, and pumping heads.
- Minimum water storage requirements: Used to size clearwells, ground storage tanks and elevated tanks.

As presented below, not all of the above criteria is applicable when planning a regional water system as most apply only or primarily to the planning of the local storage and distribution system. This is especially true if the regional system primarily provides wholesale treated water to the participating entities.

The Texas Commission on Environmental Quality (TCEQ) has established minimum values for most of the criteria listed above and 30 TAC 290 Subchapter D requires that a system be designed to meet the minimum criteria or better, unless the system can provide data that their water usage is consistently lower than the TCEQ minimum criteria.

4.2.1 Average Yearly Water Demand

The average yearly water demand is used to determine the long-term water needs of a community. This demand is used as a basis for acquiring surface water contracts, or determining long-term impacts on an aquifer. Average yearly demands are seldom used for sizing the infrastructure of a water system but they are used for estimating yearly operational costs, such as the cost of chemicals, energy, and solids hauling and disposal.

4.2.2 Maximum Day Water Demand

The maximum day water demand is the most important criteria in an infrastructure planning study since it is used to determine the required capacities of wells, intakes, water treatment plants, transmission mains, and most of the pumping stations found in a regional water system. The TCEQ minimum design standard is 0.6 GPM per connection for maximum day water demands.

This design standard was used to size the infrastructure in each of the alternatives considered in this study. Although a few of the participants have experienced maximum day demands greater than 0.6 GPM per connection, these will not have a significant impact on the overall sizing of the regional facilities for each alternative. If a regional system is implemented, the demands specific to each part of the regional system will need to be used in the final engineering design.

4.2.3 Peak Hour Demand

Peak hour demands dictate the sizing and layout of the distribution network within a water system and the sizing pumps and hydro-pneumatic tanks that supply water directly into a distribution system. Peak hour demands are also involved in sizing both ground and elevated storage tanks.

Most water systems do not monitor peak hour demands due to the difficulty of measuring these water demands. For this reason, the TCEQ minimum design criterion of 2.0 GPM per connection is typically used when planning and designing new infrastructure.

Peak hour demands are not applicable to a regional water system whose purpose is to provide treated water to existing entities that already have their local water distribution systems in place, or to future entities that will be constructing their own local water distribution infrastructure.

4.2.4 Maximum and Minimum Pressures

Maximum and minimum pressures impact pipeline sizes, storage tank elevations and booster pump locations regarding the planning and design of regional water facilities. According to TCEQ design criteria, the minimum pressure to use in laying out regional alternatives is 35 pounds per square inch (psi). Transmission main pressures are typically designed for operating pressures not to exceed 200 psi; but in some cases, higher pressures may be allowed in order to avoid the additional costs of installing a booster pumping station for example.

4.2.5 Minimum Water Storage Volume

TCEQ's water storage requirements vary with source water type and system size. Systems with surface water sources must have a clearwell(s) with a volume of at least 50 gallons per connection or a volume equal to 5 percent of the daily plant capacity, whichever is greater. TCEQ requires all water systems to provide a total storage of no less than 200 gallons per connection. At a minimum, 100 gallons of elevated storage must be provided for larger groundwater systems and surface water systems. For smaller systems, pressure (hydro-pneumatic) tanks may be used in lieu of elevated storage tanks, but the total storage must equal 200 gallons per connection.

Regional storage facilities are usually provided where booster pumping stations are required due to the length of a regional transmission main or where significant elevation increases occur along the main. These tanks are either ground storage or elevated storage tanks depending on the topography along the transmission main.

4.2.6 Recommended Criteria for Projecting Regional Water Demands

In summary, a maximum day demand of 0.6 GPM per connection was selected for sizing future facilities in this study. As previously mentioned, the maximum day demand has the largest impact on the sizing and cost of regional water facilities. Additional design criteria used are as follows:

- Average daily water demand: 0.30 GPM per connection
- Minimum transmission main pressure: 35 pound per square inch (psi)
- Maximum transmission main pressure: 200 psi
- Maximum velocity in water transmission mains: 5.0 feet per second (fps)
- Water storage for booster pumping stations: 30 minutes of storage at the design pumping rate of the booster station

4.3 WATER DEMAND PROJECTIONS

The first step in defining water treatment alternatives is to determine future demands for the study area. The assessment of water demands for the participating cities included evaluating their historical water usage (average day, maximum day and peak hour demands), as well as projected population growth and water consumption data. A summary of each project

participating entity's water consumption data based on gallons per capita per day (GPCD) is provided below in **Table 4-3**. Each entity reported its per capita water usage data to TWDB during their annual water usage survey and/or provided the data specifically for this study. The per capita water demand reported by the participating entities ranged from 53 to 261 GPCD; however, only three of the participating entities submitted their per capita water demand for the 2012 TWDB Water Use Survey, which ranged from 117 to 238 GPCD. Based on discussions with TWDB, the larger reported value of the two (highlighted in red) was used for a majority of the participants to represent a conservative water consumption scenario.

Table 4-3: Per Capita Water Usage – Project Participants

Entity	Per Capita Water Usage Data** (GPCD)					
	2012 TWDB Survey	Entity Data	2015 Reduction Goal	2020 Reduction Goal	2025 Reduction Goal	2030 Reduction Goal
City of Mart	138	103	--	--	--	--
City of Marlin	238	213	214	189	165	140
City of Mount Calm	NR*	78	--	--	--	--
Axtell WSC	NR*	112	--	--	--	--
Birome WSC	NR*	88	--	--	--	--
Chalk Bluff WSC	NR*	102	--	--	--	--
EOL WSC	NR*	87	--	--	--	--
Gholson WSC	117	261	--	--	--	--
H&H WSC	NR*	95	--	--	--	--
LTG WSC	NR*	87	--	--	--	--
Moore Water System	NR*	NA*	--	--	--	--
M.S. WSC	NR*	53	--	--	--	--
McLennan County WCID No. 2	NR*	113	--	--	--	--
Prairie Hill WSC	NR*	57	--	--	--	--
Pure WSC	NR*	94	--	--	--	--
RMS WSC	107	111	--	--	--	--
Ross WSC	NR*	95	--	--	--	--

*NR represents 'not reported'; NA represents 'not available'

** Values shown in red are those used to calculate the water demand projections.

The per capita water demand goal for TWDB is 140 GPCD. For those entities with water consumption amounts exceeding 140 GPCD, a reduction goal was identified incrementally through 2030 in order to reach TWDB's water consumption goal. Entities with per capita water demands less than or equal to 140 GPCD were not changed.

Average day water demand projections for each of the entities were calculated using their annual consumption data and population projections (listed in Table 4-2); this information was provided by each entity during the data collection activities at the beginning of the study. In addition, per capita water usage listed above in Table 4-3 (values highlighted in red) and meter counts for each entity were also used for comparison purposes; however, annual consumption data is the best source for determining average day water demands. Maximum water demand projections, converted to million gallons per day (MGD), were then calculated by applying a peaking factor to each entity's 2010 Maximum Day Demands to project water demands through 2040; this methodology, used by the project team, was also approved by TWDB staff. **Table 4-4** below summarizes the maximum day water demand projections for the participating cities and water supply corporations; reference Appendix C for a complete summary of water demand projections for the project participants.

The comparison of maximum day water demands in both 2010 and 2040 versus the existing water production capacity for the participating cities and water supply corporations is provided in **Figure 4-6**. As shown in the figure, each of the entities has sufficient water production capacity to meet their max day demands in 2040. Due to the lack of information received from Moore Water System, the issue of sufficient water production capacity versus max day demands needs further verification.

Table 4-4: Water Demand Projections – Project Participants

Entity	Average Day Water Demands (MGD)						
	Maximum Day Water Demands (MGD)						
	2010	2015	2020	2025	2030	2035	2040
City of Mart	0.370	0.375	0.388	0.402	0.416	0.431	0.446
	0.830	0.861	0.892	0.923	0.956	0.990	1.025
City of Marlin	1.358	1.385	1.413	1.441	1.470	1.500	1.530
	2.499	2.289	2.069	1.839	1.597	1.625	1.653
City of Mount Calm	0.025	0.025	0.026	0.026	0.027	0.027	0.027
	0.050	0.051	0.051	0.052	0.053	0.054	0.055
Axtell WSC	0.159	0.166	0.172	0.178	0.185	0.192	0.199
	0.372	0.389	0.403	0.418	0.433	0.449	0.465
Birome WSC	0.086	0.089	0.091	0.094	0.097	0.100	0.103
	0.327	0.338	0.349	0.360	0.371	0.382	0.393
Chalk Bluff WSC	0.265	0.286	0.310	0.334	0.361	0.390	0.422
	0.634	0.685	0.740	0.799	0.864	0.933	1.008
EOL WSC	0.172	0.180	0.189	0.197	0.206	0.216	0.226
	0.390	0.408	0.427	0.446	0.467	0.488	0.510
Gholson WSC	0.275	0.280	0.285	0.291	0.296	0.302	0.307
	0.556	0.566	0.576	0.587	0.598	0.609	0.620
H&H WSC	0.148	0.156	0.164	0.172	0.181	0.190	0.200
	0.395	0.415	0.436	0.458	0.482	0.506	0.532
LTG WSC	0.100	0.104	0.109	0.114	0.119	0.124	0.129
	0.191	0.199	0.208	0.217	0.227	0.236	0.247
Moore Water System	0.042	0.042	0.042	0.042	0.042	0.042	0.043
	0.092	0.092	0.093	0.093	0.093	0.094	0.094
M.S. WSC	0.032	0.032	0.032	0.033	0.033	0.033	0.033
	0.070	0.070	0.071	0.071	0.071	0.072	0.072
McLennan Co. WCID No. 2	0.197	0.198	0.199	0.200	0.201	0.202	0.203
	0.350	0.352	0.354	0.356	0.357	0.359	0.361
Prairie Hill WSC	0.142	0.146	0.149	0.153	0.157	0.161	0.165
	0.412	0.423	0.433	0.444	0.455	0.467	0.479
Pure WSC	0.042	0.042	0.042	0.042	0.042	0.042	0.043
	0.092	0.092	0.093	0.093	0.093	0.094	0.094
RMS WSC	0.107	0.115	0.125	0.135	0.146	0.158	0.171
	0.213	0.231	0.250	0.270	0.292	0.316	0.342
Ross WSC	0.204	0.214	0.224	0.235	0.247	0.259	0.272
	0.407	0.427	0.449	0.471	0.494	0.519	0.544
TOTAL	3.723	3.836	3.960	4.091	4.227	4.370	4.519
	7.880	7.888	7.894	7.897	7.903	8.193	8.494

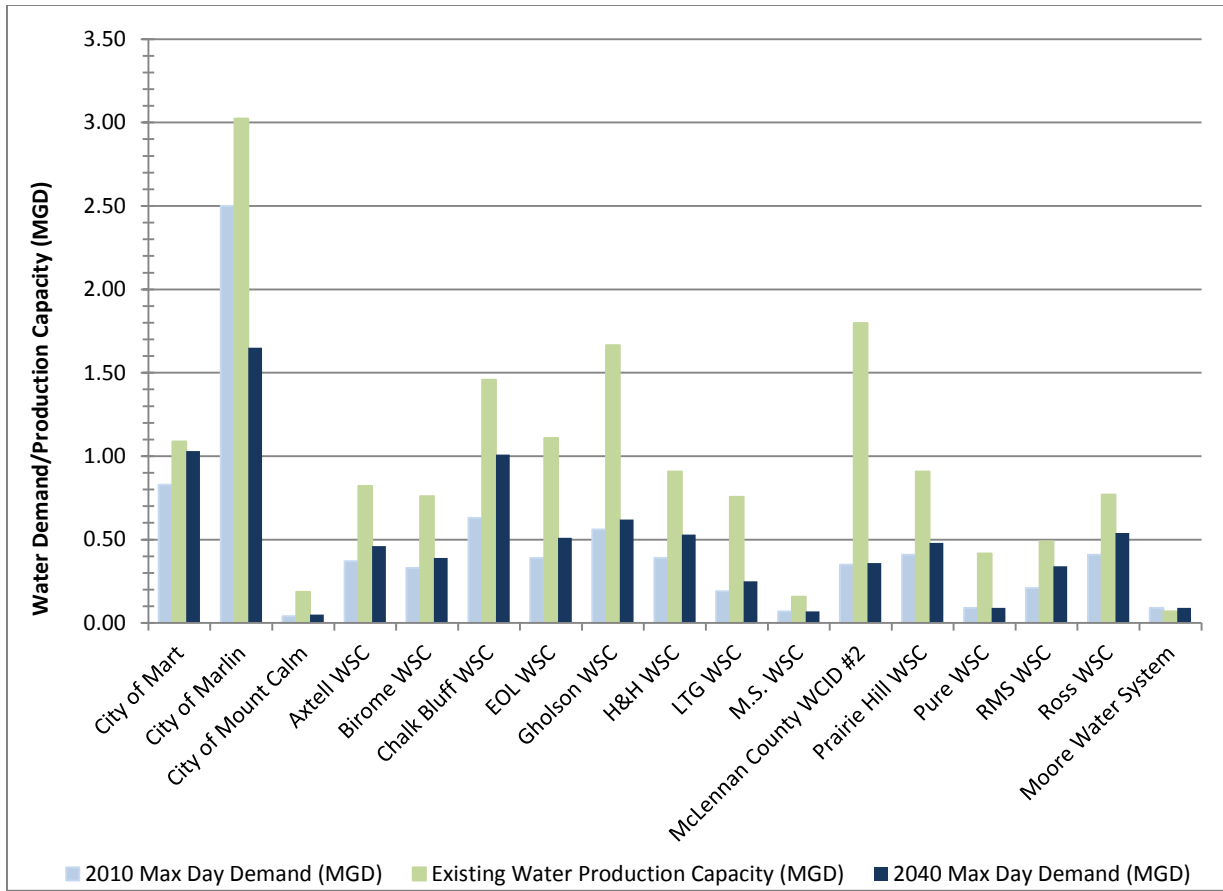


Figure 4-6: Maximum Day Demands vs. Water Capacity

Section 5.0

DESCRIPTION OF EXISTING WATER SYSTEMS

A number of factors can influence and impact what changes need to be implemented for public water systems, including new regulations and projected customer growth. Prior to making alternative recommendations, the Roth Team evaluated the water systems within the study area to determine their existing capabilities. This section of the report describes these systems.

5.1 EXISTING WATER SYSTEMS BY PARTICIPANT

There are several utilities within the project study area, each with their own existing water system. A majority of the groundwater wells for these existing systems are located in the Trinity Aquifer. Below are short descriptions of the project participants' water systems.

5.1.1 Axtell Water Supply Corporation

Axtell Water Supply Corporation's water supply consists of two groundwater wells with capacities of 180 GPM, and 390 GPM. Axtell WSC has historically experienced arsenic concentration issues. As far back as 2003 and as recently as 2014, reported data show concentrations greater than 10 ppb, with a median concentration of 15.4 ppb. In 2010, the average and max day water demands for Axtell WSC were 0.16 MGD and 0.37 MGD, respectively.

5.1.2 Birome Water Supply Corporation

Birome Water Supply Corporation's water supply consists of two groundwater wells with capacities of 200 GPM and 325 GPM. Birome WSC has historically experienced arsenic concentration issues. As far back as 2003 and as recently as 2014, reported data show concentrations greater than 10 ppb, with a median concentration of 11.6 ppb. Additionally, Birome WSC receives water from a contract with Post Oak Special Utility District. In 2010, the average and max day water demands for Birome WSC were 0.09 MGD and 0.33 MGD, respectively.

5.1.3 Chalk Bluff Water Supply Corporation

Chalk Bluff Water Supply Corporation's water supply consists of three groundwater wells with capacities of 388 GPM, 291 GPM, and 344 GPM. There are no arsenic concentration issues. In 2010, the average and max day water demands for Chalk Bluff WSC were 0.27 MGD and 0.63 MGD, respectively.

5.1.4 City of Marlin

The City of Marlin water system has a Superior rating by the TCEQ. Their water supply consists of a surface water treatment plant with a capacity of 3.02 MGD. There are no arsenic concentration issues. In 2010, the average and max day water demands for City of Marlin were 1.36 MGD and 2.50 MGD, respectively.

5.1.5 City of Mart

The City of Mart's water supply consists of one groundwater well with a capacity of 200 GPM and a surface water treatment plant with a capacity of 0.8 MGD. There are no arsenic concentration issues. In 2010, the average and max day water demands for City of Mart were 0.37 MGD and 0.83 MGD, respectively.

5.1.6 City of Mount Calm

The City of Mount Calm's water supply consists of one groundwater well with a capacity of 130 GPM. The City of Mount Calm has not exceeded the arsenic MCL; however, concentrations have been getting reportedly close to 10 ppb. In 2010, the average and max day water demands for the City of Mount Calm were 0.03 MGD and 0.05 MGD, respectively.

5.1.7 EOL Water Supply Corporation

EOL Water Supply Corporation's water supply consists of three groundwater wells with capacities of 300 GPM, 102 GPM, and 250 GPM. EOL WSC has experienced arsenic concentration issues, with one of its three wells historically being worse than the others (median concentration of 19.6 ppb versus 9.3 ppb for the other two wells from 2003 to 2014). In 2010, the average and max day water demands for EOL WSC were 0.17 MGD and 0.39 MGD, respectively.

5.1.8 Gholson Water Supply Corporation

Gholson Water Supply Corporation's water supply consists of five groundwater wells with capacities of 250 GPM, 152 GPM, 225 GPM, 300 GPM and 230 GPM. There are no arsenic concentration issues. In 2010, the average and max day water demands for Gholson WSC were 0.28 MGD and 0.56 MGD, respectively.

5.1.9 H&H Water Supply Corporation

H&H Water Supply Corporation's water supply consists of two groundwater wells with capacities of 310 GPM and 320 GPM. There are no arsenic concentration issues. In 2010, the average and max day water demands for H&H WSC were 0.15 MGD and 0.40 MGD, respectively.

5.1.10 LTG Water Supply Corporation

LTG Water Supply Corporation's water supply consists of two groundwater wells with capacities of 195 GPM and 330 GPM. LTG WSC has historically experienced arsenic concentration issues (peaks as high as 50.6 ppb have been seen, with the median concentrations for Wells No. 2 and No. 3 being 7.6 ppb and 10.7 ppb, respectively). In 2010, the average and max day water demands for LTG WSC were 0.10 MGD and 0.19 MGD, respectively.

5.1.11 McLennan County WCID No. 2

McLennan County WCID No. 2's water supply consists of three groundwater wells with capacities of 500 GPM, 289 GPM and 460 GPM. McLennan County WCID No. 2 has historically had arsenic concentrations less than 2 ppb, leading it to be considered as a good source of blending water.

In 2010, the average and max day water demands for McLennan County WCID No. 2 were 0.20 MGD and 0.35 MGD, respectively.

5.1.12 Moore Water System

Moore Water System's water supply is provided through one groundwater well (limited data was reported or available on TCEQ's website). Moore Water System has historically experienced arsenic concentration issues. As far back as 2003 and as recently as 2014, reported data show concentrations greater than 10 ppb, with a median concentration of 16.7 ppb.. In 2010, the average and max day water demands for Moore Water System were 0.04 MGD and 0.09 MGD, respectively.

5.1.13 M.S. Water Supply Corporation

M.S. Water Supply Corporation's water supply consists of one groundwater well with a capacity of 110 GPM. M.S. WSC has historically experienced arsenic concentration issues, with a reported median concentration from 2003 to 2014 of 10.9 ppb. In 2010, the average and max day water demands for M.S. WSC were 0.03 MGD and 0.07 MGD, respectively.

5.1.14 Prairie Hill Water Supply Corporation

Prairie Hill Water Supply Corporation's water supply consists of two groundwater wells with capacities of 200 GPM and 340 GPM. Prairie Hill WSC has historically experienced significant arsenic concentration issues, with reported values ranging as high as 31.7 ppb and a median concentration of 23.5 ppb from 2003 to 2014. In 2010, the average and max day water demands for Prairie Hill WSC were 0.14 MGD and 0.41 MGD, respectively.

5.1.15 Pure Water Supply Corporation

Pure Water Supply Corporation's water supply consists of one groundwater well with a capacity of 289 GPM. There are no arsenic concentration issues. In 2010, the average and max day water demands for Pure WSC were 0.04 MGD and 0.09 MGD, respectively.

5.1.16 RMS Water Supply Corporation

RMS Water Supply Corporation's water supply consists of one groundwater well with a capacity of 340 GPM. RMS WSC has experienced arsenic concentration issues, with peaks as high as 32.2 ppb and a median concentration from 2003 to 2014 of 11.9 ppb. In 2010, the average and max day water demands for RMS WSC were 0.11 MGD and 0.21 MGD, respectively.

5.1.17 Ross Water Supply Corporation

Ross Water Supply Corporation's water supply consists of three groundwater wells with capacities of 80 GPM, 165 GPM and 290 GPM. There are no arsenic concentration issues. In 2010, the average and max day water demands for Ross WSC were 0.20 MGD and 0.41 MGD, respectively.

5.1.18 Industrial Participants

Within in the project participants are two industrial manufacturers – Cargill Meat Solutions and Sanderson Farms – which are both located within the City of Waco's CCN.

Cargill Meat Solutions is a meat processing company within the city limits of the City of Waco. Cargill Meat Solutions has one active well with a maximum capacity of 380 GPM and a depth of 5,200 feet, and a 0.25 million gallon (MG) ground storage tank (GST). An average and max day well water consumption of 0.29 MGD and 0.69 MGD, respectively, is used. Additionally, they purchase surface water from the City of Waco at an average and max day demand of 0.52 MGD and 0.88 MGD, respectively.

Sanderson Farms is a poultry processing plant near Waco. Sanderson Farms has two active wells and one 0.40 MG storage tank. Well No. 1 yields 704 GPM, and Well No. 2 yields 640 GPM. Additionally they purchase surface water from the City of Waco.

As of now, neither company has reported plans for expansion that would require an additional water demand or experience arsenic issues. Both Cargill Meat Solutions and Sanderson Farms participated in this study to serve as good corporate partners with FHLM. If either company is interested in participating in a proposed regional option, then discussions and coordination would need to take place with the City of Waco due to their CCN requirements.

5.1.19 Summary

Table 5-1 summarizes the pumping capacities, casing features and storage capacities for each entity.

Table 5-1: Existing System Capacities

Entity	Storage Type ¹	Storage (No. of Units / MG)	Well ID	Well Capacity (GPM)	Casing Size (in)	Start Depth (ft)	End Depth (ft)
City of Mount Calm	Unavailable ²	Unavailable ²	Well #1	130	12	0	40
					9	0	910
					7	910	3,458
Axtell WSC	GST	1 / 0.02	Well #1	180	12	0	63
	GST	1 / 0.05			9	0	910
	EST	1 / 0.20			6	910	3,129
			Well #2	390	16	0	3,200
Birome WSC	GST	5 / Unavailable ²	Well #1	200	12	0	3,242
			Well #2	325	10	0	3,311
Chalk Bluff WSC	GST	1 / 0.05	Well #2	388	9	0	2,179
	GST	1 / 0.13	Well #4	291	14	0	24
	GST	1 / 0.20			9	0	2,120
	GST	1 / 0.21	Well #5	344	10	0	2,124

Table 5-1: Existing System Capacities (Continued)

Entity	Storage Type ¹	Storage (No. of Units / MG)	Well ID	Well Capacity (GPM)	Casing Size (in)	Start Depth (ft)	End Depth (ft)
EOL WSC	GST	2 / 0.03	Well #1	300	Unavailable	0	2,905
	GST	1 / 0.02	Well #2	102	14	0	20
	GST	1 / 0.05			8	0	3,148
	GST	1 / 0.15	Well #3	250	10	0	2,907
Gholson WSC	GST	2 / 0.5	Well #1	250	Unavailable	0	1,160
	GST	1 / 0.07	Well #2	152	16	0	20
	EST	1 / 0.10			11	0	1,323
	Standpipe	1 / 0.14	Well #3	225	16	0	43
					11	0	1,390
	Well #4	300	Unavailable ²	Unavailable ²	Unavailable ²	Unavailable ²	
Well #5	230	Unavailable ²	Unavailable ²	Unavailable ²	Unavailable ²		
H&H WSC	GST	3 / 0.50	Well #1	310	Unavailable ²	0	2,916
	Standpipe	1 / 0.11	Well #2	320	11	0	3,010
LTG WSC	GST	1 / 0.88	Well #1	195	Unavailable ²	0	2,863
	GST	1 / 0.97	Well #2	330	14	0	20
	GST	2 / 0.07			9	0	2,670
M.S. WSC	GST	4 / 0.02	Well #1	110	Unavailable ²	0	3,115
McLennan County WCID No. 2	GST	1 / 0.20	Well #1	500	Unavailable ²	0	2,348
	GST	1 / 0.25	Well #2	289	12	0	2,190
	EST	1 / 0.10			8	2,165	2,340
			Well #3	460	Unavailable ²	0	2,270
Prairie Hill WSC	GST	3 / 0.02	Well #2	200	11	0	45
	GST	1 / 0.05			7	0	3,375
	GST	1 / 0.06	Well #3	340	11	0	3,275
	GST	1 / 0.05					
	Standpipe	1 / 0.12					
Pure WSC	GST	1 / 0.03	Well #2	289	Unavailable ²	0	2,414
RMS WSC	GST	1 / 0.20	Well #1	340	16	0	70
					11	0	2,937
					9	2,727	3,200
Ross WSC	GST	3 / 0.05	Well #1	80	8	0	800
					5	800	2,265
			Well #2	165	9	0	2,344
			Well #3	290	16	0	20
					11	0	2,376

Table 5-1: Existing System Capacities (Continued)

Entity	Storage Type ¹	Storage (No. of Units / MG)	Well ID	Well Capacity (GPM)	Casing Size (in)	Start Depth (ft)	End Depth (ft)
Moore WS	GST	1 / 0.02	Well #1	49	Unavailable ²	Unavailable ²	Unavailable ²
Cargill Meat Solutions	GST	1 / 0.25	Well #1	380	Unavailable ²	Unavailable ²	Unavailable ²
Sanderson Farms	GST	1 / 0.4	Well #1	704		0	2,489
			Well #2	640	20	0	60
					13	0	2,263
					7	2,070	2,500
City of Mart ³	GST	1 / Unavailable ²	Well #1	200	10	0	610
	EST	1 / 0.15			7	610	3,181
	EST	1 / 0.25					
	EST	1 / 0.70					
	Standpipe	1 / Unavailable ²					
City of Marlin ³	GST	1 / 0.20	None				
	EST	1 / 0.80					
	EST	1 / 0.20					
	EST	1 / 0.15					

Notes

¹ Storage type does not include hydropneumatic/pressure tanks and clearwells at water treatment plants.

² Data not provided by entity during data gathering phase of the project or available from TCEQ.

³ The Cities of Mart and Marlin are both served by a surface water source. The City of Mart has a 0.8 MGD surface WTP and the City of Marlin has a 3.02 MGD surface WTP.

5.2 STUDY AREA OVERVIEW AND REGIONAL ISSUES

In 2001, the United States Environmental Protection Agency (USEPA) adopted a new standard that reduced the Maximum Contaminant Level (MCL) for arsenic from 50 parts per billion (ppb) to 10 ppb. Water systems were given until January 23, 2006, to comply with the regulations. As a result, a number of the project participants, located primarily east of the City of Waco, were faced with compliance issues due to the naturally-occurring and elevated arsenic concentrations in their groundwater supplies. Based on research from Baylor University, studies have shown that arsenic concentrations tend to increase substantially further southeast of the fault zone and farther downdip of the Trinity Aquifer.

Eight of the 27 project participants are currently under USEPA enforcement regarding the arsenic concentrations detected in their groundwater supply and have limited time to address the issue; reference **Figure 5-1** for information about the entities participating in this study who are currently under enforcement for arsenic violations.

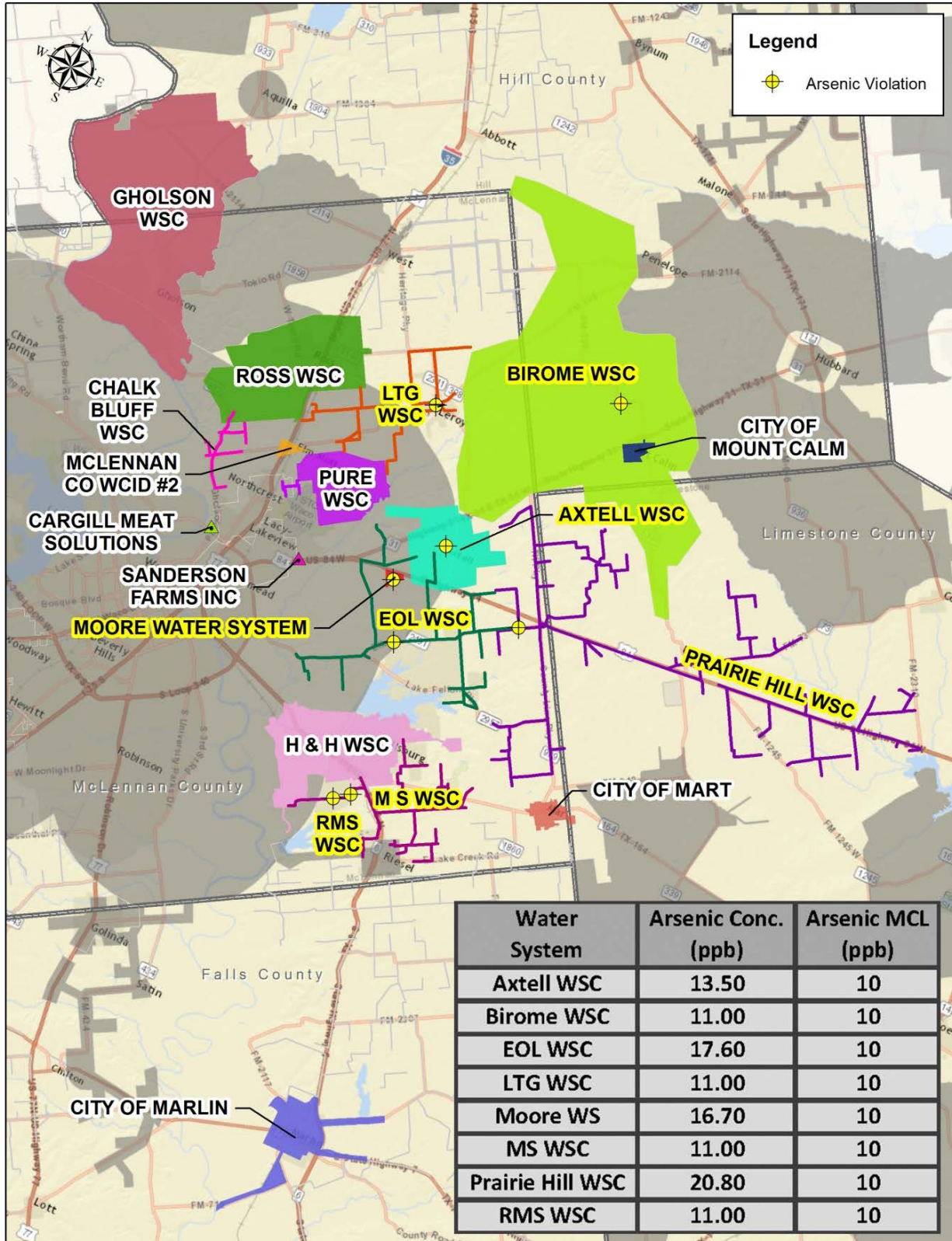


Figure 5-1: Arsenic Violators

Entities that have historically had arsenic concentration issues are:

- Axtell WSC
- Birome WSC
- EOL WSC
- LTG WSC
- Moore WS
- M.S. WSC
- Prairie Hill WSC
- RMS WSC

Figures 5-2 through 5-19 show the frequency of exceeding the maximum allowable limit and the arsenic concentration trends for each entity (Data was unavailable for Moore for this analysis).

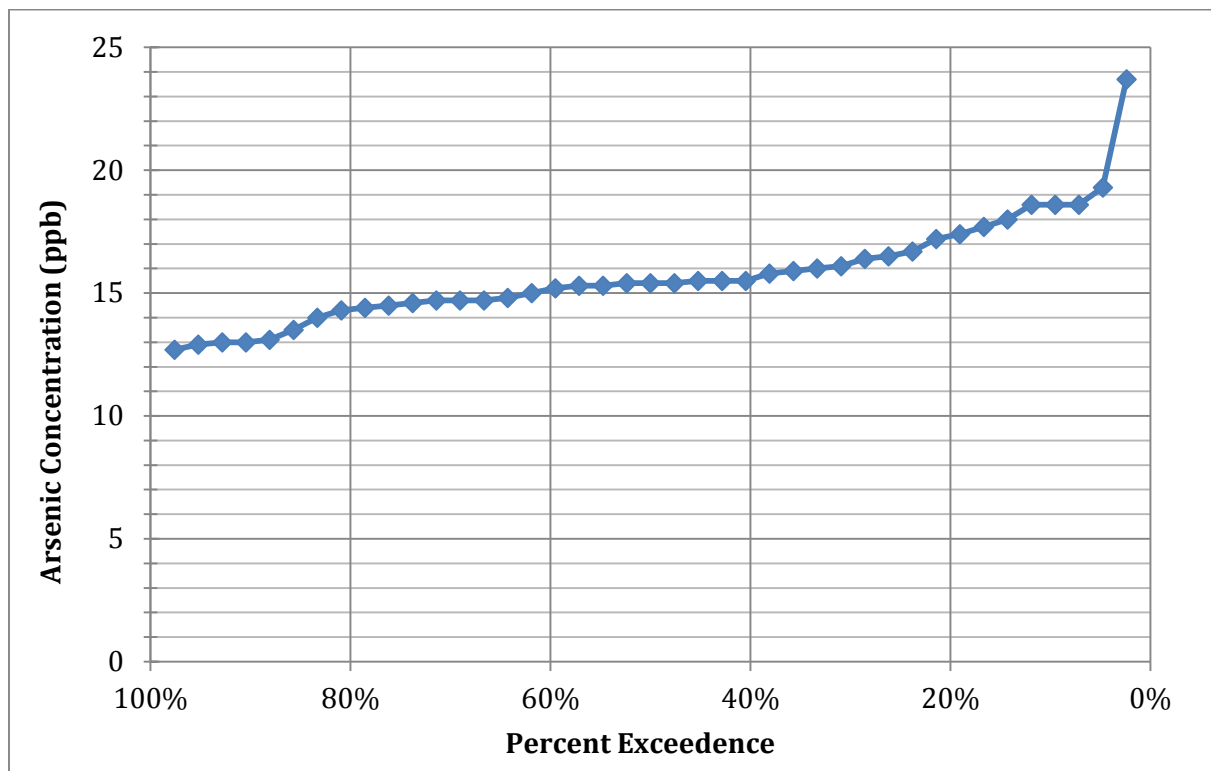


Figure 5-2: Axtell WSC Arsenic Concentration Frequency Graph

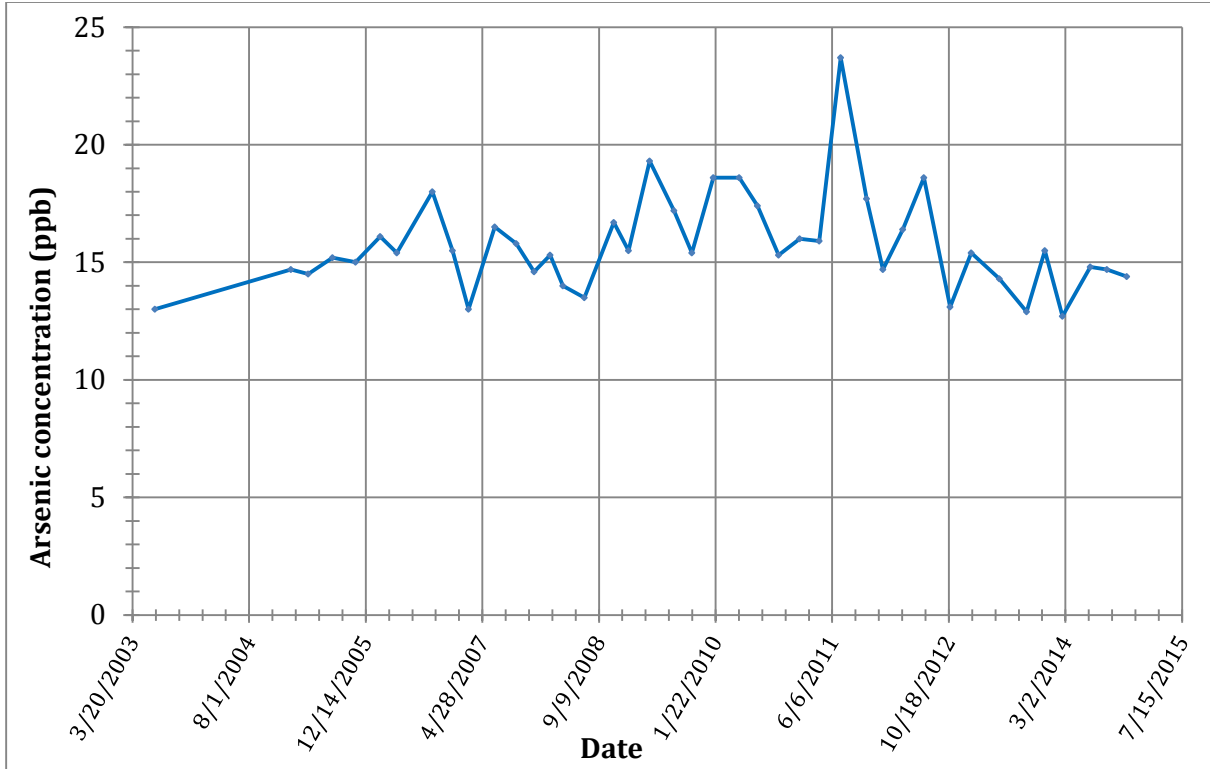


Figure 5-3: Axtell WSC Arsenic Concentration versus Time Graph

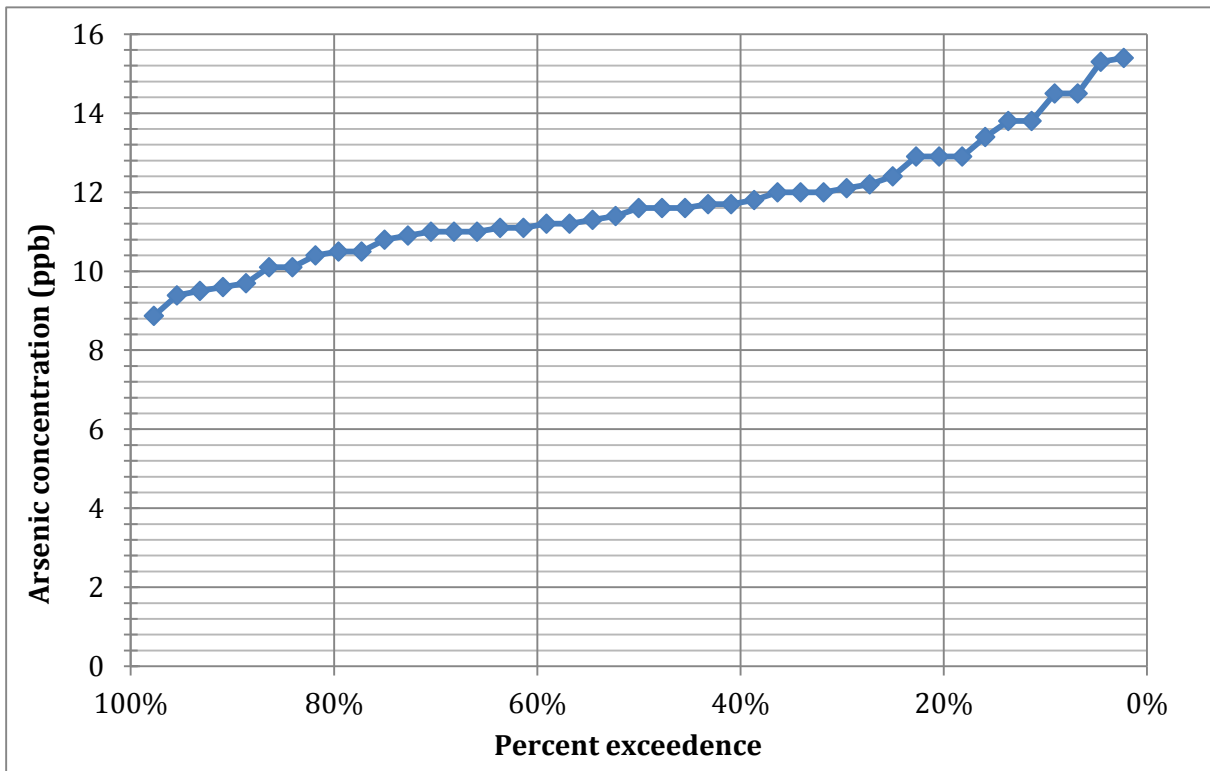


Figure 5-4: Birome WSC Arsenic Concentration Frequency Graph

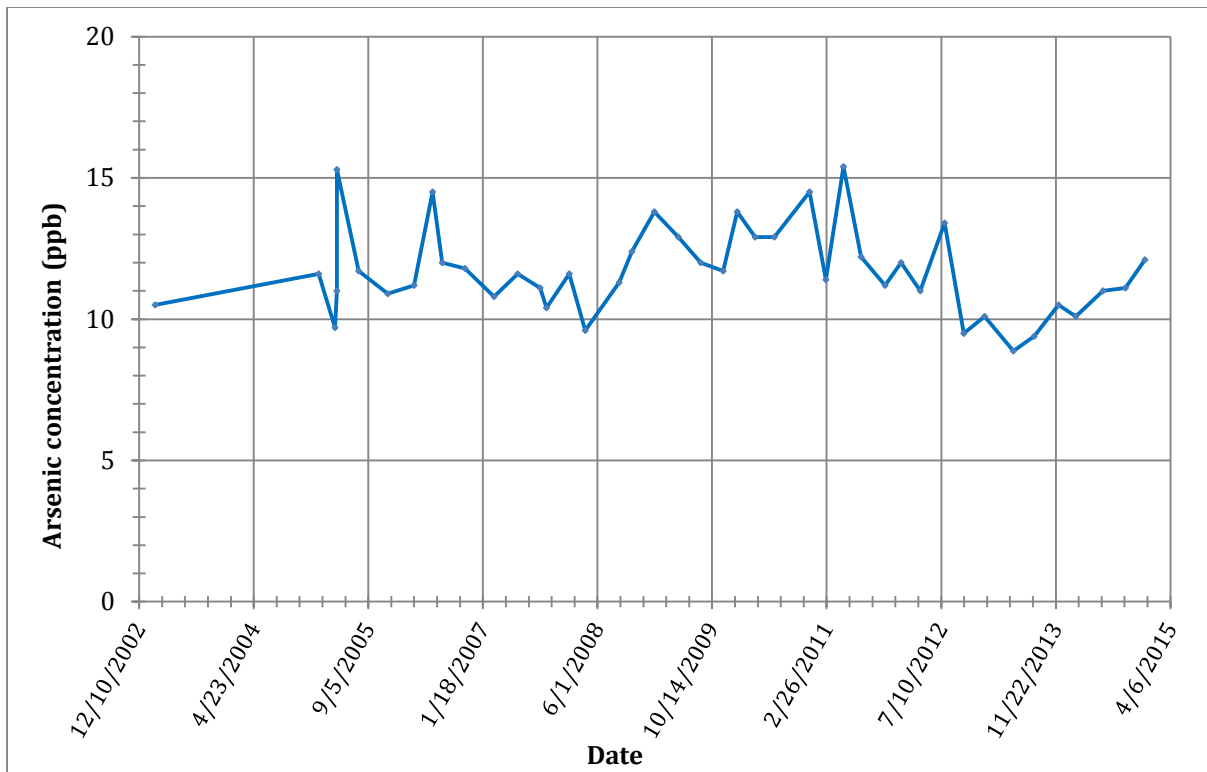


Figure 5-5: Birome WSC Arsenic Concentration versus Time Graph

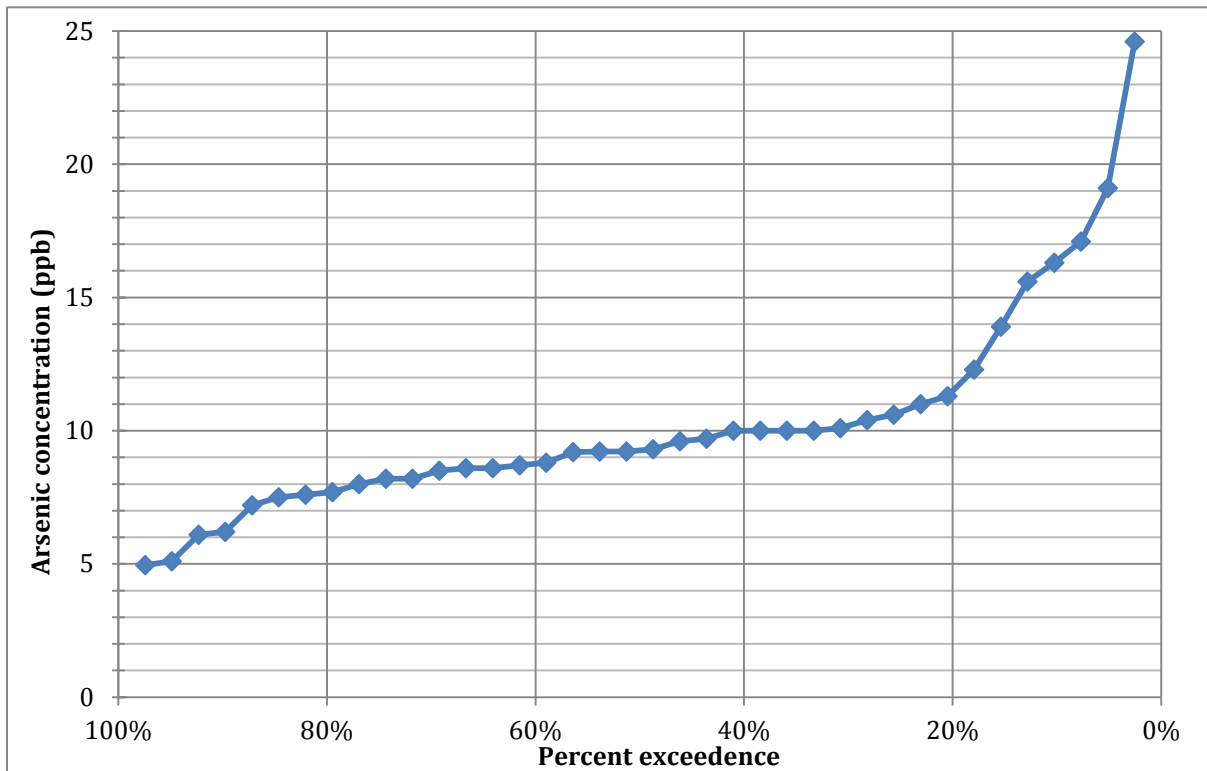


Figure 5-6: EOL WSC (Wells 1 & 3) Arsenic Concentration Frequency Graph

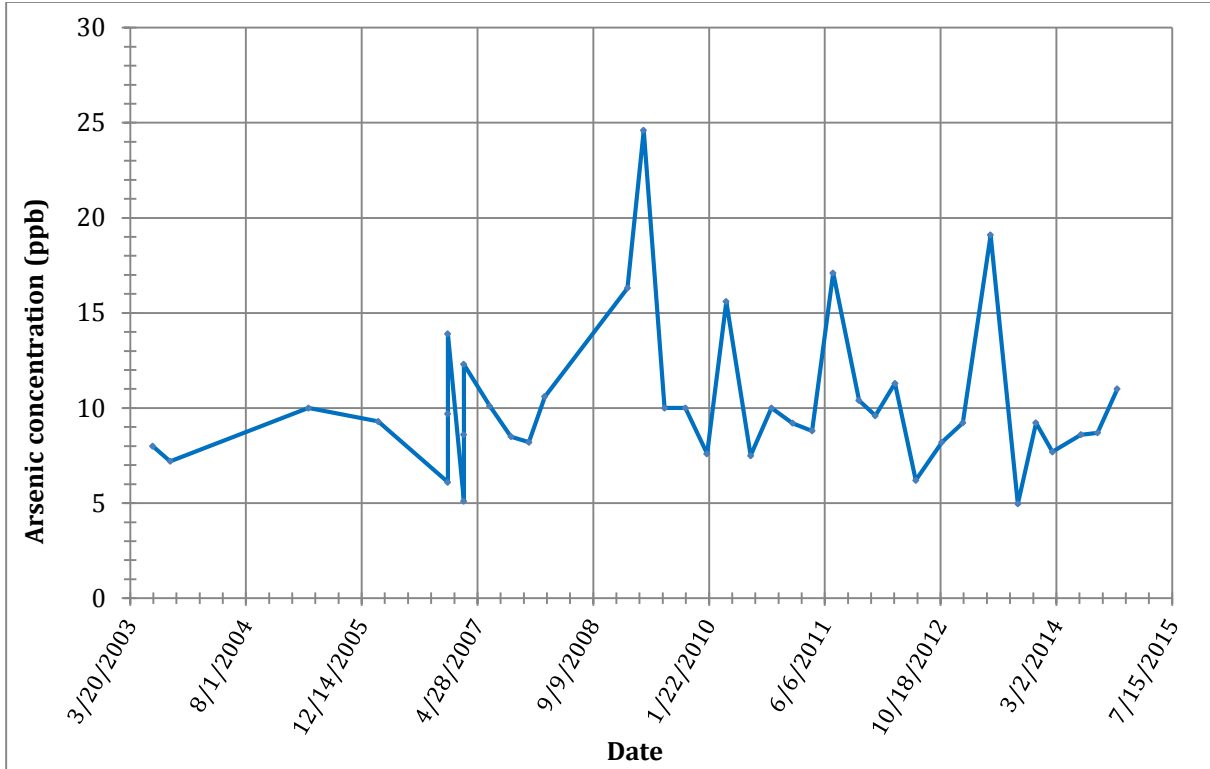


Figure 5-7: EOL WSC (Wells 1 & 3) Arsenic Concentration versus Time Graph

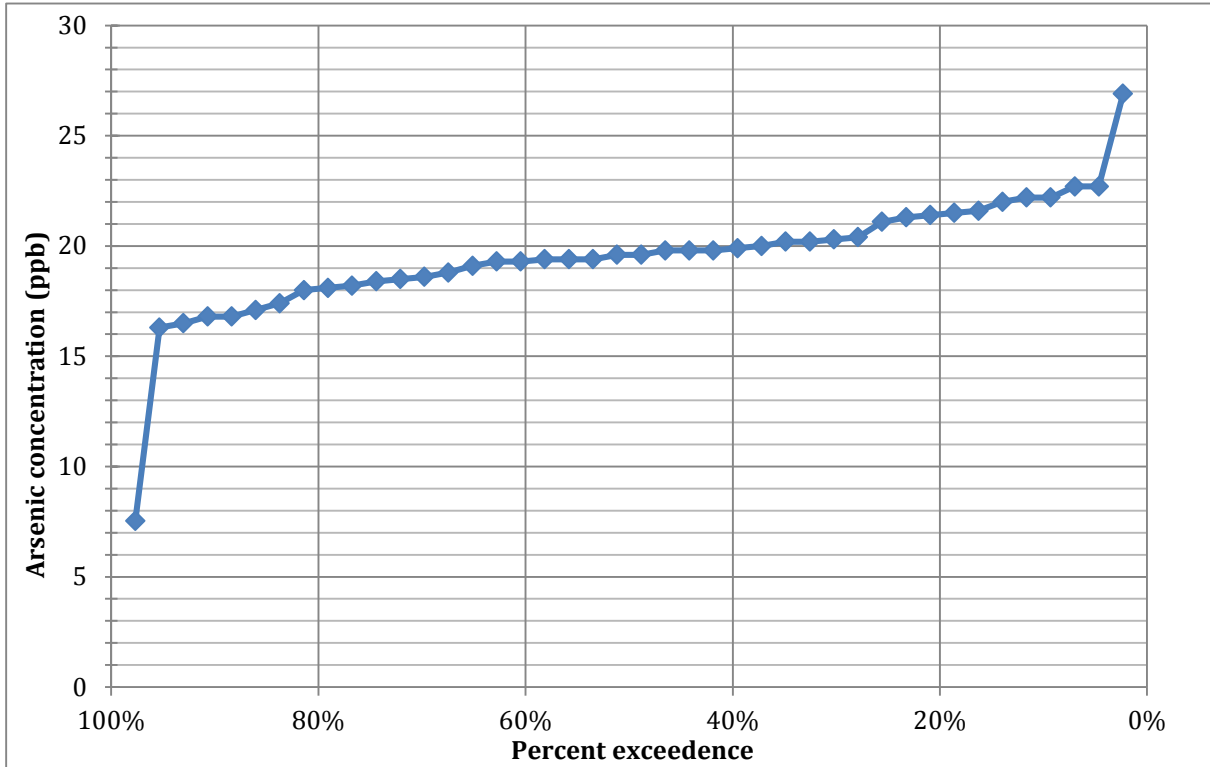


Figure 5-8: EOL WSC (Well 2) Arsenic Concentration Frequency Graph

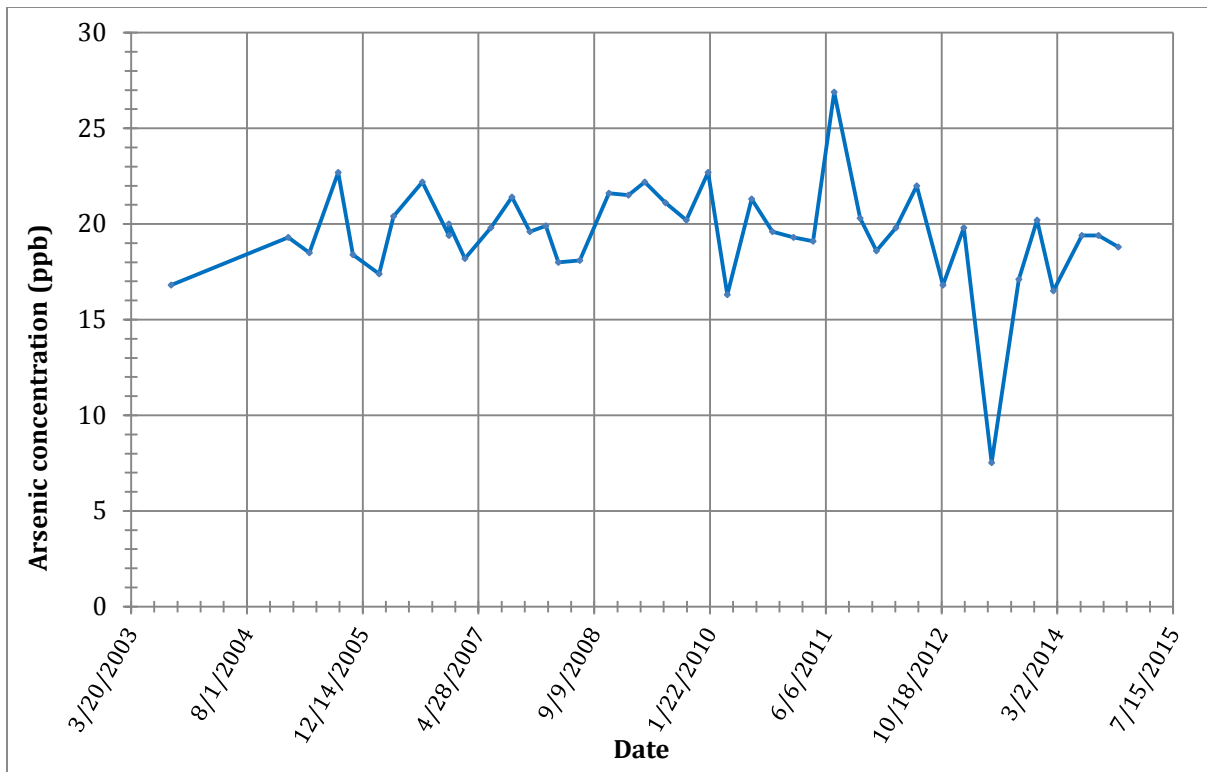


Figure 5-9: EOL WSC (Well 2) Arsenic Concentration versus Time Graph

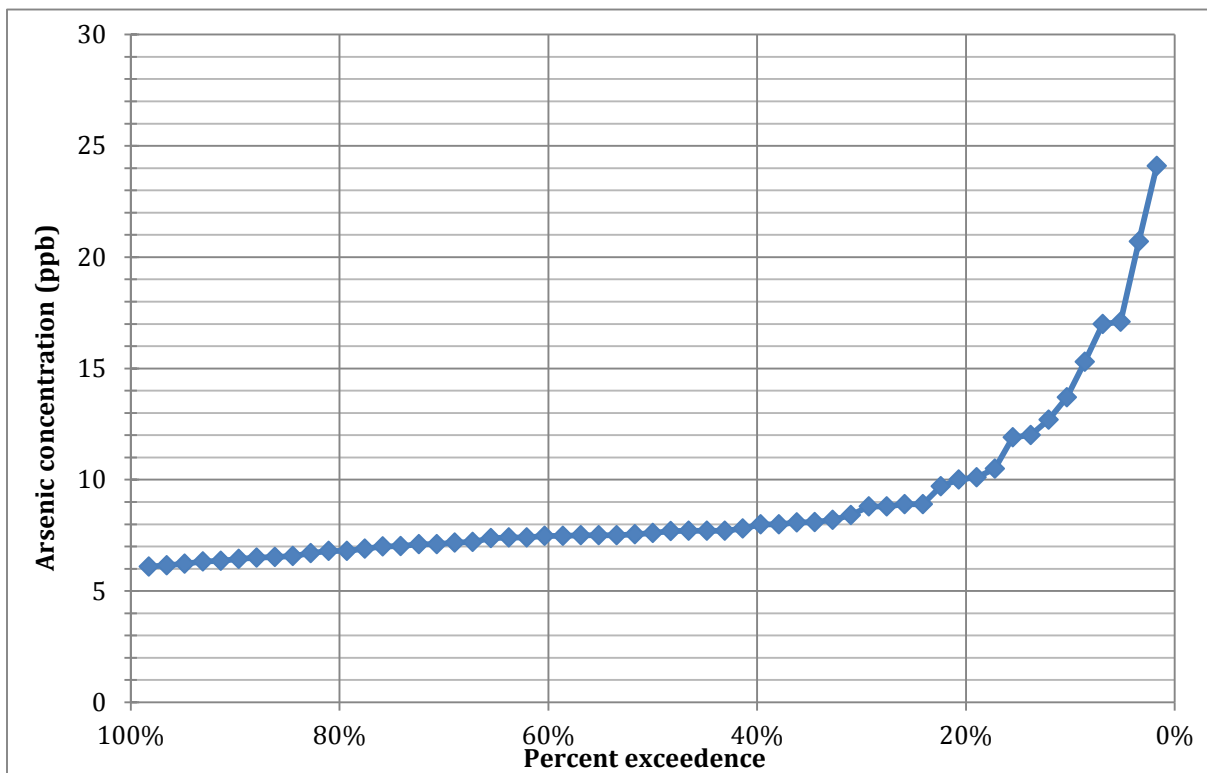


Figure 5-10: LTG WSC (Well 2) Arsenic Concentration Frequency Graph

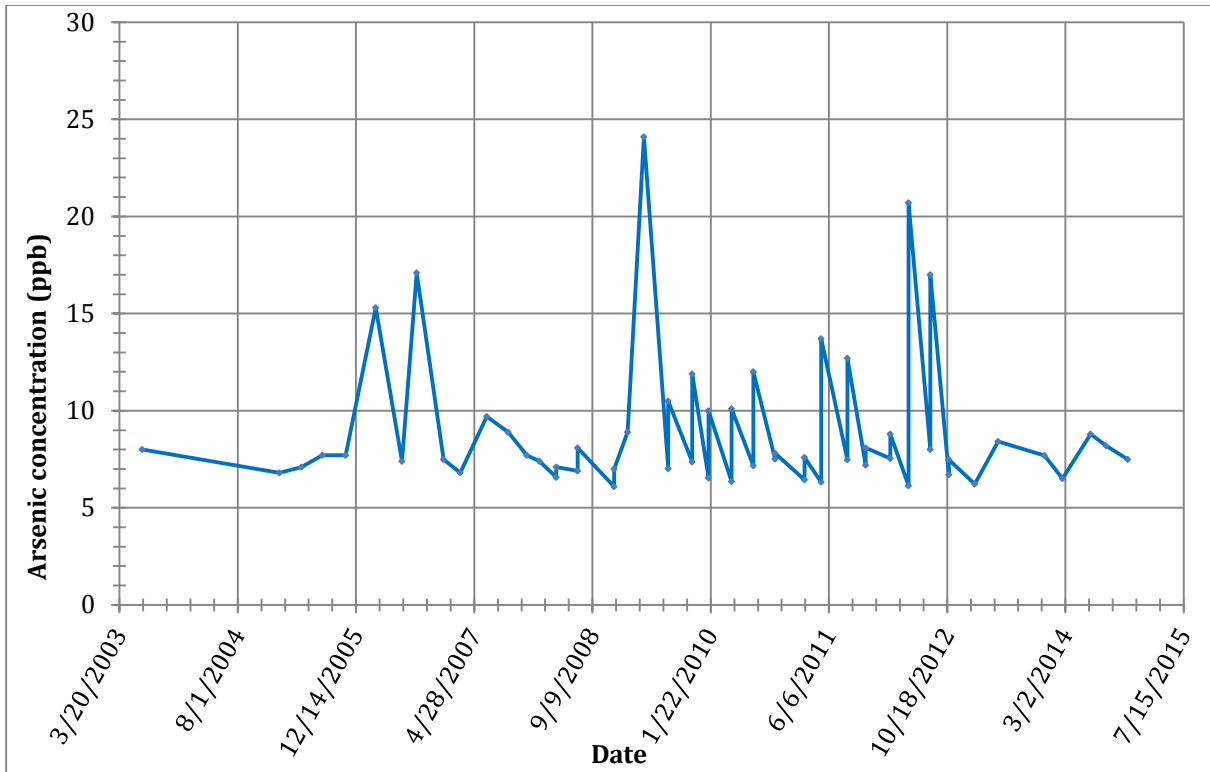


Figure 5-11: LTG WSC (Well 2) Arsenic Concentration versus Time Graph

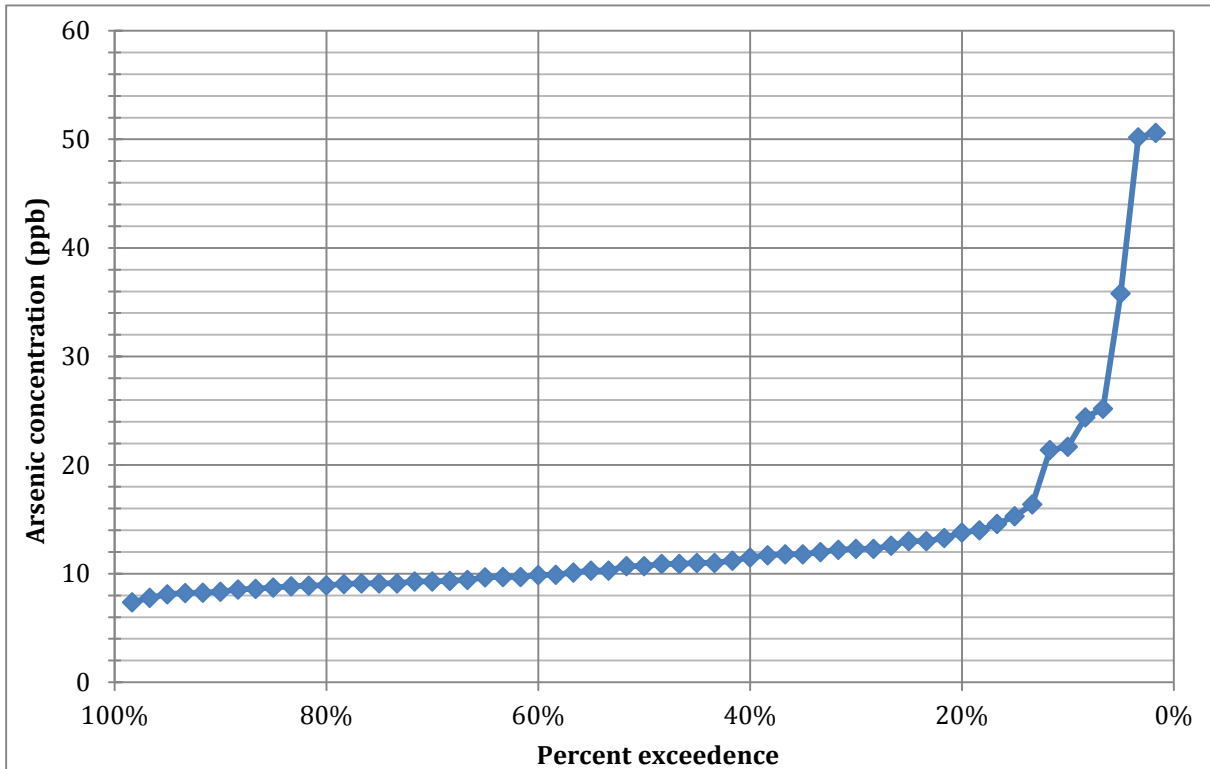


Figure 5-12: LTG WSC (Well 3) Arsenic Concentration Frequency Graph

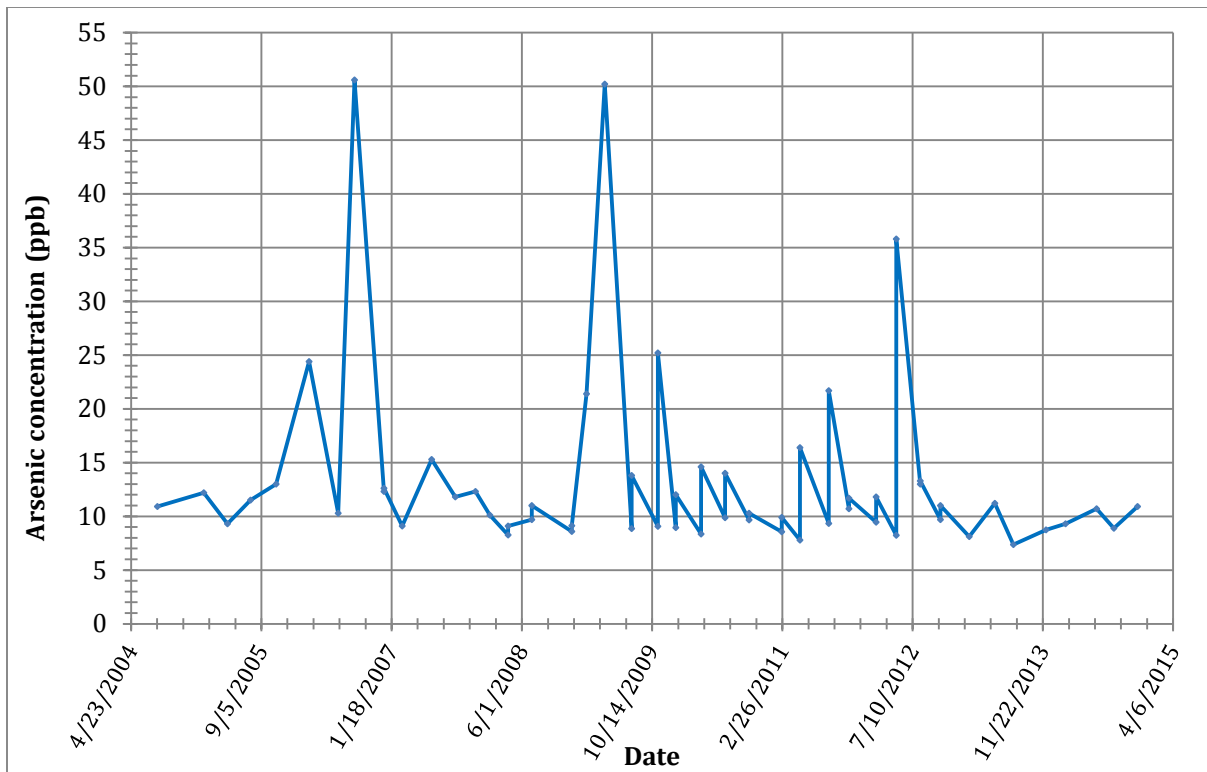


Figure 5-13: LTG WSC (Well 3) Arsenic Concentration versus Time Graph

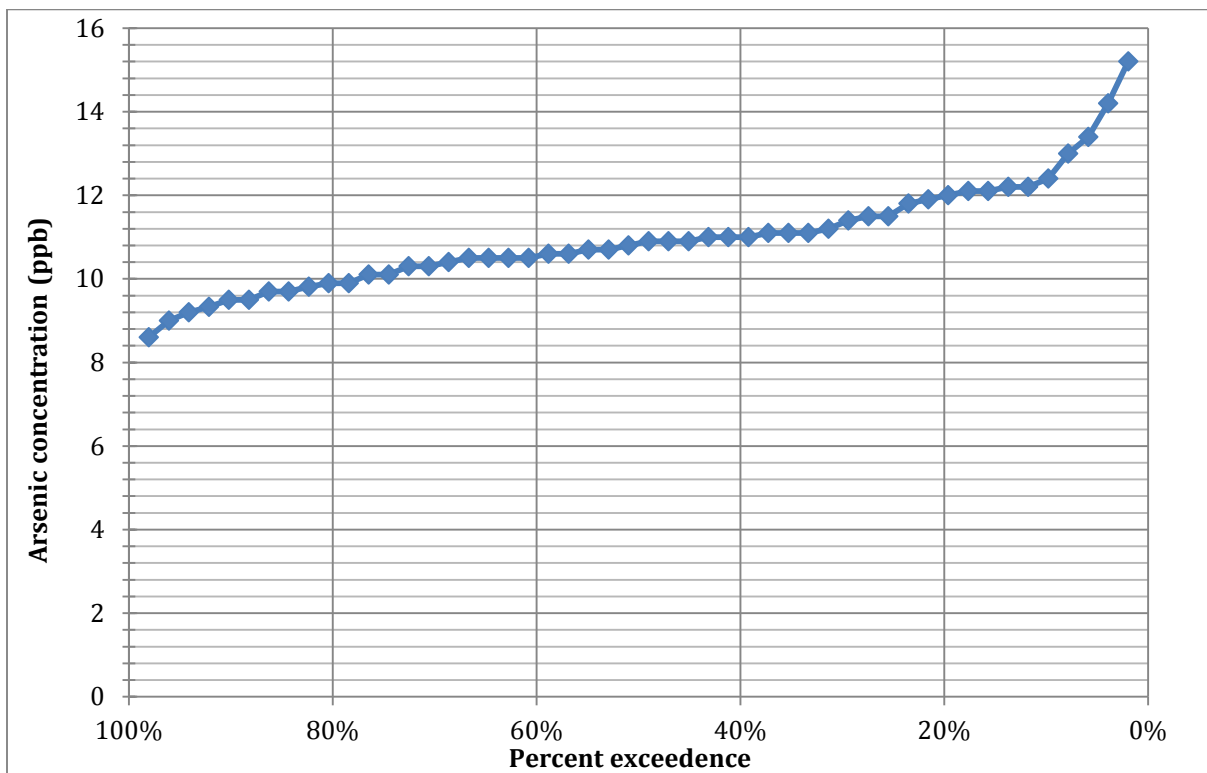


Figure 5-14: M.S. WSC Arsenic Concentration Frequency Graph

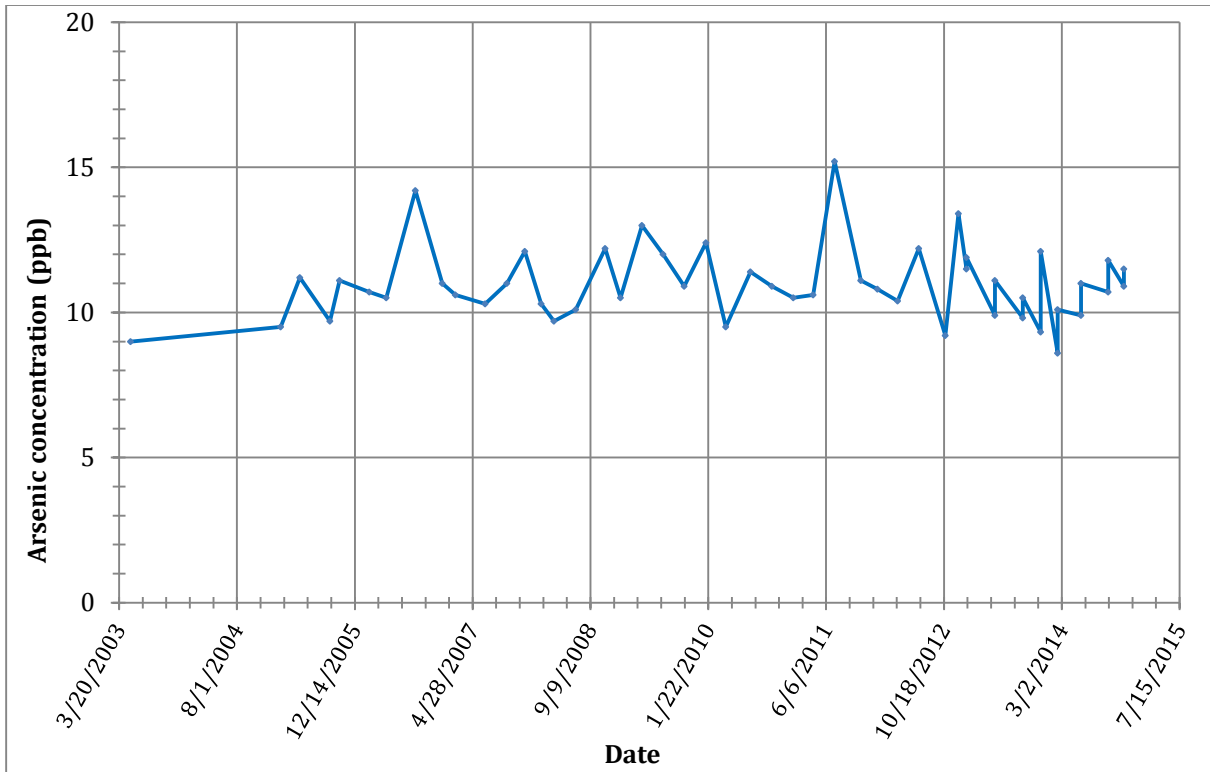


Figure 5-15: M.S. WSC Arsenic Concentration versus Time Graph

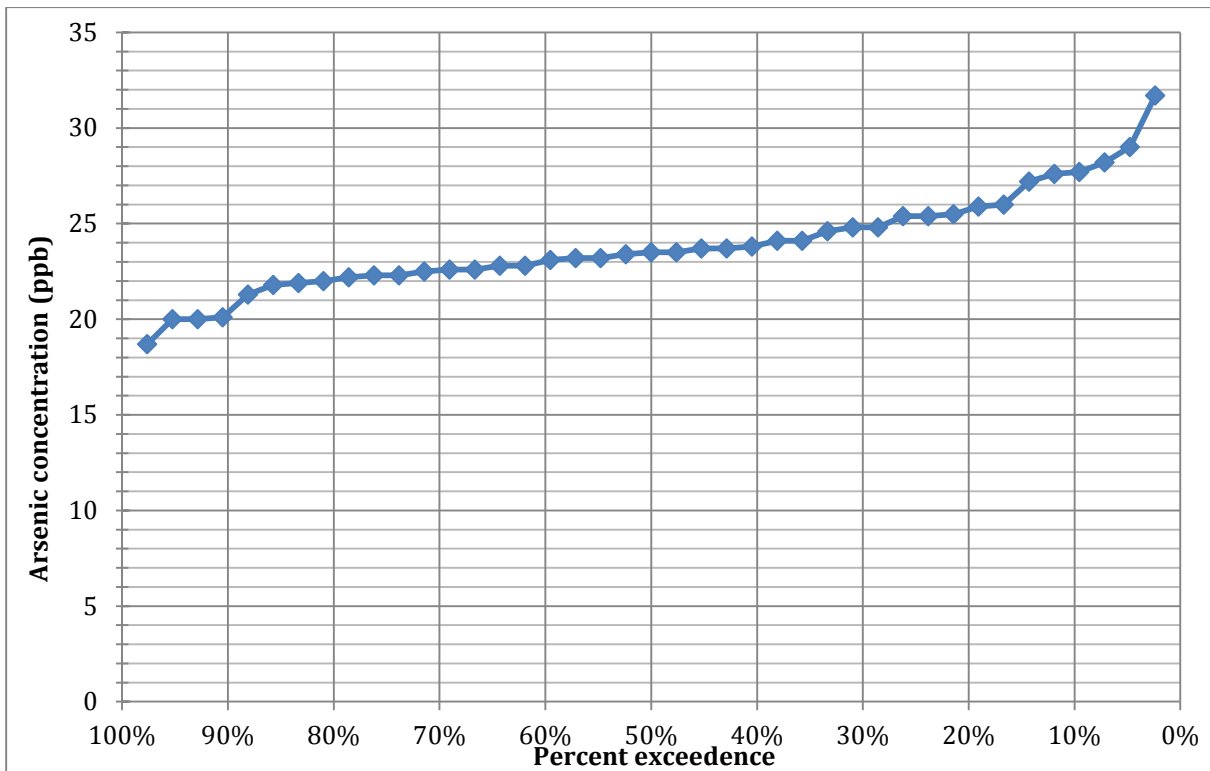


Figure 5-16: Prairie Hill WSC Arsenic Concentration Frequency Graph

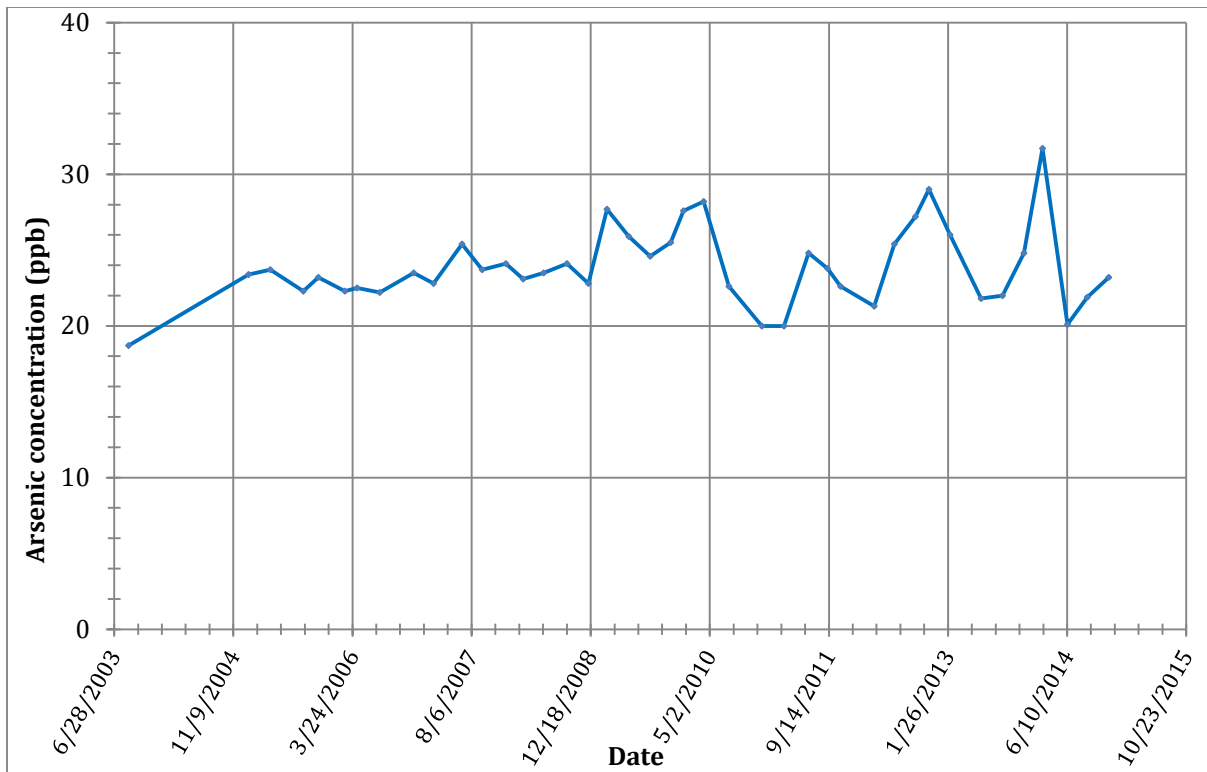


Figure 5-17: Prairie Hill WSC Arsenic Concentration versus Time Graph

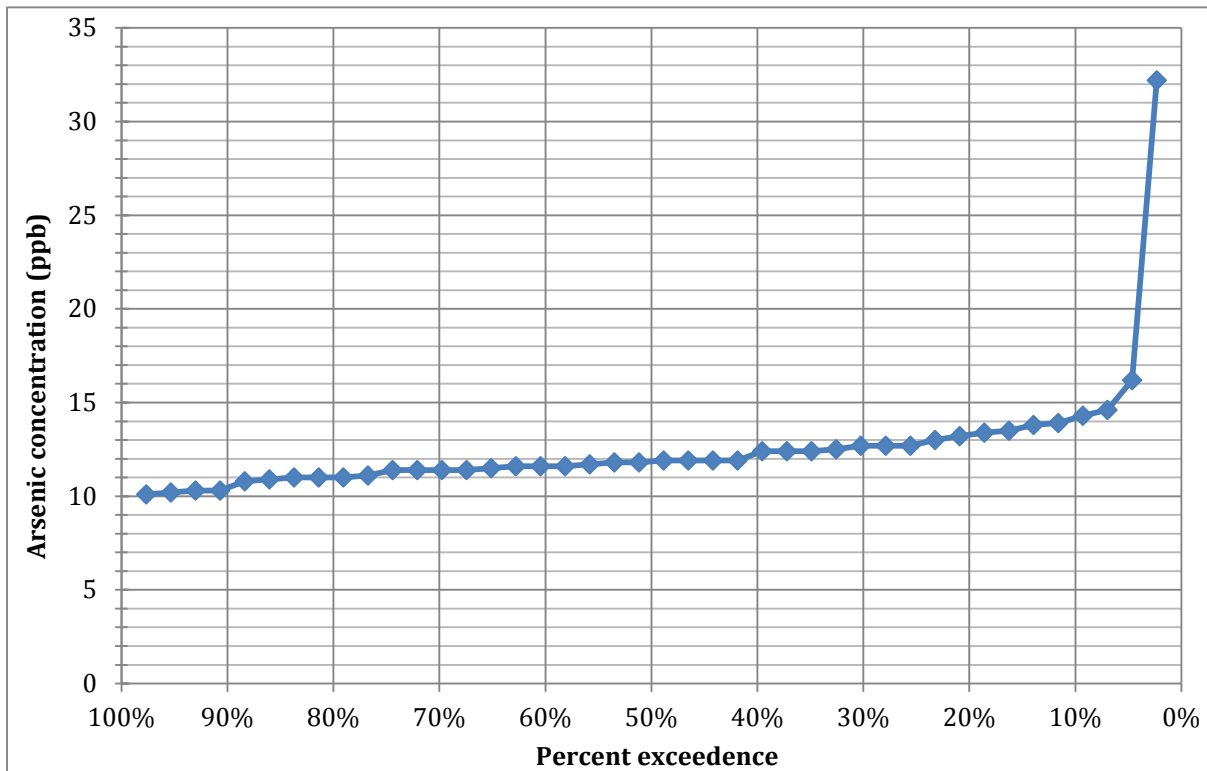


Figure 5-18: RMS WSC Arsenic Concentration Frequency Graph

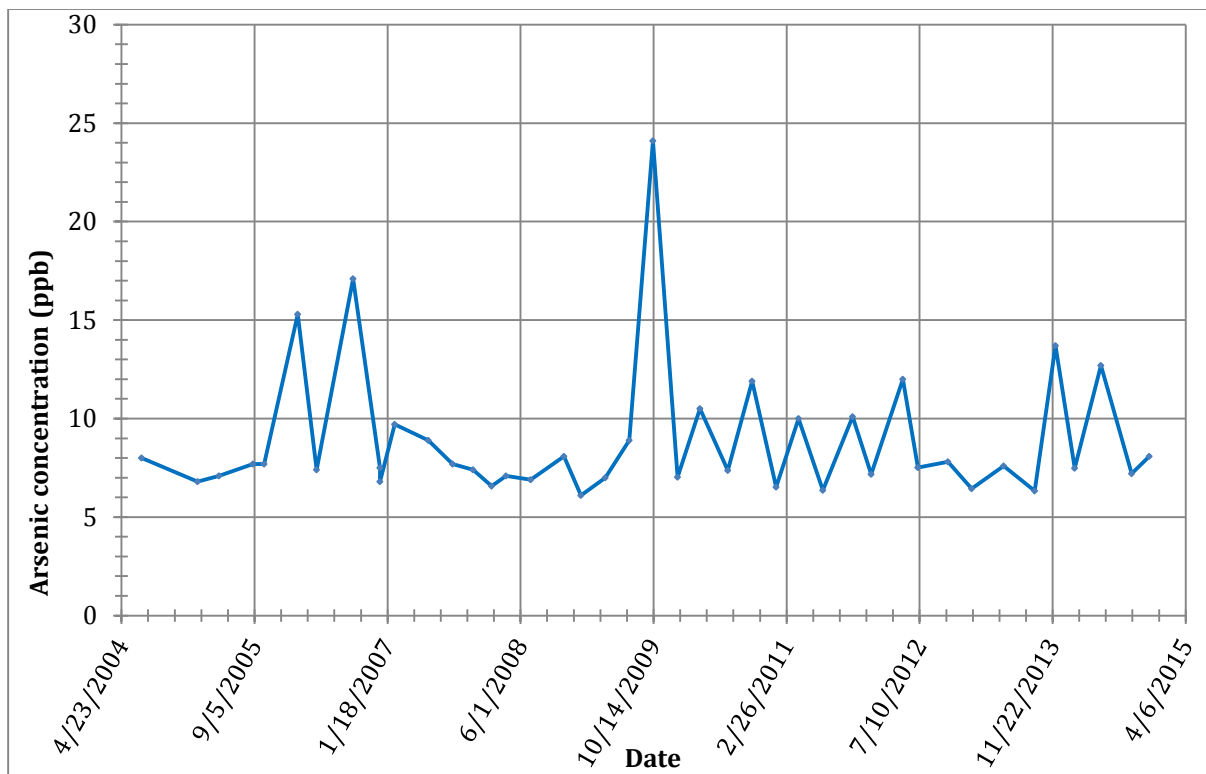


Figure 5-19: RMS WSC Arsenic Concentration versus Time Graph

In addition to the arsenic levels, there was also an increasing concern about the declining ground water levels of the Trinity Aquifer, which is the primary source of water for a these PWSs. To reduce the over pumping of the aquifer in the Waco area, the Texas Legislature in 2007 authorized McLennan County to create the Southern Trinity Groundwater District. The new district has been effective at limiting the installation of new wells for both residential and commercial use; however, the current removal rate of groundwater from the aquifer continues to be greater than the recharge rate.

The FHLM study area is located in Groundwater Management Area 8 (GMA-8), and TCEQ has designated a large area over the Trinity Aquifer from the Red River to Central Texas as a Priority Groundwater Management Area (PGMA) due to the critical groundwater declines facing the area. The preferred state of an aquifer over the ensuing 50 years is called the desired future condition. Based on GMA-8 Desired Future Conditions (DFC), the water levels in the Trinity Aquifer will drop over 500 feet by 2050 (approximately 10 feet per year); reference **Figure 5-20** for the rate of decline of the groundwater levels.

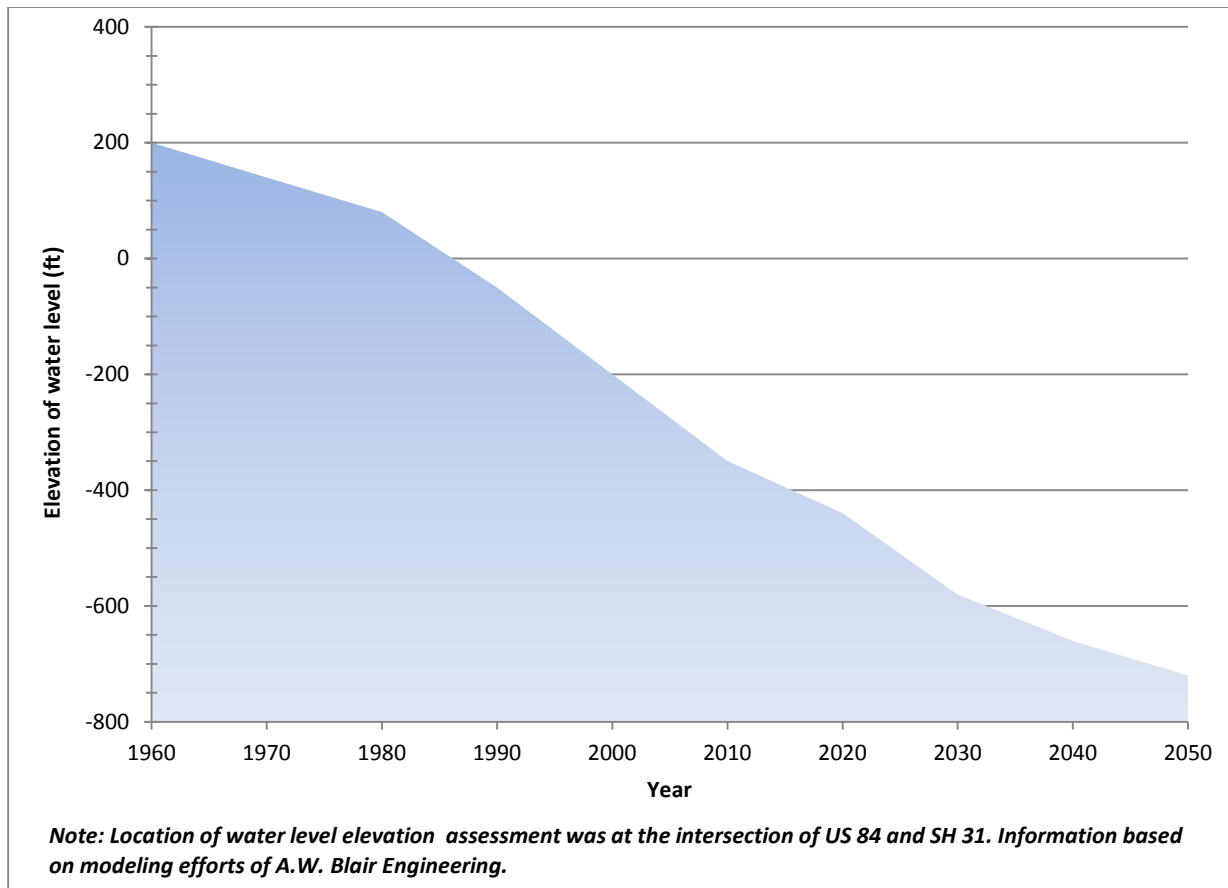


Figure 5-20: Groundwater Elevations in the Trinity Aquifer (per the Desired Future Conditions established by GMA 8)

5.3 POTENTIAL REGIONAL INFRASTRUCTURE ASSETS

Most of the participants in the study do not have water infrastructure that could be considered regional in scope. The exceptions would be the City of Waco, who is already a regional water provider in McLennan County, and the City of Robinson, who is providing water to the City of Lorena. In Limestone County, Bistone Municipal Water Supply District (Bistone MWSD) is also a regional provider, which sources its water from Lake Mexia and the Carrizo-Wilcox Aquifer. Both the City of Marlin and the City of Mart have expressed interest in becoming regional providers; however, according to the *TWDB 2011 Region G Water Plan*, both cities do not currently have supply that would allow them to meet the water needs of the project participants.

The City of Waco has two water treatment plants and a distribution system that provides water to its retail customers and wholesale customers. In order to take advantage of this regional asset, the City of Waco would need to be willing to sell water to the project participants. As discussed in earlier sections, at this time, and without the implementation of the proposed reclaimed water project, the City of Waco is not in a position to sell water to the project participants.

The City of Robinson's source of water supply comes from the City of Waco, wells in the Trinity Aquifer and a reverse osmosis water treatment plant treating water from the Brazos River. The City of Robinson has expressed an interest in establishing a cost-share arrangement in the expansion of their existing plant with the FHLM project participants if they would commit to a supply of 1.0 MGD. The participants would have to construct pump stations and pipelines to transport the water from the City of Robinson plant to their individual systems.

Bistone Municipal Water Supply District has a surface water treatment plant on Lake Mexia and groundwater wells in the Carrizo-Wilcox Aquifer in Limestone County. Bistone MWSD has a water transmission line along U.S. Highway 84 that could be used to deliver water into a new regional system near Lake Mexia. Bistone MWSD is not signed up as an official project participant of this study, but has expressed interest in possibly working with the group to achieve a win-win solution.

5.4 WATER CONSERVATION AND DROUGHT CONTINGENCY PLANS

Senate Bill 1 (SB-1), passed by the Texas Legislature in 1997, increased the number of entities required to submit water conservation and drought contingency plans. As part of a regionalization strategy, all involved entities would need to draft and adopt Water Conservation and Drought Contingency Plans under the conditions of SB-1. In addition, the TWDB requires project participants receiving grant funding through the Regional Water and Wastewater Facilities Planning Grant Program to prepare and implement water conservation and drought contingency plans. These plans must meet all minimum requirements outlined by the Texas Commission on Environmental Quality (TCEQ).

Many of the project participants using groundwater that have Historic Use Permits and Non-Historic Use Permits with Southern Trinity Groundwater Conservation District in McLennan County are required to adopt a Drought Contingency Plan according to the District's rules and management plan. Copies of these plans for each of the participating cities and water supply corporations are provided in Appendix A for reference.

Section 6.0

DEVELOPMENT OF REGIONAL ALTERNATIVES

6.1 INTRODUCTION

As presented in previous sections, several drivers have led to the need for the FHLM project participants to evaluate alternative water solutions, with one of the main factors being the change in arsenic concentration regulations in 2001 to a maximum allowable limit from 50 ppb to 10 ppb. This change in regulations, along with the decreased water level of the Trinity Aquifer due to the DFC, led to exploration of viable regional water treatment options.

This section of the report focuses on the development of regional water treatment and transmission alternatives for FHLM, to include the methodology, determination and screening of initial and final alternatives.

6.2 METHODOLOGY

The first part to developing possible regional water treatment and transmission alternatives for FHLM was to gather information from all the project participants on their current water treatment systems, projected growth and issues they were facing. Electronic questionnaires and/or one-on-one interviews were conducted with each entity. (Descriptions of population projections and existing systems can be found in Sections 4 and 5, respectively). Taking into account the information that was obtained, the following steps show how the project team developed the regional alternatives:

- **Step 1: Determine initial alternatives.** Based on engineering judgment, voting and inputs provided by the project participants, 16 preliminary alternatives were presented and developed into initial alternatives.
- **Step 2: Screen initial alternatives.** Discussions were held and comments collected from the project participants concerning the initial alternatives with the goal of selecting the top alternatives for further evaluation.
- **Step 3: Select regional alternatives for further evaluation.** Based on the comments during the screening phase, four alternatives were modified and chosen for further evaluation.

The sections below describe these steps.

6.3 DESCRIPTION OF INITIAL ALTERNATIVES

Prior to the project meeting held on December 17, 2014, participants were presented with a wide variety of alternatives that were grouped according to three categories:

- 1) individual solutions;
- 2) surface water resources; and
- 3) groundwater resources. Under each of these headings, multiple options were presented.

For the individual solutions, the following alternatives were presented:

- 1) Construct wellhead treatment units at each water system and upgrade wells/pumps due to desired future conditions (DFC). Possible treatment technologies include:
 - a. Activated alumina
 - b. Ion exchange
 - c. Reverse Osmosis
 - d. Electrodialysis reversal
 - e. Oxidation/coagulation/filtration
 - f. Adsorption
- 2) Employ a regional operation of treatment. Possible options include:
 - a. Contract with private company to handle regional operations of each individual treatment system
 - b. FHLM WSC serves as lead entity to oversee contract

For the surface water resources, the following alternatives were presented as possible water providers:

- 1) Brazos River Authority – Lake Aquilla and Whitney
- 2) City of Waco – Lake Waco
- 3) Energy Future Holdings (TXU, Luminant)
- 4) City of Marlin
- 5) City of Mart

For the groundwater resources, the following alternatives were presented as possible supply options in addition to the Trinity Aquifer:

- 1) Brazos River Alluvium (minor aquifer)
- 2) Carrizo-Wilcox (major aquifer)
- 3) Woodbine (minor aquifer)

During the working session of the meeting, each individual in attendance had the opportunity to select their top three alternatives to be considered for further investigation. Based on feedback received from the meeting, two additional regional alternatives were included on the list for consideration:

- 1) **Brackish Groundwater (Reverse Osmosis WTP)** - construct reverse osmosis (RO) water treatment plant to treat brackish groundwater from new well field located in northwestern corner of Limestone County; evaluate option to provide water for blending and/or replacement of existing supply.
- 2) **Tehuacana Creek (New Surface WTP)** - construct off-channel reservoir along Tehuacana Creek near the intersection of Loop 340 and SH-6; the Tehuacana Creek site near SH-6 and the Brazos River has a contributing drainage area of approximately 243.4 sq. mi. and could possibly have a yield of 10,000 ac-ft/year depending on senior water rights and environmental flows.

Additionally, three of the six individual treatment options (i.e. active alumina, ion exchange and electro dialysis) were removed from further consideration based on the cost effectiveness of these processes.

An additional email poll was conducted afterwards, and each of the 26 project participants had the opportunity to submit a single vote for their entity that listed their top three ranked alternatives; FHLM WSC did not participate in the voting exercise. As a result, the list of preliminary alternatives was narrowed down to five initial alternatives for further evaluation. Below is a description of each initial alternative.

6.3.1 Blending of Arsenic Violation Water

For this initial alternative, RMS WSC and M.S. WSC would receive the supply to meet year 2040 average day demands from an expanded City of Robinson RO WTP, which receives its water from the Brazos River, to blend with their current groundwater supply, and LTG WSC and Pure WSC would receive the year 2040 average day demands from McLennan County WCID No. 2 wells to blend with their current groundwater supply. The water volume to be provided was determined based on the required supply needed for a finished water supply with a targeted annual average arsenic concentration of 8.0 ppb. All other participants would continue to utilize their existing supply. The City of Robinson WTP would be expanded, as well as transmission pipelines and booster pump stations constructed. With the McLennan County WCID No. 2 option, additional storage at the well site, new transmission pipelines and booster pump stations would be constructed.

Figures 6-1 and 6-2 at the end of Section 6.3 show an overview of the initial McLennan County WCID No. 2 and City of Robinson blending alternatives, respectively.

6.3.2 Individual Treatment for Arsenic Violators

For project participants that historically had arsenic concentrations greater than the MCL, arsenic treatment at the wellhead was considered. The entities included in this evaluation were: Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, LTG WSC, M.S. WSC, City of Mount Calm WSC, Moore WS, and RMS WSC. Arsenic treatment alternatives evaluated were adsorption using iron-based adsorptive media and coagulation followed by filtration with granular media. All other participants would continue to utilize their existing supply without treatment.

Figure 6-3 at the end of Section 6.3 shows an overview of the initial individual treatment system alternative.

6.3.3 Reverse Osmosis Brackish Groundwater Treatment Plant

For this alternative, a new regional reverse osmosis (RO) brackish groundwater treatment plant would be constructed south of Birome WSC and the City of Mount Calm in the northwest corner of Limestone County. The proposed plant would be sized to meet the year 2040 average day demands. New wells sized at approximately 500-600 GPM would be drilled at the plant site, as well as new transmission pipelines and booster pump stations constructed. The existing wells for each entity would be used during the summer months to supplement the peak flow demands as necessary.

For this treatment option, four tiers were initially developed based on geographical location to the proposed plant site. The Primary Tier included Axtell WSC, Birome WSC and Prairie Hill WSC. The Secondary Tier included all entities from the Primary Tier, plus EOL WSC, Moore WS, Pure WSC, LTG WSC, and the City of Mount Calm. The Tertiary Tier included all entities from the Secondary Tier, plus M.S .WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2 and Ross WSC. The Quaternary Tier included all entities include in the Tertiary Tier, plus the City of Mart, City of Marlin, Gholson WSC, and Chalk Bluff WSC.

Figures 6-4 through 6-7 at the end of Section 6.3 show the different tiers of this alternative.

6.3.4 New Surface Water Treatment Plant

A new surface water treatment plant would be constructed on the Tehuacana Creek southeast of the City of Waco and would have the capacity to meet the year 2040 average day demands. A new reservoir would need to be constructed, approximately one mile northwest of the WTP location, as well as new transmission pipelines and booster pump stations. The existing wells for each entity would be used during the summer months to supplement the peak flow demands as necessary.

For this treatment option, four tiers were initially developed based on geographic location to the proposed plant site. The Primary Tier included EOL WSC, Moore WS, Pure WSC and H&H WSC. The Secondary Tier included the entities from the Primary Tier, plus Axtell WSC, Prairie Hill WSC, LTG WSC, RMS WSC and McLennan County WCID No. 2. The Tertiary Tier included all entities from the Secondary Tier, plus Birome WSC, City of Mount Calm, M.S. WSC and Ross WSC. The Quaternary Tier included all entities include in the Tertiary Tier, plus the City of Mart, City of Marlin, Gholson WSC, and Chalk Bluff WSC.

This alternative assumes that a new off-channel reservoir would be constructed near the proposed WTP site at the gravel pits east of Loop 340 on the Tehuacana Creek (further investigation into the exact location and size of the reservoir would need to be conducted if this alternative were chosen). This alternative could require substantially more time to implement than other alternatives due to the need to obtain a water rights permit, conduct environmental

permitting and receive approval, land acquisition, and other obstacles associated with the construction of the reservoir.

Figures 6-8 through Figure 6-11 at the end of Section 6.3 show the different tiers of this alternative.

6.3.5 Carrizo-Wilcox Aquifer Pipeline

The Carrizo-Wilcox Aquifer is known for producing excellent quality (no arsenic concentration issues) and sufficient quantity of groundwater supply. A new well field would be drilled in the southeast corner of Limestone County in the outcrop of the Carrizo-Wilcox Aquifer. Transmission pipelines and booster pump stations would be constructed to provide the year 2040 average day water demand.

For this treatment alternative, two tiers were initially developed. The Primary Tier included Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2 and Ross WSC. The Secondary Tier included the entities from the Primary Tier, plus the City of Mart, City of Marlin, Gholson WSC, and Chalk Bluff WSC.

Figures 6-12 and 6-13 at the end of Section 6.3 show the different tiers for this alternative.

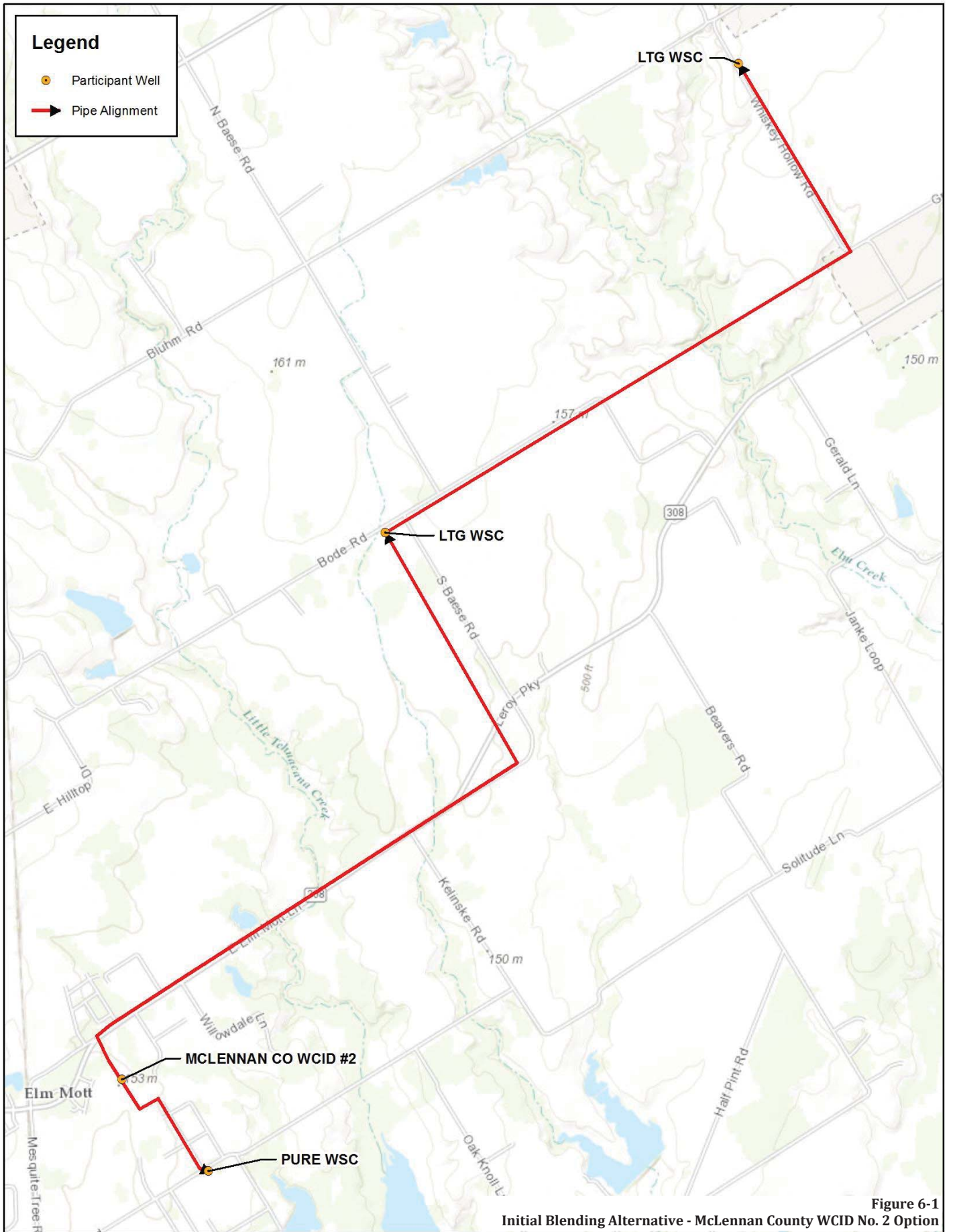


Figure 6-1
Initial Blending Alternative - McLennan County WCID No. 2 Option

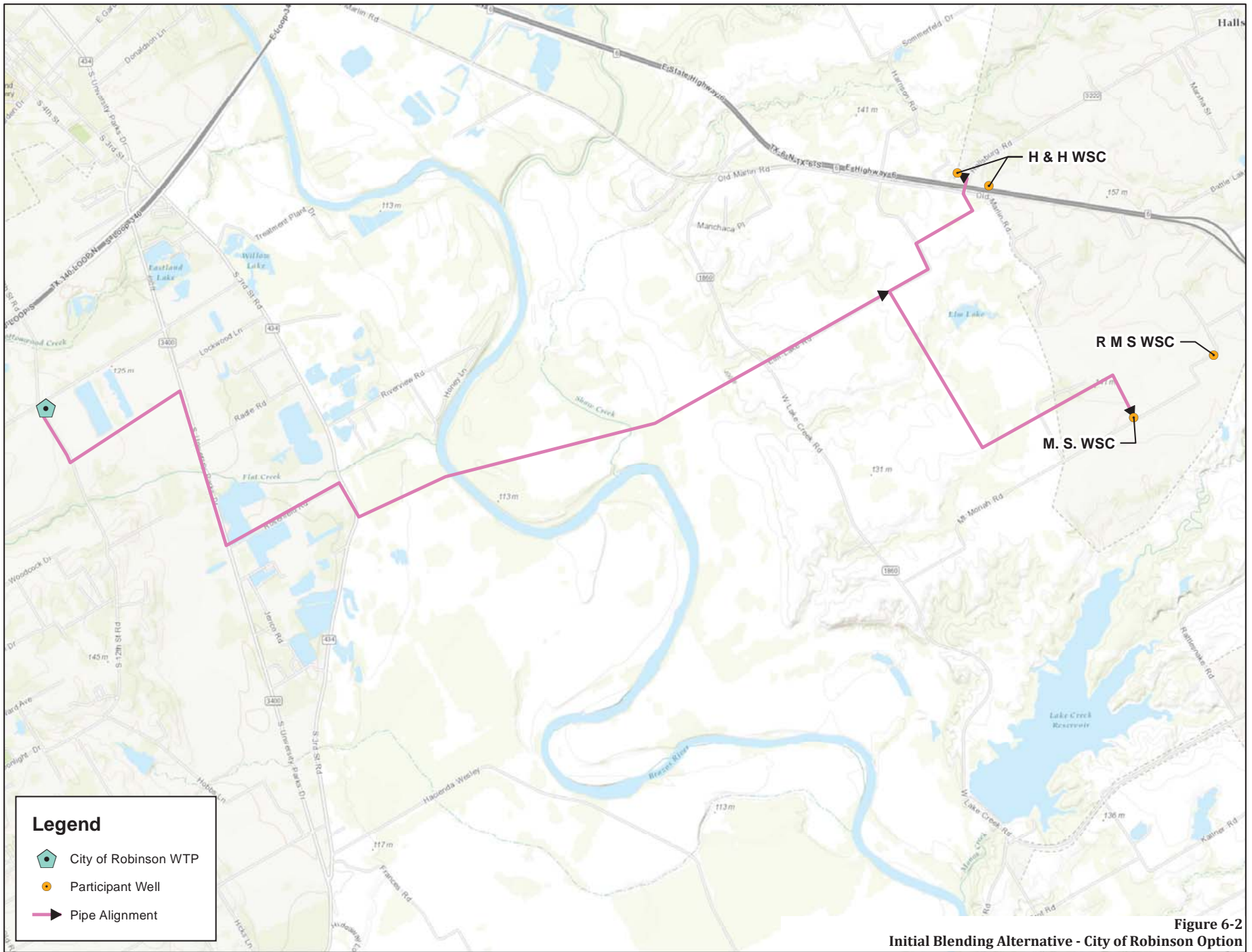


Figure 6-2
Initial Blending Alternative - City of Robinson Option

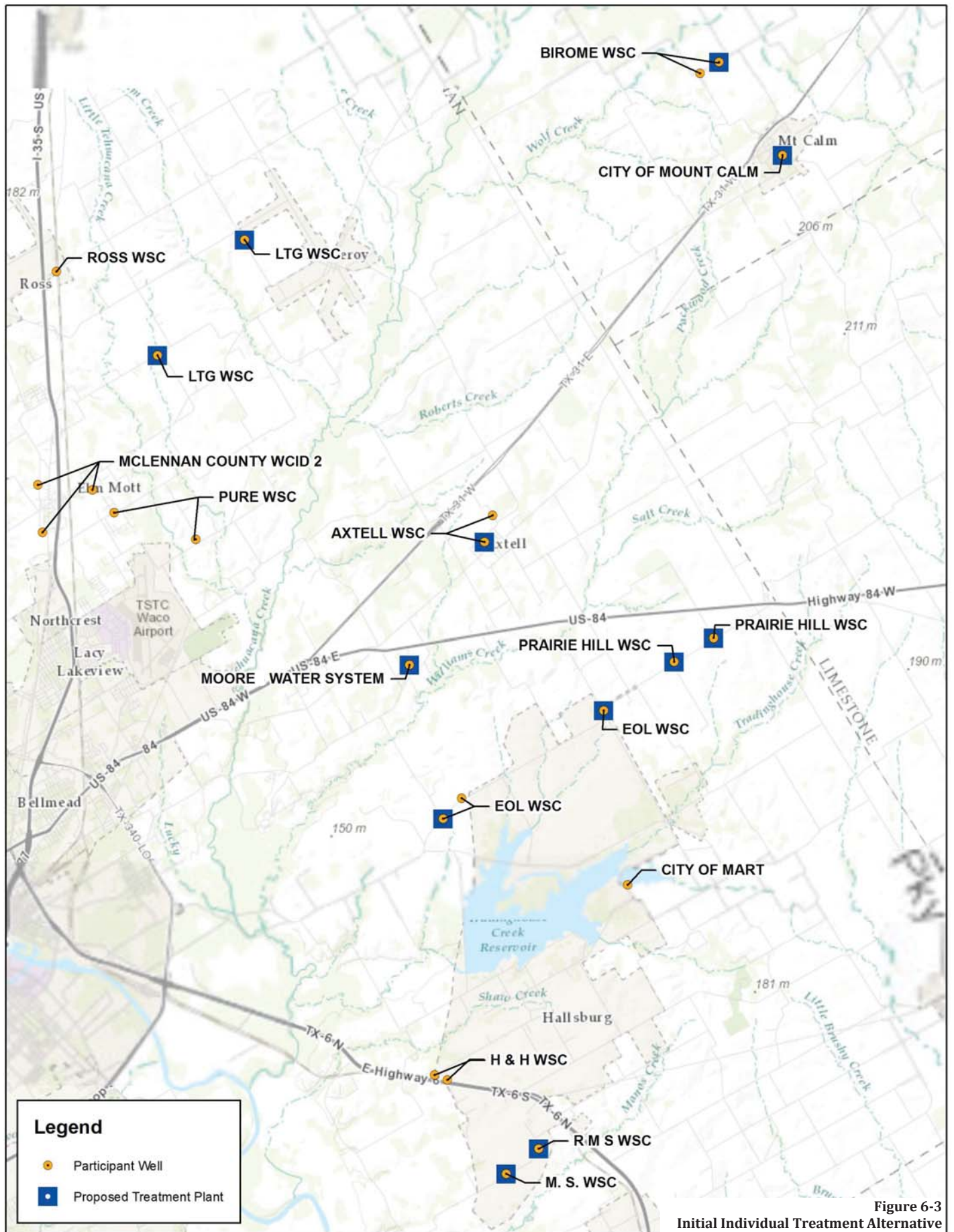


Figure 6-3
Initial Individual Treatment Alternative

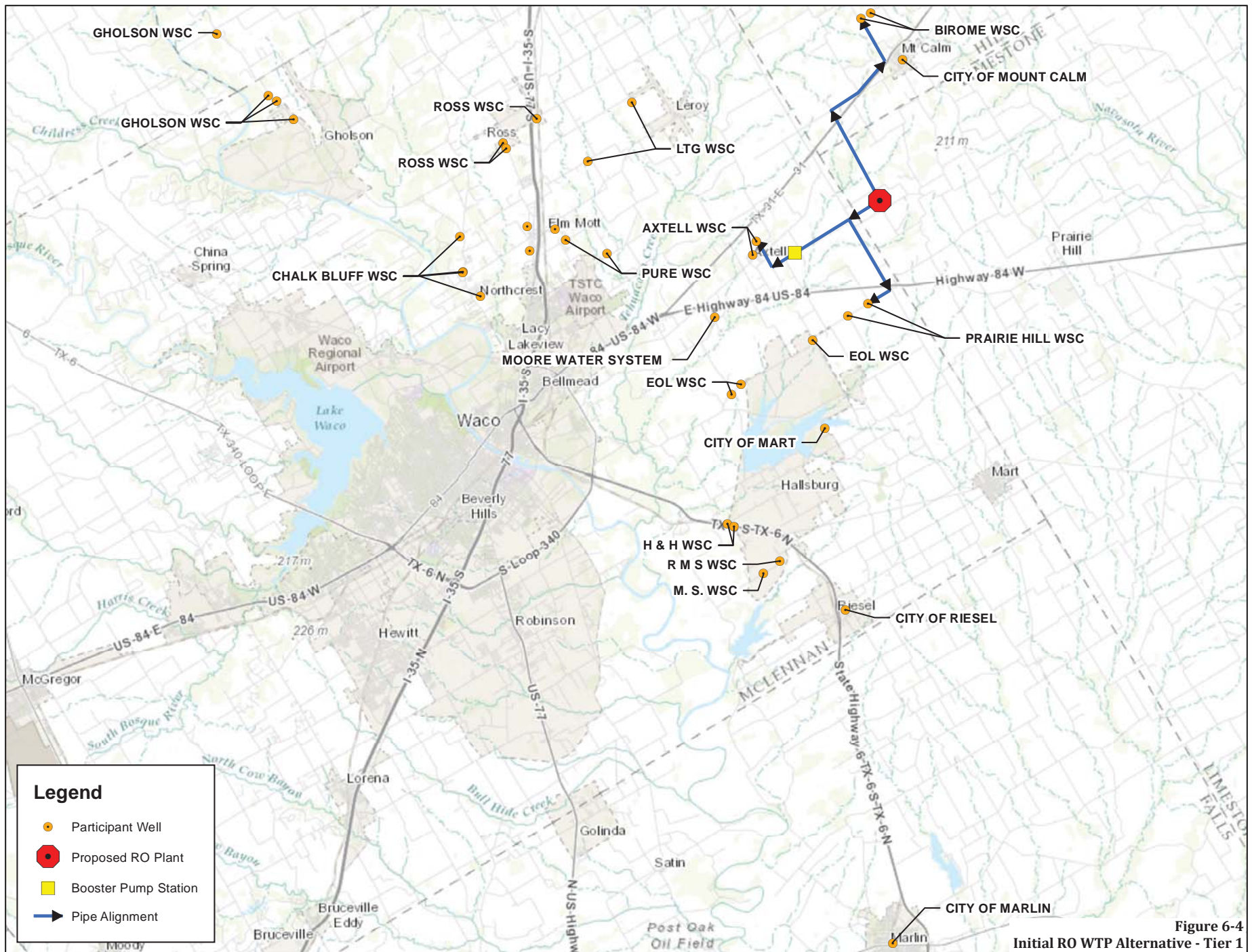


Figure 6-4
Initial RO WTP Alternative - Tier 1

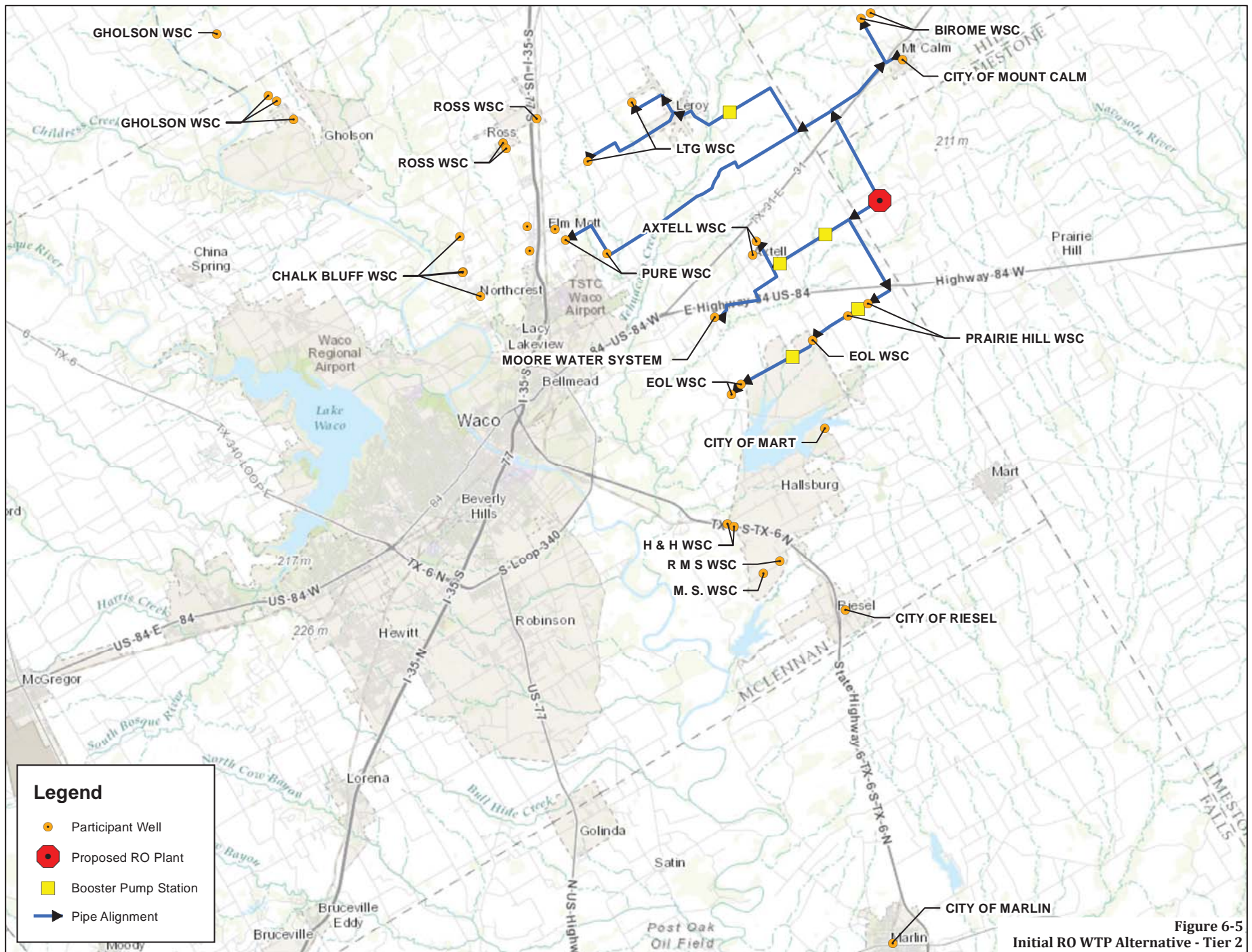


Figure 6-5
Initial RO WTP Alternative - Tier 2

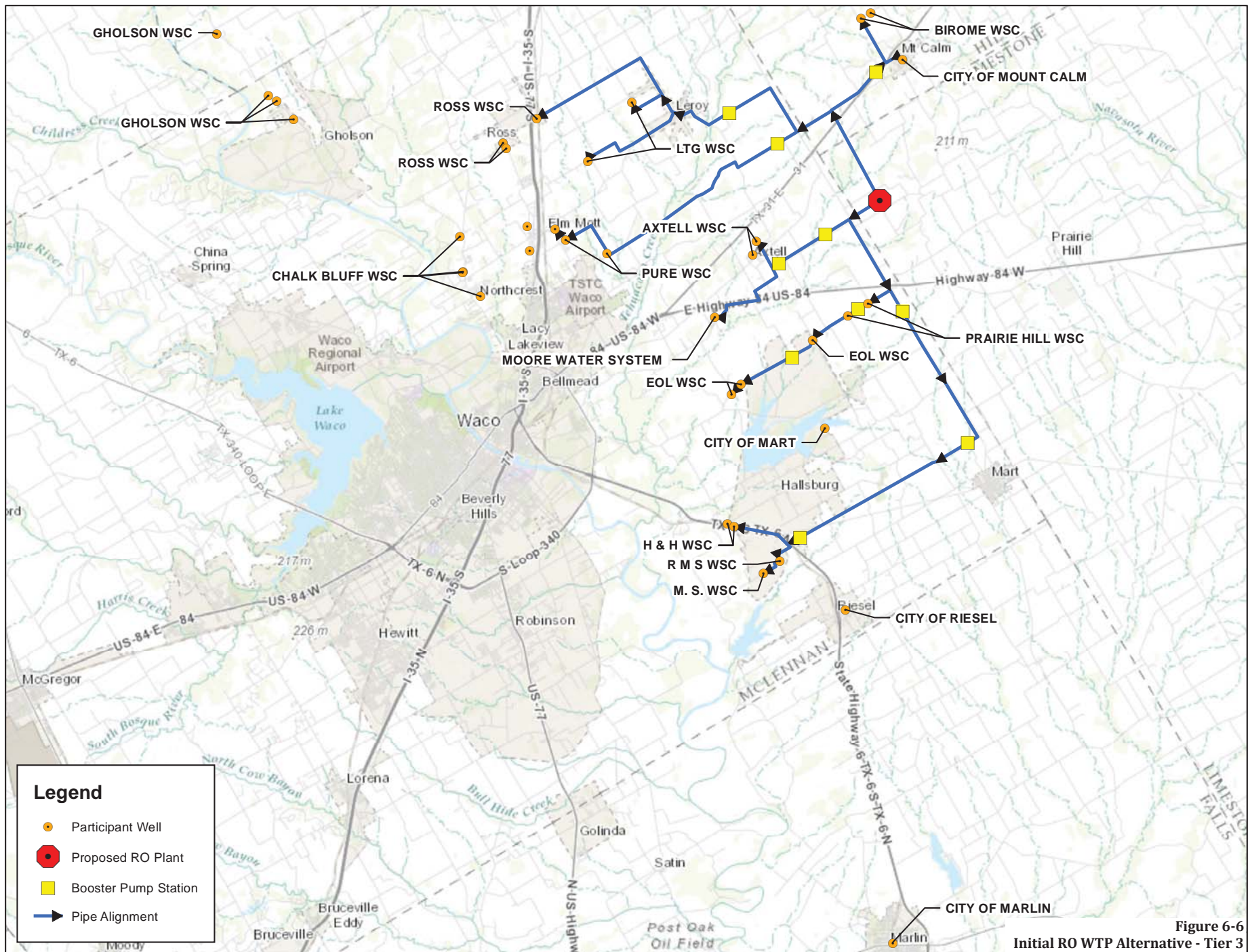


Figure 6-6
Initial RO WTP Alternative - Tier 3

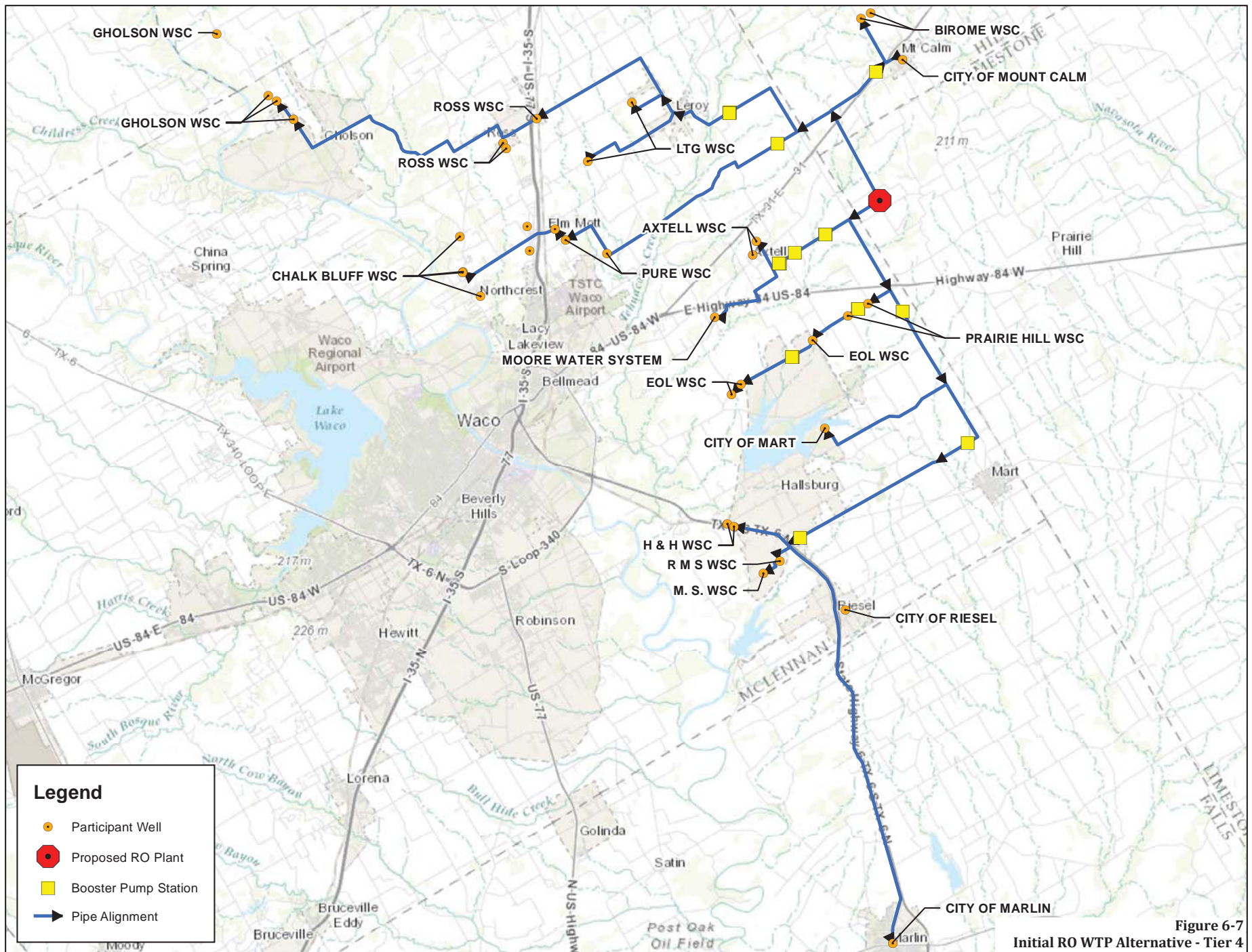


Figure 6-7
Initial RO WTP Alternative - Tier 4

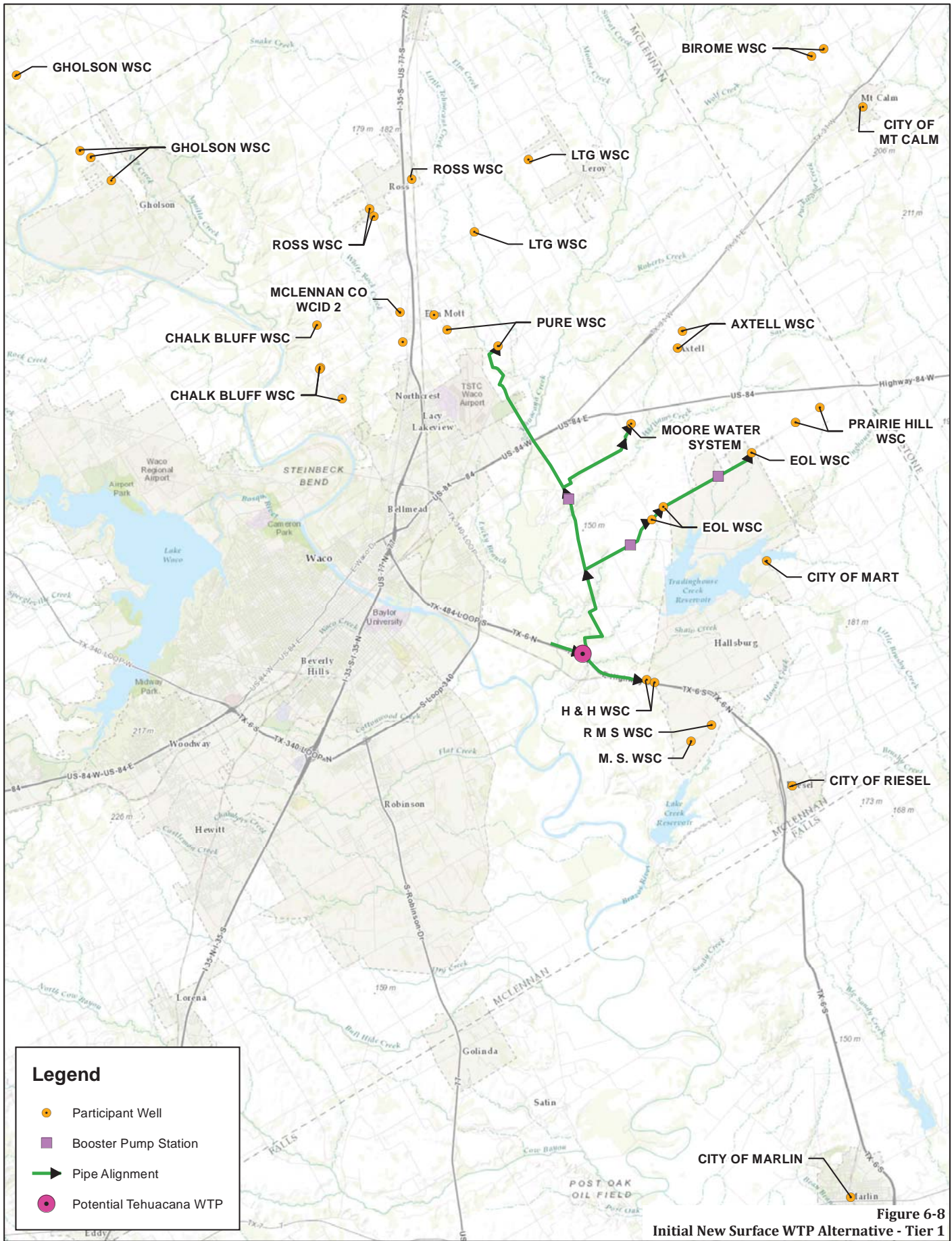


Figure 6-8
Initial New Surface WTP Alternative - Tier 1

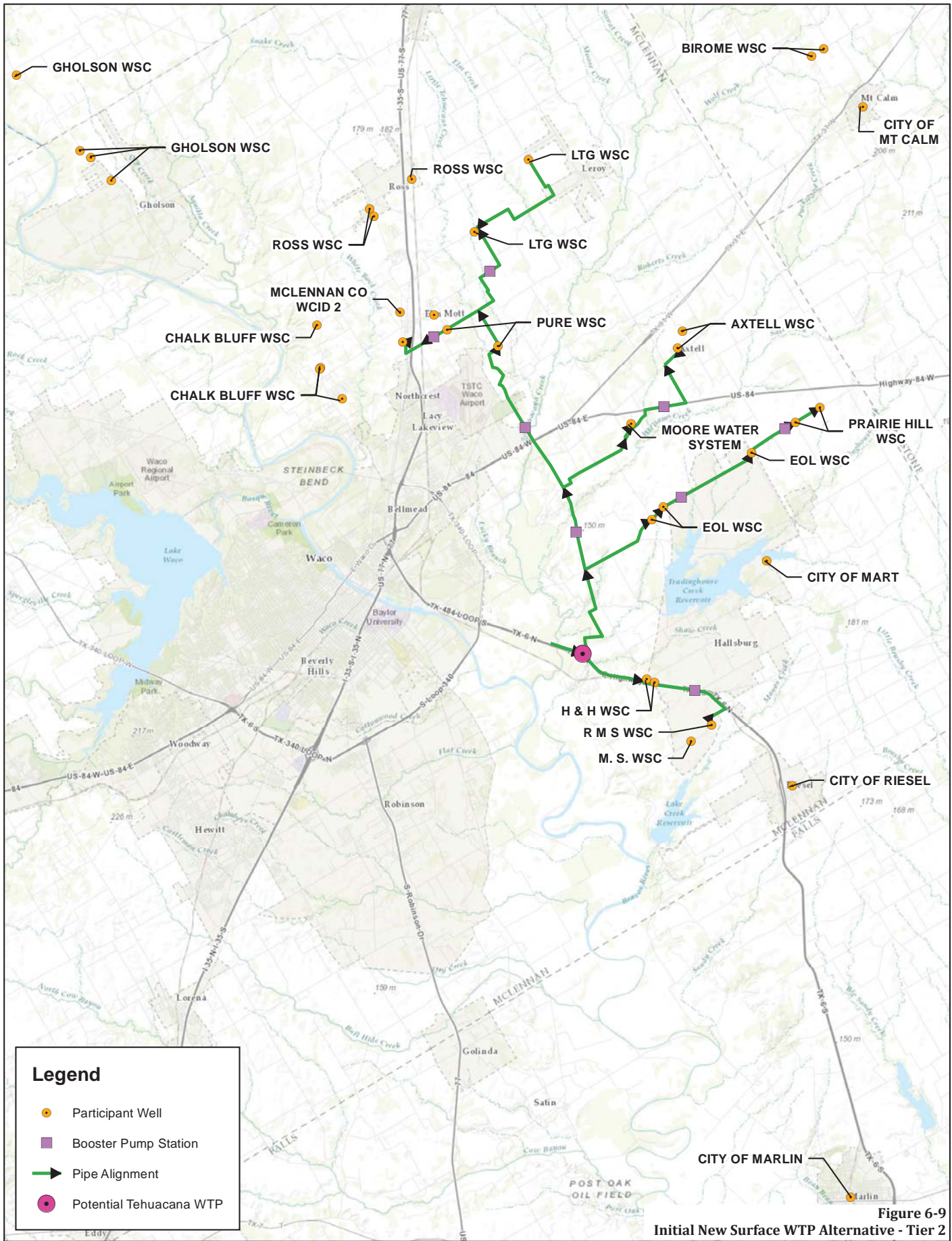


Figure 6-9
Initial New Surface WTP Alternative - Tier 2

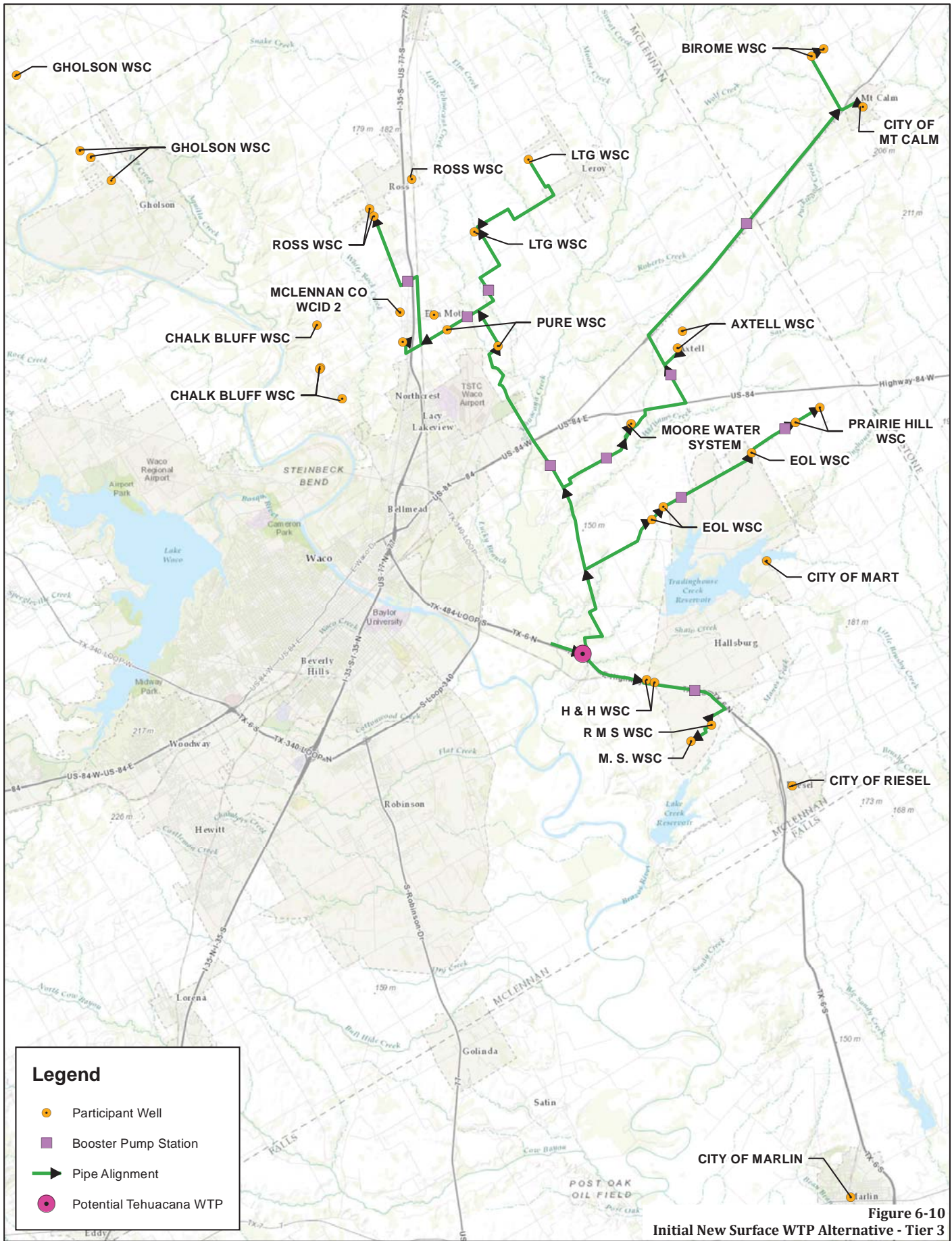
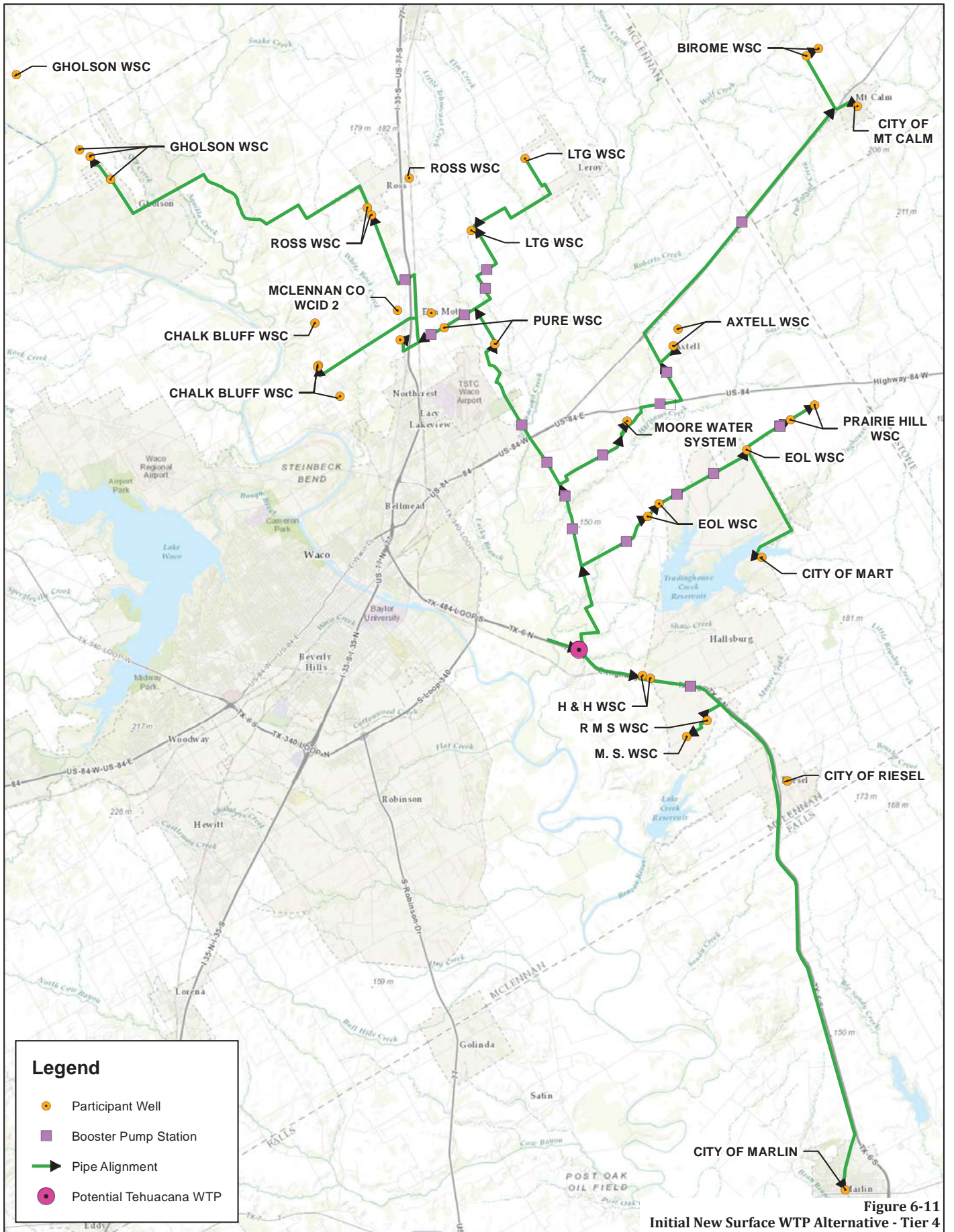


Figure 6-10
Initial New Surface WTP Alternative - Tier 3



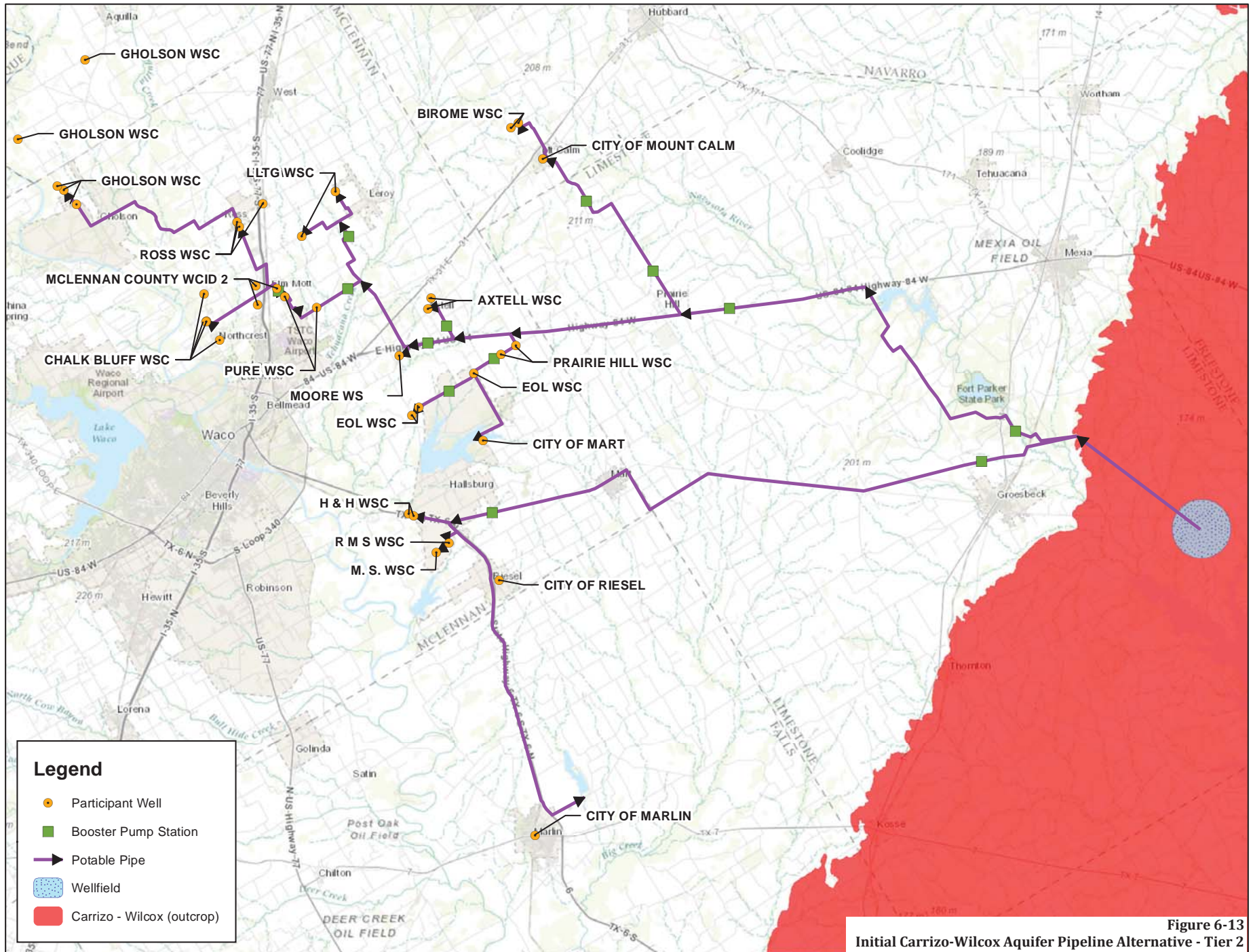


Figure 6-13
Initial Carrizo-Wilcox Aquifer Pipeline Alternative - Tier 2

6.4 SCREENING OF INITIAL ALTERNATIVES

The five initial alternatives were presented to the project participants in order to initiate the screening process. The objective of the screening process was to consolidate, improve and determine which of final alternatives would be considered for further evaluation. During this screening period, changes were made to the initial alternatives.

When considering blending existing groundwater supplies with the City of Robinson water supply, it was noted that the City would be interested in this option only if FHLM would commit to a supply of 1.0 MGD and participate in a cost-share arrangement for the expansion of their existing plant. As such, additional arsenic violators were added to this alternative, as well as H&H WSC, who expressed interest in an additional water supply source.

For the blending alternative, it was also determined that McLennan County WCID No. 2 might not be able to provide the necessary water for this alternative. This option was modified to include a well drilled in the same vicinity of the McLennan County WCID No. 2 wells, as water from this area in the Trinity Aquifer was not experiencing arsenic concentration issues. Additional entities with arsenic concentration violations were added to the McLennan option to provide a blending alternative for all arsenic concentration violators.

For the Brackish RO WTP and the Carrizo-Wilcox Aquifer Pipeline alternatives, the Cities of Mart and Marlin were removed from consideration based on their input and comments.

For the Carrizo-Wilcox Aquifer Pipeline Alternative, the City of Waco initially expressed interest in being included in the evaluation for this alternative. As such, three options were considered under this alternative: 2040 max day demand for the entities and additional supply to Waco; 2040 max day demand for the entities (no supply for Waco); and 2040 average day demand for the entities (no supply for Waco).

For alternatives that had four tiers, only the high level tiers (quaternary) were considered for further evaluation. For the Carrizo-Wilcox Aquifer Pipeline Alternative, only the secondary tier was considered for further evaluation.

One of the improvements considered during the screening phase was to reduce the design flow from max day demand (MDD) to average day demand (ADD) to reduce the capital cost required to construct the regional alternative.

In order to completely meet the water participants MDD, the new regional system would have to provide a minimum of 8.5 MGD in 2040; however, most of the project participants already have a water supply that is sufficient to meet their demands through 2040. Therefore, the main factor on deciding the type of water supply and volume amount depends on the level of arsenic concentrations.

As presented in Section 5.2, the arsenic concentrations in the wells of the participants under USEPA enforcement do not always exceed the maximum allowable limit of 10 ppb on a

monthly basis. Since arsenic sampling is taken and reported on a quarterly basis, it was studied as to what flow arsenic violators would require from a new water source to blend with their existing water source in order to maintain a non-violation water. The reason for this approach was to better utilize the existing systems and improve the overall cost-efficiency.

With the data provided by the project participants and obtained from TCEQ, entities known for their historically high arsenic concentrations were used to evaluate what the required flow would be to blend with the non-treated groundwater to achieve an arsenic concentration of less than 8 ppb. The steps for this evaluation were as follows:

- **Step 1:** Based on the data provided, determine what would be the max month water demand for each month in the year. Calculate the difference between the ADD and max month demand. Flows for the ADD and lower were assumed to come from a new treatment plant or different groundwater source and would have no arsenic.
- **Step 2:** Using the exceedance graphs (presented in Section 5.2), determine what would be the arsenic concentration at which samples would be below 80 percent of the time. The difference in flow between the ADD and the MDD was assumed to have this arsenic concentration.
- **Step 3:** Based on a weighted average, determine what the monthly and annual arsenic concentrations would be for each entity.

Table 6-1 presents the calculated arsenic concentrations per month for these entities. For arsenic concentrations of 0 ppb, it was calculated that the ADD was lower than the max month demand for these months, and the entire flow would be provided by one of the new alternatives. As shown in this table, all the entities with the exception of one were below the maximum allowable limit every month. Based on the data provided, Prairie Hill WSC, which might require a flow of 10 percent greater than its ADD, shows their arsenic concentrations exceeding the MCL in September. However, both the third quarter (July through September) and the annual average were below the 10 ppb limit. Based on this evaluation, it was determined that designing for the ADD would be acceptable for dealing with the existing arsenic issues.

For alternatives that used a design flow equal to the ADD (Blending with McLennan County well, New Surface WTP and Carrizo-Wilcox Aquifer Pipeline alternatives), the average day and annual water consumption had to be further evaluated. When designing for MDD, the ADD would be used to calculate O&M costs and to determine what the annual flow would be. For example in **Figure 6-14**, all the volume under the MDD curve can be calculated by assuming an ADD every day.

When designing for ADD, the maximum supplied amount would be equal to the ADD; therefore, assuming this demand every day as in the previous scenario would not be an accurate calculation. As such, a lower volume would need to be used in the calculation of the O&M costs and to determine the annual flow.

As shown in **Figure 6-14**, this flow (represented by the red line) is referred to as the adjusted ADD. Based on the project participants provided data, it was determined that this adjusted ADD would be equal to 85 percent of the ADD.

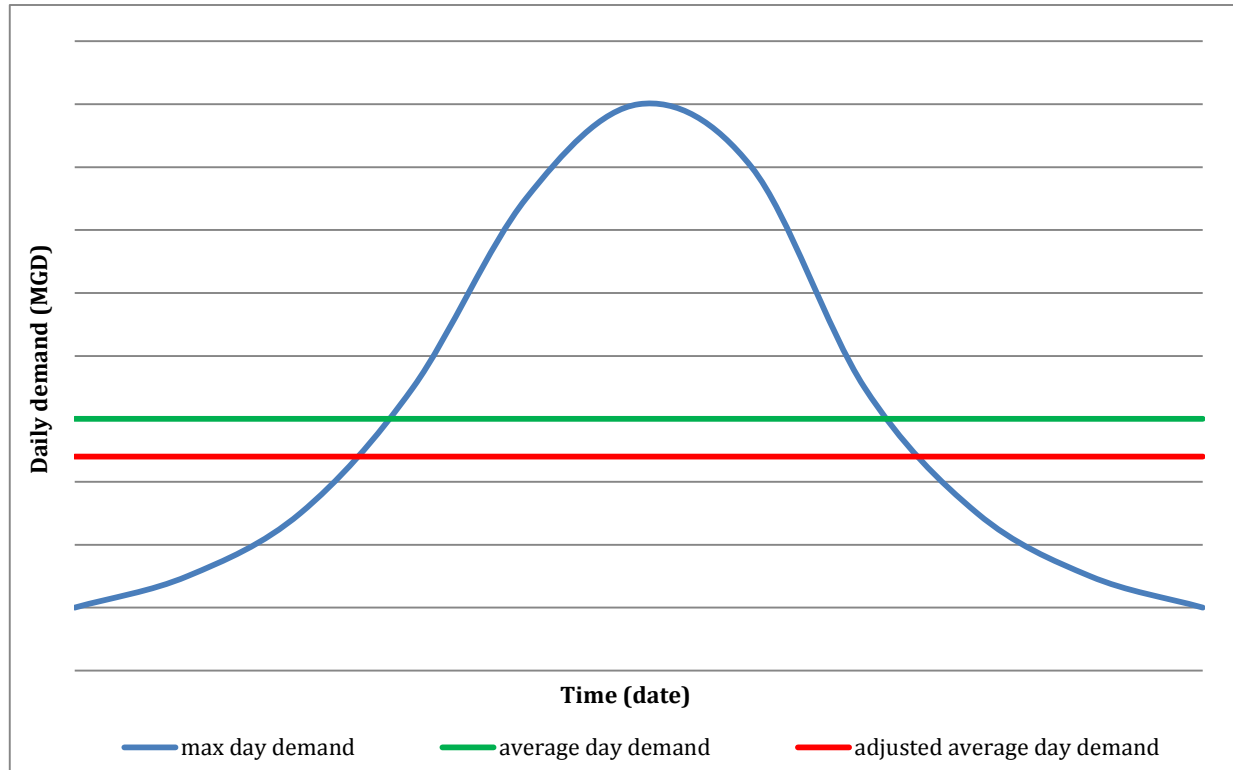


Figure 6-14: Annual Daily Demand Curve

Table 6-1: Arsenic Values per Month for Violators (ppb)

Entity	Design value	January	February	March	April	May	June	July	August	September	October	November	December	Annual Average
Axtell WSC	17.4	0.00	0.00	0.00	0.00	0.29	5.74	6.11	6.62	2.98	0.00	0.00	0.00	1.81
Birome WSC	12.9	1.64	2.58	1.30	1.65	3.65	5.67	6.20	6.67	7.48	4.31	3.84	3.95	4.08
City of Mount Calm	Unavailable	No Data Available for a Breakdown of Water Demands per Month												
Prairie Hill WSC	26.0	1.67	3.34	1.40	1.27	0.00	6.08	8.50	9.21	10.22	2.70	4.13	3.17	4.31
EOL WSC	21.5	0.00	0.00	0.00	0.00	0.00	0.09	4.57	5.27	3.14	0.00	0.00	0.00	1.09
Moore WS	Unavailable	No Data Available for a Breakdown of Water Demands per Month												
LTG WSC	13.8	0.00	0.00	0.00	0.00	0.00	3.36	4.33	4.87	4.24	0.00	0.00	0.00	1.40
M.S. WSC	12.0	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	0.00	0.17
RMS WSC	13.4	No Data Available for a Breakdown of Water Demands per Month												

6.5 REGIONAL ALTERNATIVES SELECTED FOR DETAILED EVALUATION

Following the screening of the initial alternatives, the RO WTP alternative was removed from further consideration due to the initial capital cost estimates expressed in dollar per thousand gallons (\$/1,000 gallons) being much greater than the other options. All other alternatives were evaluated based on the improvements made during the initial screening phase. **Table 6-2** summarizes which project participants were included in each alternative.

Table 6-2: Summary of Project Participants per Alternative

Blending - Robinson	Blending - McLennan County	Individual Treatment	New Surface Plant	Carrizo-Wilcox Max Day with Waco	Carrizo-Wilcox Avg Day, No Waco	Carrizo-Wilcox Max Day, No Waco
Prairie Hill WSC	Axtell WSC	Axtell WSC	Axtell WSC	Axtell WSC	Axtell WSC	Axtell WSC
EOL WSC	Birome WSC	Birome WSC	Birome WSC	Birome WSC	Birome WSC	Birome WSC
Moore Water System	Pure WSC	Prairie Hill WSC	Prairie Hill WSC	Prairie Hill WSC	Prairie Hill WSC	Prairie Hill WSC
M.S. WSC	LTG WSC	EOL WSC	EOL WSC	EOL WSC	EOL WSC	EOL WSC
RMS WSC	City of Mount Calm	Moore Water System	Moore Water System	Moore Water System	Moore Water System	Moore Water System
H&H WSC		Pure WSC	Pure WSC	Pure WSC	Pure WSC	Pure WSC
		LTG WSC	LTG WSC	LTG WSC	LTG WSC	LTG WSC
		City of Mount Calm	City of Mount Calm	City of Mount Calm	City of Mount Calm	City of Mount Calm
		M.S. WSC	M.S. WSC	M.S. WSC	M.S. WSC	M.S. WSC
		RMS WSC	RMS WSC	RMS WSC	RMS WSC	RMS WSC
		H&H WSC	H&H WSC	H&H WSC	H&H WSC	H&H WSC
		McLennan County WCID #2	McLennan County WCID #2	McLennan County WCID #2	McLennan County WCID #2	McLennan County WCID #2
		Ross WSC	Ross WSC	Ross WSC	Ross WSC	Ross WSC
		Gholson WSC	Gholson WSC	Gholson WSC	Gholson WSC	Gholson WSC
	Chalk Bluff WSC	Chalk Bluff WSC	Chalk Bluff WSC	Chalk Bluff WSC	Chalk Bluff WSC	
	City of Mart	City of Mart	City of Mart	City of Mart	City of Mart	
	City of Marlin	City of Marlin	City of Marlin	City of Marlin	City of Marlin	

6.5.1 Blending of Arsenic Violation Water

In this alternative, there would be two water supply sources used for blending – a new well in McLennan County in the portion of the Trinity Aquifer that does not have arsenic issues for the northern arsenic violators and the City of Robinson RO WTP, which receives its water from the Brazos River, for the southern arsenic violators. Under this alternative, each entity would continue to utilize its existing groundwater supply during the summer months and peak flows to blend with the provided water supply to meet demands. **Figures 6-15 and 6-16** at the end of Section 6.6 show an overview of the northern and southern option, respectively.

In the north, LTG WSC, Pure, WSC, Axtell WSC, Birome WSC and the City of Mount Calm would be provided a 2040 average day demand of 0.5 MGD from a new well drilled in McLennan County. **Table 6-3** shows the average day demands to be provided for each entity.

**Table 6-3: Blending of Arsenic Violation Water – Northern Option
Average Day Water Demands (MGD)**

Entity	2010	2015	2020	2025	2030	2035	2040
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13
Pure WSC	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Total:	0.41	0.43	0.44	0.45	0.47	0.48	0.50

New transmission pipelines required will be sized to transport the capacity needed to meet the year 2040 average day water demand and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to transport the water through the transmission system. **Table 6-4** presents the required transmission piping size and length for the northern option. **Table 6-5** shows the booster pump stations required along the northern pipeline system, as well as their estimated horsepower.

**Table 6-4: Transmission Pipelines Required for
Blending Alternative – Northern Option**

Pipe Diameter (in)	Length (ft)
4	88,900
8	48,100

Table 6-5: Booster Pump Stations Required for Blending Alternative – Northern Option

Name	Horsepower (hp)
Booster Pump Station #1	20
Booster Pump Station #2	10

In the south, RMS WSC, M.S. WSC, Prairie Hill WSC, EOL WSC, Moore WS and H&H WSC would be provided a 2040 average day demand of 1.0 MGD from the City of Robinson WTP. Arsenic violators - RMS WSC, M.S. WSC, Prairie Hill WSC, EOL WSC, and Moore WS – would receive their average day demand, while H&H WSC would get the remaining supply up to 1.0 MGD. The City of Robinson WTP would be expanded by 2.0 MGD with 1.0 MGD in capacity interest purchased by the project participants. An additional 40-horsepower booster pump station and 1.0 million gallon ground storage tank (GST) would be constructed at the plant to provide the water supply to these new entities. **Table 6-6** shows the average day demands for each entity.

Table 6-6: Blending of Arsenic Violation Water – Southern Option Average Day Water Demands (MGD)

Entity	2010	2015	2020	2025	2030	2035	2040
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Prairie Hill WSC	0.16	0.16	0.16	0.17	0.17	0.18	0.18
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04
H&H WSC	0.49	0.47	0.45	0.42	0.40	0.37	0.35
Total:	1.00	1.00	1.00	1.00	1.00	1.00	1.00

New transmission pipelines that are required will be sized to transport the flow needed to meet the year 2040 average day water demand and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to transport the water through the transmission system. **Table 6-7** presents the required transmission piping size and length for the northern option. **Table 6-8** shows the booster pump stations required along the pipeline route, as well as their estimated horsepower.

Table 6-7: Transmission Pipelines Required for Blending Alternative – Southern Option

Pipe Diameter (in)	Length (ft)
4	46,700
6	18,300
8	32,700
10	42,100

Table 6-8: Booster Pump Stations Required for Blending Alternative – Southern Option

Name	Horsepower (hp)
Booster Pump Station #1	20
Booster Pump Station #2	15
Booster Pump Station #3	10

6.5.2 Individual Treatment for Arsenic Violators

There are nine project participants that were evaluated for individual arsenic treatment at their existing wells. Details about this evaluation can be found in the Technical Memorandum in **Appendix E. Figure 6-17** at the end of Section 6.6 shows an overview of this alternative.

In this alternative, Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, LTG WSC, M.S. WSC, City of Mount Calm, Moore WS and RMS WSC were evaluated for two options, with the iron-based adsorptive media treatment being considered the most cost effective. **Table 6-9** shows the average day demands for each entity in this alternative.

Table 6-9: Individual Treatment Average Day Demand (MGD)

Entity	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Prairie Hill WSC	0.14	0.15	0.15	0.15	0.16	0.16	0.17
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17

No new water supply, transmission pipelines, or lift stations are required, as the construction for the individual treatment units will take place at the existing well sites and each entity will continue to use its existing distribution system and groundwater wells.

6.5.3 New Surface Water Treatment Plant

In this alternative, a new surface WTP would be constructed near Tehuacana Creek east of Waco to serve the 2040 average day demand for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, City of Mart, City of Marlin, Gholson WSC and Chalk Bluff WSC. Per TCEQ regulations, once the water demand meets 85 percent of the plant capacity, preparations to expand the capacity must begin. Taking this regulation into account, the new WTP would be sized for 5.4 MGD. **Figure 6-18** at the end of Section 6.6 shows an overview of this alternative.

This alternative assumes that a new off-channel reservoir would be constructed near the WTP site at the gravel pits east of Loop 340 (further investigation into the exact location and size of the reservoir would need to be conducted if this alternative were chosen). **Table 6-10** shows the average day demands for each entity in this alternative.

Table 6-10: New Surface WTP Average Day Demand (MGD)

Entity	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Prairie Hill WSC	0.14	0.15	0.15	0.15	0.16	0.16	0.17
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Pure WSC	0.04	0.04	0.04	0.04	0.04	0.04	0.04
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17
H&H WSC	0.15	0.16	0.16	0.17	0.18	0.19	0.20
McLennan Co. WCID No. 2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Ross WSC	0.20	0.21	0.22	0.24	0.25	0.26	0.27
City of Mart	0.37	0.38	0.39	0.40	0.42	0.43	0.45
City of Marlin	1.36	1.38	1.41	1.44	1.47	1.50	1.53
Gholson WSC	0.28	0.28	0.29	0.29	0.30	0.30	0.31
Chalk Bluff WSC	0.27	0.29	0.31	0.33	0.36	0.39	0.42
Total	3.72	3.84	3.96	4.09	4.23	4.37	4.52

A 20-inch raw water pipeline from the reservoir to the proposed WTP would be approximately one mile long. New transmission pipelines required will be sized to transport the capacity needed to meet the year 2040 average day water demand and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, will also be needed to transport the water through the transmission system. **Table 6-11** presents

the required transmission piping size and length. **Table 6-12** shows the booster pump stations required along the pipeline route, as well as their estimated horsepower.

Table 6-11: Transmission Pipelines Required for New WTP Alternative

Pipe Diameter (in)	Length (ft)
4	130,800
6	129,600
8	71,500
10	135,900
12	27,800

Table 6-12: Booster Pump Stations Required for New WTP Alternative

Name	Horsepower (hp)
Booster Pump Station #1	100
Booster Pump Station #2	100
Booster Pump Station #3	55
Booster Pump Station #4	20
Booster Pump Station #5	5
Booster Pump Station #6	95
Booster Pump Station #7	25
Booster Pump Station #8	15
Booster Pump Station #9	15
Booster Pump Station #10	5
Booster Pump Station #11	60
Booster Pump Station #12	50
Booster Pump Station #13	25

6.5.4 Carrizo-Wilcox Aquifer Pipeline

In this alternative, wells would be drilled in the Carrizo-Wilcox Aquifer to serve the water demands of project participants. As previously noted in Section 5, the aquifer can provide a maximum supply of 12,000 acre-ft/year, or 10.71 MGD. This alternative has three options: 2040 max day demand for the entities and additional supply goes to the City of Waco; 2040 max day demand for the entities (no supply for Waco); and 2040 average day demand for the entities (no supply for Waco). Each option is detailed in the following subsections. **Figure 6-19** at the end of Section 6.6 shows an overview of this alternative.

6.5.4.1 2040 Max Day Demand for Entities (including additional supply to Waco)

The water supply from the Carrizo-Wilcox Aquifer would be utilized first to serve the 2040 max day water demands for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC, and Chalk Bluff WSC and the additional supply will be provided to the City of Waco. Eight 1,000-GPM wells would be drilled in this aquifer within Limestone County. **Table 6-13** shows the max day demands for each entity in this alternative.

Table 6-13: Carrizo-Wilcox Aquifer Pipeline Alternative Including Waco Max Day Demand (MGD)

Entity	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.37	0.39	0.40	0.42	0.43	0.45	0.46
Birome WSC	0.33	0.34	0.35	0.36	0.37	0.38	0.39
Prairie Hill WSC	0.41	0.42	0.43	0.44	0.46	0.47	0.48
EOL WSC	0.39	0.41	0.43	0.45	0.47	0.49	0.51
Moore WS	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Pure WSC	0.09	0.09	0.09	0.09	0.09	0.09	0.09
LTG WSC	0.19	0.20	0.21	0.22	0.23	0.24	0.25
City of Mount Calm	0.05	0.05	0.05	0.05	0.05	0.05	0.05
M.S. WSC	0.07	0.07	0.07	0.07	0.07	0.07	0.07
RMS WSC	0.21	0.23	0.25	0.27	0.29	0.32	0.34
H&H WSC	0.39	0.41	0.44	0.46	0.48	0.51	0.53
McLennan Co. WCID No. 2	0.35	0.35	0.35	0.36	0.36	0.36	0.36
Ross WSC	0.41	0.43	0.45	0.47	0.49	0.52	0.54
Gholson WSC	0.56	0.57	0.58	0.59	0.60	0.61	0.62
Chalk Bluff WSC	0.63	0.68	0.74	0.80	0.86	0.93	1.01
City of Waco	6.16	5.97	5.78	5.57	5.36	5.13	4.89
Total:	10.71	10.71	10.71	10.71	10.71	10.71	10.71

New transmission pipelines required would be sized to transport the capacity needed to meet these water demands and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, would also be needed to transport the water through the transmission system. **Table 6-14** presents the required transmission piping size and length. **Table 6-15** shows the booster pump stations required along the pipeline route, as well as their estimated horsepower.

Table 6-14: Transmission Pipelines Required for 2040 Max Day Demand and Additional Supply to Waco Option

Pipe Diameter (in)	Length (ft)
4	28,100
6	60,300
8	55,000
10	151,700
12	16,300
16	40,300
24	91,700
36	159,200

Table 6-15: Booster Pump Stations Required for 2040 Max Day Demand and Additional Supply to Waco Option

Name	Horsepower (hp)
Booster Pump Station #1	30
Booster Pump Station #2	260
Booster Pump Station #3	150
Booster Pump Station #4	65
Booster Pump Station #5	25
Booster Pump Station #6	10
Booster Pump Station #7	140
Booster Pump Station #8	60

6.5.4.2 2040 Average Day Demand for Entities (without Waco)

The water supply from the Carrizo-Wilcox Aquifer would provide 2040 average day water demands for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC, and Chalk Bluff WSC. Two 1,000-GPM wells would be drilled in this aquifer within Limestone County. **Table 6-16** shows the average day demands for each entity in this alternative.

Table 6-16: Carrizo-Wilcox Aquifer Pipeline Alternative Average Day Demand (MGD)

Entity	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Prairie Hill WSC	0.14	0.15	0.15	0.15	0.16	0.16	0.17
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Pure WSC	0.04	0.04	0.04	0.04	0.04	0.04	0.04
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17
H&H WSC	0.15	0.16	0.16	0.17	0.18	0.19	0.20
McLennan Co. WCID No. 2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Ross WSC	0.20	0.21	0.22	0.24	0.25	0.26	0.27
Gholson WSC	0.28	0.28	0.29	0.29	0.30	0.30	0.31
Chalk Bluff WSC	0.27	0.29	0.31	0.33	0.36	0.39	0.42
Total:	2.00	2.08	2.16	2.25	2.34	2.44	2.54

New transmission pipelines required would be sized to transport the capacity needed to meet these water demands and would be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, would also be needed to transport the water through the transmission system. **Table 6-17** presents the required transmission piping size and length. **Table 6-18** shows the booster pump stations required along the pipeline route, as well as their estimated horsepower.

Table 6-17: Transmission Pipelines Required for 2040 Average Day Demand

Pipe Diameter (in)	Length (ft)
4	143,400
6	21,500
8	137,800
10	74,100
16	200,700

Table 6-18: Booster Pump Stations Required for 2040 Average Day Demand

Name	Horsepower (hp)
Booster Pump Station #1	10
Booster Pump Station #2	5
Booster Pump Station #3	45
Booster Pump Station #4	15
Booster Pump Station #5	95
Booster Pump Station #6	15
Booster Pump Station #7	10
Booster Pump Station #8	65
Booster Pump Station #9	25
Booster Pump Station #10	150

6.5.4.3 2040 Max Day Demand for Entities (without Waco)

The water supply from the Carrizo-Wilcox Aquifer would provide 2040 max day water demands for Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC, and Chalk Bluff WSC. Five 1,000-GPM wells would be drilled in this aquifer within Limestone County. **Table 6-19** shows the max day demands for each entity in this alternative.

Table 6-19: Carrizo-Wilcox Aquifer Alternative Entities Max Day Demand (MGD)

Entity	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.37	0.39	0.40	0.42	0.43	0.45	0.46
Birome WSC	0.33	0.34	0.35	0.36	0.37	0.38	0.39
Prairie Hill WSC	0.41	0.42	0.43	0.44	0.46	0.47	0.48
EOL WSC	0.39	0.41	0.43	0.45	0.47	0.49	0.51
Moore WS	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Pure WSC	0.09	0.09	0.09	0.09	0.09	0.09	0.09
LTG WSC	0.19	0.20	0.21	0.22	0.23	0.24	0.25
City of Mount Calm	0.05	0.05	0.05	0.05	0.05	0.05	0.05
M.S. WSC	0.07	0.07	0.07	0.07	0.07	0.07	0.07
RMS WSC	0.21	0.23	0.25	0.27	0.29	0.32	0.34
H&H WSC	0.39	0.41	0.44	0.46	0.48	0.51	0.53
McLennan County WCID No. 2	0.35	0.35	0.35	0.36	0.36	0.36	0.36
Ross WSC	0.41	0.43	0.45	0.47	0.49	0.52	0.54
Gholson WSC	0.56	0.57	0.58	0.59	0.60	0.61	0.62
Chalk Bluff WSC	0.63	0.68	0.74	0.80	0.86	0.93	1.01
City of Waco	6.16	5.97	5.78	5.57	5.36	5.13	4.89
Total:	4.55	4.74	4.93	5.14	5.35	5.58	5.82

New transmission pipelines required would be sized to transport the capacity needed to meet these water demands and will be constructed as soon as possible. Booster pump stations, each containing a 100,000-gallon ground storage tank, would also be needed to transport the water through the transmission system. **Table 6-20** presents the required transmission piping size and length. **Table 6-21** shows the booster pump stations required along the pipeline route, as well as their estimated horsepower.

Table 6-20: Transmission Pipelines Required for 2040 Max Day Demand

Pipe Diameter (in)	Length (ft)
4	28,100
6	60,300
8	55,000
10	151,700
12	16,300
16	65,400
18	41,500
30	159,200

Table 6-21: Booster Pump Stations Required for 2040 Max Day Demand

Name	Horsepower (hp)
Lift Station #1	45
Lift Station #2	190
Lift Station #3	65
Lift Station #4	50
Lift Station #5	25
Lift Station #6	10
Lift Station #7	140
Lift Station #8	60

6.6 SUMMARY

Each of the regional options has been described in detail in this section including the types and sizes of the regional facilities. In Section 7, the costs for constructing and operating the facilities associated with each alternative are presented along with cost comparisons.

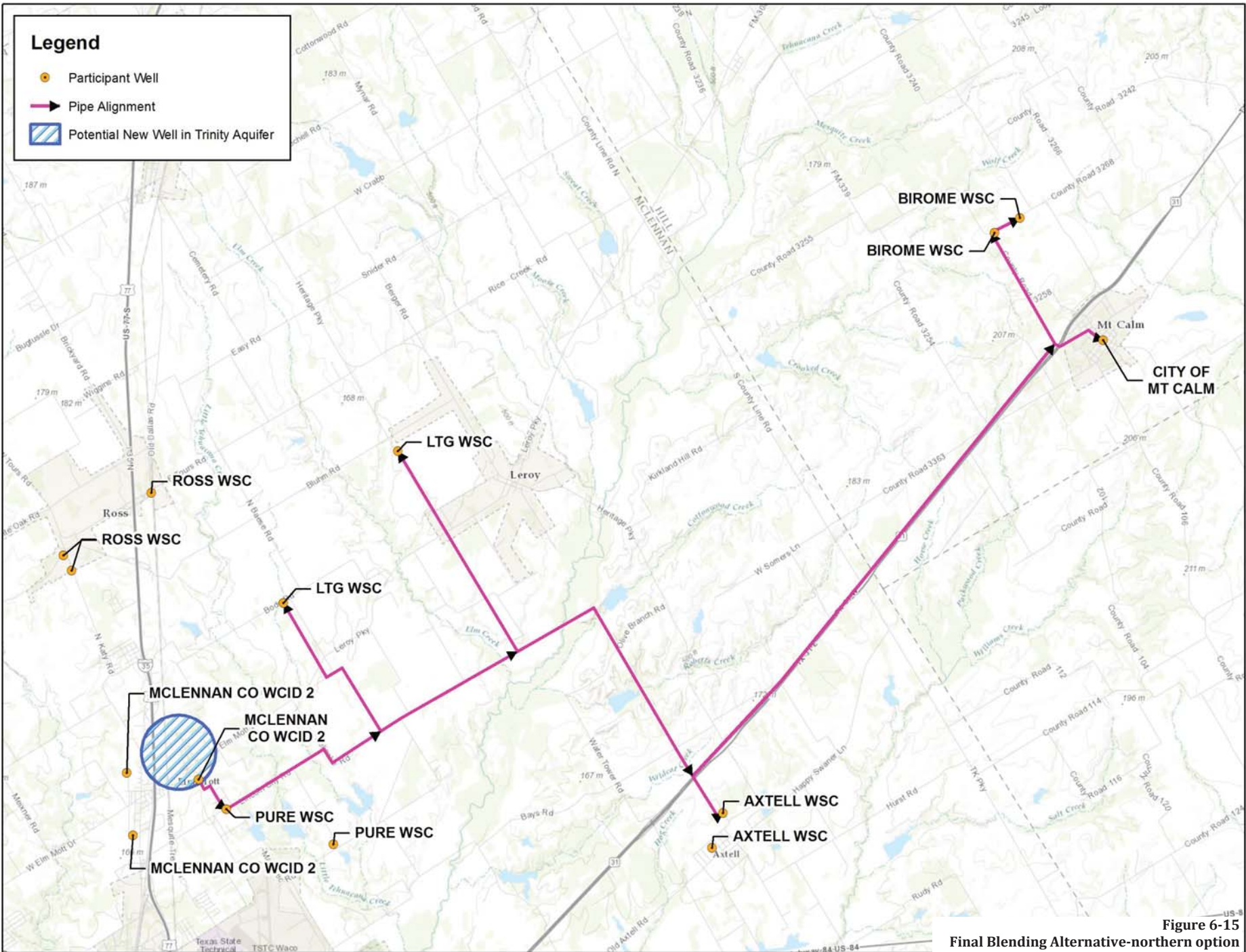


Figure 6-15
Final Blending Alternative-northern option

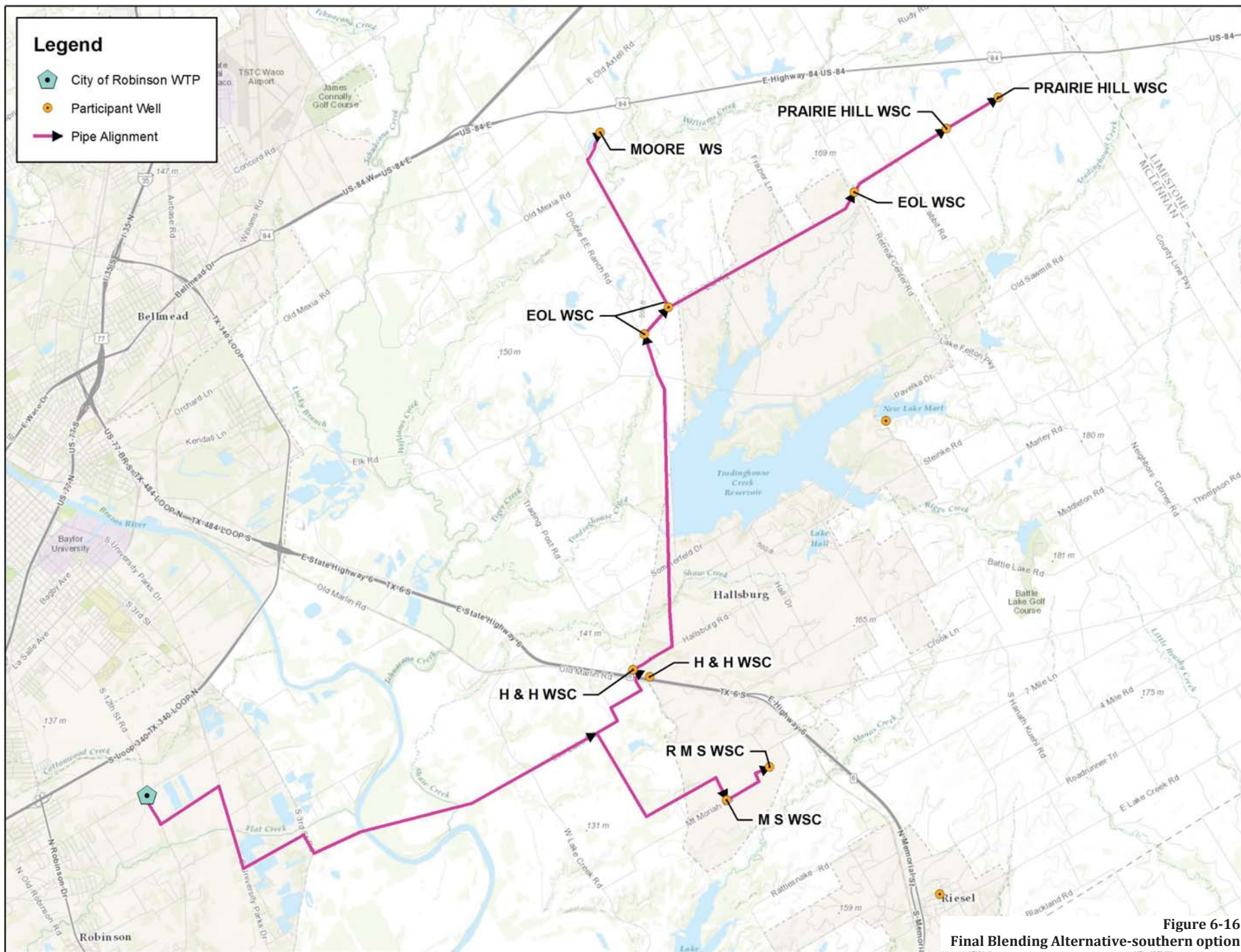


Figure 6-16
Final Blending Alternative-southern option

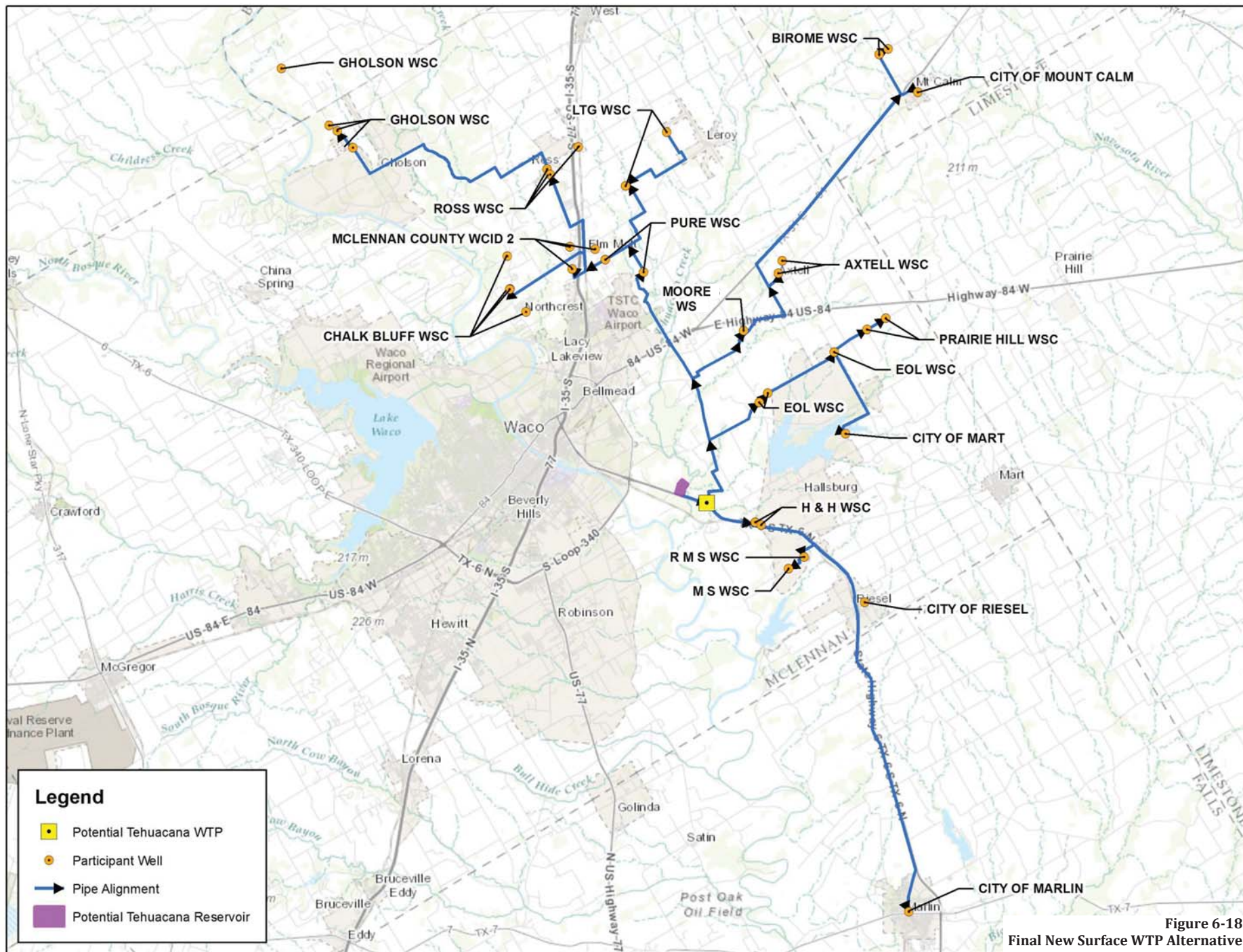


Figure 6-18
Final New Surface WTP Alternative

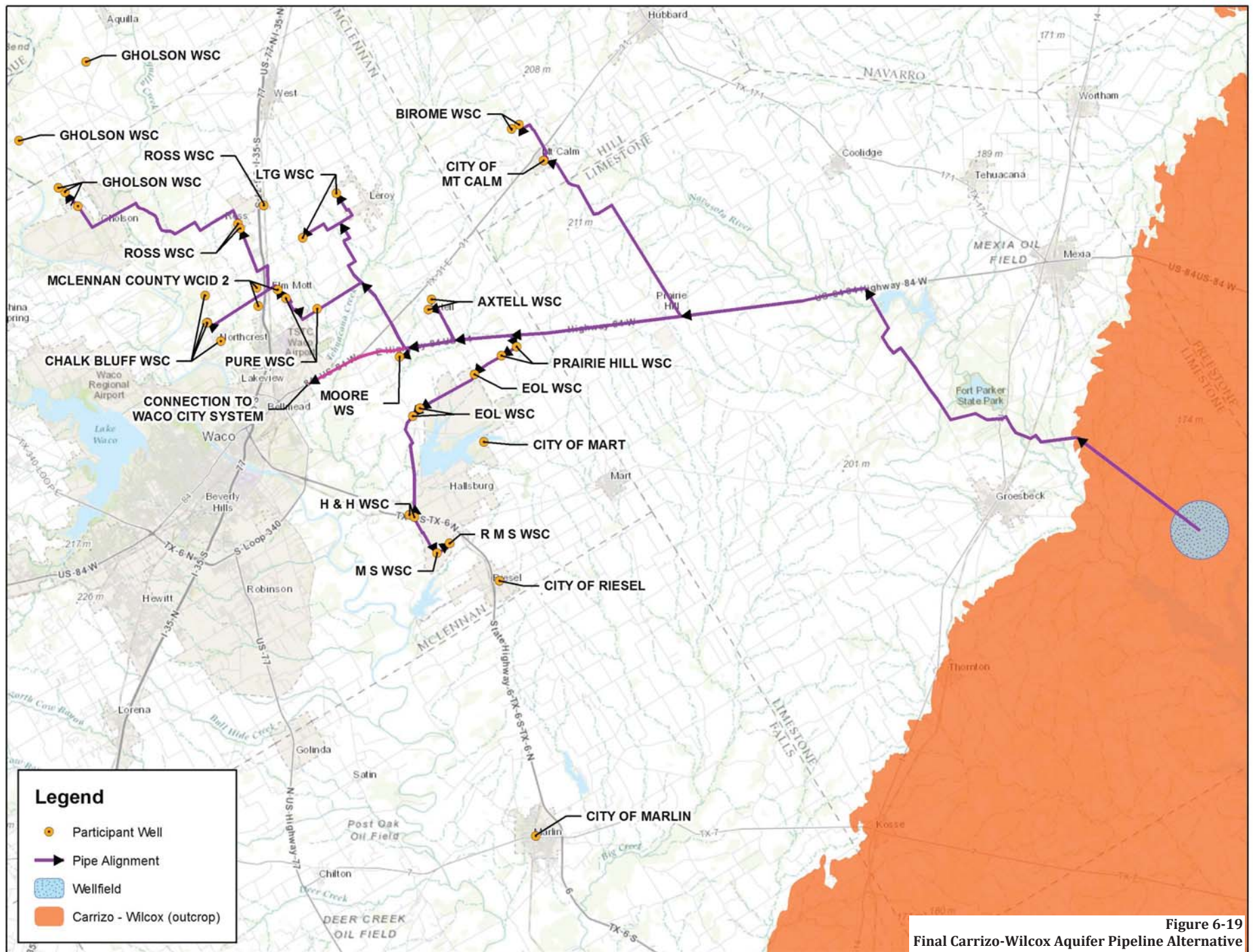


Figure 6-19
Final Carrizo-Wilcox Aquifer Pipeline Alternative

Section 7.0

COST ESTIMATES

7.1 INTRODUCTION

Cost analyses on each of the alternatives described in Section 6 were performed. This analysis allowed the alternatives to be ranked and the least-cost option for the project participants to be determined. Depending if the project participants select an alternative to pursue, the Roth Team recommends having a complete financial analysis performed for the entities by a financial analyst before securing and closing on funds for the project(s).

Two categories for each alternative's cost analysis were considered: capital costs for water treatment, transmission pipelines and booster pump stations and annual operations and maintenance (O&M) costs for the entire system. Additionally, a financial evaluation was completed to determine a cost per 1,000 gallons of treated water. The steps to this process for each option included the following:

- **Step 1:** Determine what water supplies are available in the study area.
- **Step 2:** Determine the water demand required for each entity, taking into account which entities need a new water supply due to arsenic concentration issues.
- **Step 3:** Calculate capital costs.
- **Step 4:** Complete a present worth analysis of the capital costs based on 2015 dollars.
- **Step 5:** Calculate annual O&M costs.
- **Step 6:** Complete a present worth analysis of the O&M costs based on 2015 dollars.
- **Step 7:** Using the combined present worth values for the capital and O&M costs and the total water supplied from 2015 to 2040, calculate a cost per acre-foot of treated water.
- **Step 8:** Using the capital costs, inflated O&M costs and current debt service, complete a financial evaluation to determine a cost per 1,000 gallons of treated water.

7.2 UNIT CAPITAL COSTS FOR WATER TREATMENT

The capital cost analysis for water treatment included the following cost categories for each of the options:

- Water treatment construction/expansion, where applicable;
- Groundwater wells, where applicable;
- Reservoir, where applicable;
- Transmission system piping;
- Booster pump stations and storage; and

- Easement/land acquisition.

As it was not within the scope of this project to determine the detailed design/treatment process or piping design required for each alternative, planning level unit costs were based on industry standards and experience in lieu of a more specific engineering design. The capital cost analysis assumed that any selected alternative would begin construction as soon as possible (due to the fact that many entities are currently violating arsenic concentration levels) and included the following cost factors in addition to the unit costs:

- 20 percent contingency
- 15 percent professional services fee, which can include costs for surveying, legal services, engineering services, financial advisors, etc.
- 5 percent mobilization and demobilization

Water treatment cost analysis did not incorporate any upgrades required on the project participants' existing systems (i.e., wells, existing pipelines, and pump stations, etc) as these would be determined in subsequent phases of a future project upon selection of an alternative. Additionally, O&M costs do not include the costs of disinfection, labor or distribution within each entity's area of responsibility.

The methodology used to determine the capital costs is described in the sections below.

7.2.1 Water treatment

Capital costs for the water treatment were based on a planning level unit cost per gallon of water treated for the expansion of existing facilities and the new surface WTP. Based on input from the City of Robinson's WTP design engineer, the Roth Team used \$4.00 per gallon per day (GPD) of capacity for the expansion of the existing Robinson RO WTP. Costs for construction of a new conventional surface WTP were based on the "*Unified Costing Model User's Guide*" version 1.0 (prepared by HDR and Freese & Nichols for the Texas Water Development Board, dated May 2013). For a new surface WTP, unit costs were based on the regional costing code Level 3 – Conventional Treatment and groundwater nitrate removal. Costs include high service pump stations and clearwell storage at the plant. For alternatives that need additional ground storage at an existing plant site, a cost of \$1.00 per gallon of storage was used.

Capital costs for the individual treatment were developed based on proven reliable processes and vendor cost estimates. Details on this cost determination can be found in **Appendix D**.

7.2.2 Groundwater wells

For alternatives using groundwater wells, the cost for constructing the wells was based on the "*Unified Costing Model User's Guide*" (*Guide*). Costs provided in the *Guide* include the complete installation of the well and pump, including drilling services, essential equipment and testing. Based on the *Guide*, 350 GPM wells at a depth of 1,500 feet in McLennan County would cost approximately \$811,000 per well. In the Carrizo-Wilcox Aquifer, the wells would not need

to be drilled as deep. Using 1,000 GPM wells at a depth of 300 feet, the cost would be approximately \$526,000 per well.

7.2.3 Reservoir

For the New Surface WTP alternative, a reservoir will need to be constructed. As previously mentioned, it was not within the scope of this project to determine the design and sizing required for this reservoir; therefore, a planning level unit cost of \$20 million based on experience and industry standards was used.

7.2.4 Water transmission system

The costs for the treated water transmission pipeline included the costs of furnishing and installing the pipeline to convey treated water from the water supply location to the individual customers but did not include the costs for transmission through the individual systems. For this analysis, the Roth Team assumed the installation of the pipelines would not be phased and the cost to accommodate any future flows would be incurred at the earliest point possible. The new pipelines for this analysis were based on the following assumptions:

Pipeline diameter was based on a targeted velocity between 3.0 and 5.0 feet per second (fps), with a minimum pipe diameter of four inches.

Pipeline alignments were not based on a detailed study of the topography and soil conditions as this was not part of the scope. Alignments were assumed to follow highways and county road right of ways within the area.

Pipeline costs used were based on the “*Unified Costing Model User’s Guide*”. Costs for pipeline sizes not presented in the *Guide* (such as four inches) were based on industry standard and extrapolation from the published costs available. Assuming the pipelines would be in rural areas, buried within soil, planning level unit costs used are presented in **Table 7-1**.

Table 7-1: Pipeline Unit Costs

Diameter	\$/in-ft
4	\$15
6	\$18
8	\$28
10	\$31
12	\$35
16	\$57
18	\$68
20	\$80
24	\$102
30	\$136
36	\$169

7.2.5 Booster pump station

Capital costs for the booster pump stations were based on the “*Unified Costing Model User’s Guide*”. Costs for sizes not presented in the *Guide* were based on interpolation/extrapolation from the published costs available. Planning level unit costs used are presented in **Table 7-2**.

Table 7-2: Booster Pump Station Unit Costs

Horsepower (hp)	Cost
5	\$602,000
10	\$662,000
20	\$695,000
25	\$730,000
50	\$766,000
100	\$804,000
200	\$1,616,000
300	\$1,778,000

For each booster pump station, it was assumed a 100,000-gallon ground storage tank would be constructed at the site to allow for storage capacity and avoid cross-connection with the existing groundwater systems. A cost of \$1.00 per gallon of storage was used in addition to the pump station costs.

7.2.6 Easements/land acquisition

For easements and land acquisitions, there were two categories of costs. For pipelines, based on experience and industry standards, the Roth Team used a unit cost of \$4,000 per acre, using the total linear footage and assuming a width of 20 feet. For non-linear locations (booster pump stations, well sites and plant sites), a cost of \$8,000 per acre was used. Each booster pump station with storage tank was given 0.5 acre per site, well sites were given 1.0 acre per site, and treatment plants were given 10 acres per site.

7.3 OPERATIONS AND MAINTENANCE COSTS

The Roth Team also considered operation and maintenance (O&M) costs in the economic cost analysis, which are important elements to consider when determining which regional alternative would be the least cost for the entities. The O&M costs included:

- Well operations, if applicable,
- Treatment operations, if applicable,
- High service pump station operations, and
- Booster pump station operations.

All calculations are based on daily flows needed to meet the water demands for each option. For alternatives providing a design flow equal to the average day demands, the demand used to compute the annual O&M costs was 85 percent of the average day demand. For individual treatment, the O&M costs were determined based on the selected vendor process. Details for this evaluation can be found in Appendix D. The methodology used to determine each of these O&M costs is discussed in the subsequent sections.

7.3.1 Well operations

For options including the use of groundwater, wells would need to be drilled and operated to meet the demands. Based on experience, industry standards, and prior experience, the cost of operation for a groundwater well used in this analysis was \$0.10 per 1,000 gallons pumped.

7.3.2 Treatment operations

Operations costs were based on experience, industry standards, and prior experience in the operations of treatment plants. For a surface water treatment plant, the unit cost used was \$1.00 per 1,000 gallons treated.

7.3.3 High service pump station operations

High service pumping operations costs included the electricity costs for pumping, as well as maintenance and labor costs associated with the equipment. Based on experience, the high service pump station operations were estimated at a unit cost of \$0.05 per 1,000 gallons pumped.

7.3.4 Booster pump station operations

Booster pump station operations costs included the electricity costs for pumping, as well as maintenance and labor costs associated with the equipment. Similar to the high service pump station, the booster pump station operations were estimated at a unit cost of \$0.05 per 1,000 gallons pumped.

7.4 ECONOMIC AND FINANCIAL ANALYSIS METHODOLOGY

The economic and financial analysis is used as a way of comparing each alternative on an even level, based on capital and operations and maintenance (O&M) costs. The analysis included capital costs for new and expanded water treatment capacity, booster pump stations, and transmission pipelines. O&M costs were included from 2015 through 2040. An interest rate of 4.0 percent, an inflation rate of 2.5 percent and a period of 2015 through 2040 were used.

For the economic analysis, the following steps were taken:

- **Step 1:** Present worth capital costs and O&M costs were calculated as previously described.
- **Step 2:** Calculate the total volume of water provided for a given alternative based on the average annual water demands from 2015 through 2040.

- **Step 3:** Convert the annual O&M costs for each year to a PW value to determine a total O&M cost for each alternative from 2015 through 2040.
- **Step 4:** Using the total present worth value (capital and O&M costs) and the total water demand, a cost per acre-foot of treated water, referred to as the economic value, was determined.

For the financial evaluation, the following methodology was applied:

- **Step 1:** Using the previously calculated O&M costs, determine an inflated O&M cost for each year from 2015 through 2040. The inflation rate used for this evaluation is 2.5 percent.
- **Step 2:** Using the previously calculated capital costs, determine a debt service payment for each capital expenditure.
- **Step 3:** Based on the annual expenditures and average annual water sold, determine a cost per 1,000 gallons.

7.5 COST COMPARISON OF ALTERNATIVES

Below are the results of the cost comparison for each alternative. Appendix D shows the detailed cost analysis.

7.5.1 Blending of Arsenic Violation Water

For the Blending of Arsenic Violation Water alternative, the costs are divided between the northern and southern options.

The present worth (PW) of the capital costs for the northern blending option is \$8.0 million and the PW for the O&M costs from 2015 to 2040 is approximately \$467,000, which is a combined total of approximately \$8.5 million. When calculating the total average volume of water produced, this value would be a percentage of the average day demand. Based on the average peak factors for the entities, a factor of 85 percent was used. The total average volume of water produced from 2015 through 2040 is 3,731 million gallons, or 11,450 acre-feet. The economic value for this alternative is \$743 per acre-foot. Using an actual average day demand total of 4,389 million gallons and a 10-year average annual O&M cost, the cost per \$1,000 gallons is \$3.84. **Table 7-3** summarizes the costs for this alternative.

Table 7-3: Cost Summary for Blending Alternative – Northern Option

Item Description	Quantity	Unit	Unit Cost	Total Cost
Transmission Pipeline, 4"	88,923	LF	\$15	\$1,333,850
Transmission Pipeline, 8"	48,140	LF	\$28	\$1,347,920
Booster Pump Station #1, 20 hp	1	LS	\$795,000	\$795,000
Booster Pump Station #2, 10 hp	1	LS	\$762,000	\$762,000
Ground Storage Tank at well site	501,000	GAL	\$1	\$501,000
Groundwater Wells, 350 GPM	1	EA	\$811,201	\$811,210
Construction Subtotal				\$5,551,000
Mobilization and Demobilization (5%)				\$277,600
Contingency (20%)				\$1,110,200
Professional Services (15%)				\$832,700
Construction Total				\$7,771,500
Easement/Acquisition (pipeline)	63	AC	\$4,000	\$252,000
Easement/Acquisition (Well site and pump stations)	2	AC	\$8,000	\$16,000
Easement Subtotal				\$268,000
Project Total				\$8,040,000
2015 Present Worth of Capital Costs				\$8,040,000
2015 Present Worth of O&M Costs				\$467,000
Total 2015 Present Worth Cost				\$8,507,000
Total Average Day Water Demand from 2015-2040 (acre-ft)				11,450
Total Present Worth Cost/acre-ft				\$743

The PW of the capital costs for the southern blending option is \$16.2 million and the PW for the O&M costs from 2015 to 2040 is approximately \$12.6 million, which is a total of approximately \$28.8 million. The total average volume of water produced from 2015 through 2040 is 9,490 million gallons or 29,126 acre-feet. The economic value for this alternative is \$988 per acre-foot. Using a 10-year average annual O&M cost, the cost per \$1,000 gallons is \$5.04. **Table 7-4** summarizes the costs for this alternative.

Table 7-4: Cost Summary for Blending Alternative – Southern Option

Item Description	Quantity	Unit	Unit Cost	Total Cost
Robinson Water Treatment Plant Expansion	1,000,000	GPD	\$4.00	\$4,000,000
Transmission Pipeline, 4"	46,660	LF	\$15	\$699,900
Transmission Pipeline, 6"	18,307	LF	\$18	\$329,530
Transmission Pipeline, 8"	32,728	LF	\$28	\$916,390
Transmission Pipeline, 10"	42,074	LF	\$31	\$1,304,300
Booster Pump Station #1, 20 hp	1	LS	\$795,000	\$795,000
Booster Pump Station #2, 15 hp	1	LS	\$780,000	\$780,000
Booster Pump Station #3, 10 hp	1	LS	\$762,000	\$762,000
Ground Storage Tank at Robinson WTP	1,000,000	GAL	\$1	\$1,000,000
Booster pump station from Robinson WTP, 40 hp	1	LS	\$755,000	\$755,000
Construction Subtotal				\$11,342,200
Mobilization and Demobilization (5%)				\$567,110
Contingency (20%)				\$2,268,500
Professional Services (15%)				\$1,701,400
Construction Total				\$15,879,300
Easement/Acquisition (pipeline)	65	AC	\$4,000	\$260,000
Easement/Acquisition (WTP, pump stations, and GST)	2.5	AC	\$8,000	\$20,000
Easement Subtotal				\$280,000
Project Total				\$16,160,000
2015 Present Worth of Capital Costs				\$16,160,000
2015 Present Worth of O&M Costs				\$12,619,000
Total 2015 Present Worth Cost				\$28,779,000
Total Average Day Water Demand from 2015-2040 (acre-ft)				29,126
Total Present Worth Cost/acre-ft				\$988

7.5.2 Individual Treatment for Arsenic Violators

For the Individual Treatment for the Arsenic Violators, each entity was evaluated separately. **Table 7-5** summarizes the PW of the capital costs, the O&M costs from 2015 to 2040 and the total cost. **Table 7-6** presents the total average volume of water treated from 2015 through 2040, as well as the economical values and costs per 1,000 gallons.

Table 7-5: Present Worth Cost Summary for Individual Treatment

Entity	PW for Capital Cost	PW for O&M Cost	Total PW Cost
Axtell WSC	\$654,000	\$567,100	\$1,221,100
Birome WSC	\$654,000	\$340,300	\$994,300
Prairie Hill WSC	\$784,500	\$1,188,700	\$1,973,200
EOL WSC	\$1,084,500	\$359,900	\$1,444,400
LTG WSC	\$1,076,500	\$244,300	\$1,320,800
MS WSC	\$463,700	\$56,700	\$520,400
City of Mount Calm	\$463,700	\$56,700	\$520,400
Moore WS	\$463,700	\$56,700	\$520,400
RMS WSC	\$536,000	\$102,500	\$638,500

Table 7-6: Economical and Financial Analysis for Individual Treatment

Entity	Total average volume of water treated from 2015 through 2040 (acre-ft)	Economic Value (\$/acre-ft)	Total average volume of water treated from 2015 through 2040 (MG)	\$/1,000 gallons
Axtell WSC	5,299	\$230	1,726	\$1.25
Birome WSC	2,788	\$357	908	\$2.00
Prairie Hill WSC	4,520	\$437	1,473	\$2.19
EOL WSC	5,887	\$245	1,918	\$1.44
LTG WSC	3,389	\$390	1,104	\$2.34
MS WSC	951	\$547	310	\$3.21
City of Mount Calm	767	\$679	250	\$4.01
Moore WS	1,229	\$423	400	\$2.29
RMS WSC	4,120	\$155	1,343	\$0.89

7.5.3 New Surface Water Treatment Plant

For the New Surface Water Treatment Plant alternative, the PW of the capital costs is \$86.6 million and the PW for the O&M costs from 2015 to 2040 is approximately \$31.5 million, which is a total of approximately \$118 million. When calculating the total average volume of water produced, this value would be a percentage of the average day demand. Based on the average peak factors for the entities, a factor of 85 percent was used. The total average volume of water treated from 2015 through 2040 is 33,724 million gallons or 103,501 acre-feet. The economic value for this alternative is \$1,145 per acre-foot. Using an actual average day demand of 39,675 million gallons and a 10-year average annual O&M cost, the cost per \$1,000 gallons is \$5.48. **Table 7-7** summarizes the costs for this alternative.

Table 7-7: Cost Summary for New Surface Water Treatment Plant Alternative

Item Description	Quantity	Unit	Unit Cost	Total Cost
New WTP, 5.4 MGD	1	LS	\$18,500,000	\$18,500,000
Transmission Pipeline, 4"	130,774	LF	\$15	\$1,961,610
Transmission Pipeline, 6"	129,593	LF	\$18	\$2,332,680
Transmission Pipeline, 8"	71,520	LF	\$28	\$2,002,560
Transmission Pipeline, 10"	135,905	LF	\$31	\$4,213,060
Transmission Pipeline, 12"	27,817	LF	\$35	\$973,600
Raw Water Pipeline, 20"	5,074	LF	\$80	\$405,920
Booster Pump Station #1, 100 hp	1	LS	\$904,000	\$904,000
Booster Pump Station #2, 100 hp	1	LS	\$904,000	\$904,000
Booster Pump Station #3, 55 hp	1	LS	\$875,000	\$875,000
Booster Pump Station #4, 20 hp	1	LS	\$795,000	\$795,000
Booster Pump Station #5, 5 hp	1	LS	\$702,000	\$702,000
Booster Pump Station #6, 95 hp	1	LS	\$903,000	\$903,000
Booster Pump Station #7, 25 hp	1	LS	\$830,000	\$830,000
Booster Pump Station #8, 15 hp	1	LS	\$780,000	\$780,000
Booster Pump Station #9, 15 hp	1	LS	\$780,000	\$780,000
Booster Pump Station #10, 5 hp	1	LS	\$702,000	\$702,000
Booster Pump Station #11, 60 hp	1	LS	\$875,000	\$875,000
Booster Pump Station #12, 50 hp	1	LS	\$866,000	\$866,000
Booster Pump Station #13, 25 hp	1	LS	\$830,000	\$830,000
Reservoir	1	LS	\$20,000,000	\$20,000,000
Construction Subtotal				\$61,135,500
Mobilization and Demobilization (5%)				\$3,056,800
Contingency (20%)				\$12,227,100
Professional Services (15%)				\$9,170,400
Construction Total				\$85,589,800
Easement/Acquisition (pipeline)	230	AC	\$4,000	\$920,000
Easement/Acquisition (WTP and pump stations)	16.5	AC	\$8,000	\$132,000
Easement Subtotal				\$1,052,000
Project Total				\$86,642,000
2015 Present Worth of Capital Costs				\$86,642,000
2015 Present Worth of O&M Costs				\$31,520,000
Total 2015 Present Worth Cost				\$118,162,000
Total Average Day Water Demand from 2015-2040 (acre-ft)				103,201
Total Present Worth Cost/acre-ft				\$1,142

7.5.4 Carrizo-Wilcox Aquifer Pipeline

For the Carrizo-Wilcox Aquifer Pipeline alternative - 2040 max day demand for entities and additional supply to Waco option, the PW of the capital costs is \$84.6 million and the PW for the O&M costs from 2015 to 2040 is approximately \$16.2 million, which is a total of approximately \$101 million. The total average volume of water produced from 2015 through 2040 is 99,331 million gallons or 304,856 acre-feet. The economic value for this alternative is \$331 per acre-foot. Using a 10-year average annual O&M cost, the cost per \$1,000 gallons is \$1.87. **Table 7-8** summarizes the costs for this alternative.

For the Carrizo-Wilcox Aquifer Pipeline alternative - 2040 average day demand, the PW of the capital costs is \$42.8 million and the PW for the O&M costs from 2015 to 2040 is approximately \$4.9 million, which is a total of approximately \$47.7 million. When calculating the total average volume of water produced, this value would be a percentage of the average day demand. Based on the average peak factors for the entities, a factor of 85 percent was used. The total average volume of water produced from 2015 through 2040 is 18,545 million gallons or 56,916 acre-feet. The economic value for this alternative is \$838 per acre-foot. Using an actual average day demand of 21,818 million gallons and a 10-year average annual O&M cost, the cost per \$1,000 gallons was \$4.33. **Table 7-9** summarizes the costs for this alternative.

Table 7-8: Cost Summary for Carrizo-Wilcox Aquifer Pipeline Alternative - 2040 Max Day Demand and Additional Supply to Waco Option

Item Description	Quantity	Unit	Unit Cost	Total Cost
Transmission Pipeline, 4"	28,138	LF	\$15	\$422,070
Transmission Pipeline, 6"	60,259	LF	\$18	\$1,084,670
Transmission Pipeline, 8"	55,002	LF	\$28	\$1,540,060
Transmission Pipeline, 10"	151,734	LF	\$31	\$4,703,760
Transmission Pipeline, 12"	16,284	LF	\$35	\$569,940
Transmission Pipeline, 16"	40,323	LF	\$57	\$2,298,420
Transmission Pipeline, 24"	91,712	LF	\$102	\$9,354,630
Transmission Pipeline, 36"	159,172	LF	\$169	\$26,900,070
Booster Pump Station #1, 30 hp	1	LS	\$835,000	\$835,000
Booster Pump Station #2, 260 hp	1	LS	\$1,810,000	\$1,810,000
Booster Pump Station #3, 150 hp	1	LS	\$1,300,000	\$1,300,000
Booster Pump Station #4, 65 hp	1	LS	\$890,000	\$890,000
Booster Pump Station #5, 25 hp	1	LS	\$830,000	\$830,000
Booster Pump Station #6, 10 hp	1	LS	\$762,000	\$762,000
Booster Pump Station #7, 140 hp	1	LS	\$1,250,000	\$1,250,000
Booster Pump Station #8, 60 hp	1	LS	\$875,000	\$875,000
Groundwater Wells, 1,000 GPM	8	EA	\$525,322	\$4,202,580
Construction Subtotal				\$59,628,200
Mobilization and Demobilization (5%)				\$2,981,500
Contingency (20%)				\$11,925,700
Professional Services (15%)				\$8,944,300
Construction Total				\$83,479,700
Easement/Acquisition (pipeline)	277	AC	\$4,000	\$1,108,000
Easement/Acquisition (well site and pump stations)	5	AC	\$8,000	\$40,000
Easement Subtotal				\$1,148,000
Project Total				\$84,628,000
2015 Present Worth of Capital Costs				\$84,628,000
2015 Present Worth of O&M Costs				\$16,246,000
Total 2015 Present Worth Cost				\$100,874,000
Total Average Day Water Demand from 2015-2040 (acre-ft)				304,856
Total Present Worth Cost/acre-ft				\$331

Table 7-9: Cost Summary for Carrizo-Wilcox Aquifer Pipeline Alternative – 2040 Average Day Demand for Entities

Item Description	Quantity	Unit	Unit Cost	Total Cost
Transmission Pipeline, 4"	143,399	LF	\$15	\$2,150,990
Transmission Pipeline, 6"	21,513	LF	\$18	\$387,240
Transmission Pipeline, 8"	137,787	LF	\$28	\$3,858,040
Transmission Pipeline, 10"	74,084	LF	\$31	\$2,296,610
Transmission Pipeline, 12"	0	LF	\$35	\$0
Transmission Pipeline, 16"	200,645	LF	\$57	\$11,436,770
Booster Pump Station #1, 10 hp	1	LS	\$762,000	\$762,000
Booster Pump Station #2, 5 hp	1	LS	\$702,000	\$702,000
Booster Pump Station #3, 45 hp	1	LS	\$860,000	\$860,000
Booster Pump Station #4, 15 hp	1	LS	\$780,000	\$780,000
Booster Pump Station #5, 95 hp	1	LS	\$903,000	\$903,000
Booster Pump Station #6, 15 hp	1	LS	\$780,000	\$780,000
Booster Pump Station #7, 10 hp	1	LS	\$762,000	\$762,000
Booster Pump Station #8, 65 hp	1	LS	\$890,000	\$890,000
Booster Pump Station #9, 25 hp	1	LS	\$830,000	\$830,000
Booster Pump Station #10, 150 hp	1	LS	\$1,300,000	\$1,300,000
Groundwater Wells, 1,000 GPM	2	EA	\$525,322	\$1,050,650
Construction Subtotal				\$29,749,300
Mobilization and Demobilization (5%)				\$1,487,500
Contingency (20%)				\$5,949,900
Professional Services (15%)				\$4,462,400
Construction Total				\$41,649,100
Easement/Acquisition (pipeline)	266	AC	\$4,000	\$1,064,000
Easement/Acquisition (well site and pump stations)	6	AC	\$8,000	\$48,000
Easement Subtotal				\$1,112,000
Project Total				\$42,762,000
2015 Present Worth of Capital Costs				\$42,762,000
2015 Present Worth of O&M Costs				\$4,933,000
Total 2015 Present Worth Cost				\$47,695,000
Total Average Day Water Demand from 2015-2040 (acre-ft)				56,916
Total Present Worth Cost/acre-ft				\$838

For the Carrizo-Wilcox Aquifer Pipeline alternative - 2040 max day demand, the PW of the capital costs is \$69.3 million and the PW for the O&M costs from 2015 to 2040 is approximately \$7.8 million, which is a total of approximately \$77.1 million. The total average volume of water produced from 2015 through 2040 is 21,818 million gallons or 66,960 acre-feet. The economic

value for this alternative is \$1,151 per acre-foot. Using a 10-year average annual O&M cost, the cost per \$1,000 gallons was \$7.00. **Table 7-10** summarizes the costs for this alternative.

Table 7-10: Cost Summary for Carrizo-Wilcox Aquifer Pipeline Alternative - 2040 Max Day Demand for Entities

Item Description	Quantity	Unit	Unit Cost	Total Cost
Transmission Pipeline, 4"	28,138	LF	\$15	\$422,070
Transmission Pipeline, 6"	60,259	LF	\$18	\$1,084,670
Transmission Pipeline, 8"	55,002	LF	\$28	\$1,540,060
Transmission Pipeline, 10"	151,734	LF	\$31	\$4,703,760
Transmission Pipeline, 12"	16,284	LF	\$35	\$569,940
Transmission Pipeline, 16"	65,366	LF	\$57	\$3,725,870
Transmission Pipeline, 18"	41,473	LF	\$68	\$2,820,170
Transmission Pipeline, 30"	159,172	LF	\$136	\$21,647,400
Booster Pump Station #1, 45 hp	1	LS	\$840,000	\$840,000
Booster Pump Station #2, 190 hp	1	LS	\$1,650,000	\$1,650,000
Booster Pump Station #3, 65 hp	1	LS	\$890,000	\$890,000
Booster Pump Station #4, 50 hp	1	LS	\$866,000	\$866,000
Booster Pump Station #5, 25 hp	1	LS	\$830,000	\$830,000
Booster Pump Station #6, 10 hp	1	LS	\$762,000	\$762,000
Booster Pump Station #7, 140 hp	1	LS	\$1,250,000	\$1,250,000
Booster Pump Station #8, 60 hp	1	LS	\$875,000	\$875,000
Groundwater Wells, 1,000 GPM	5	EA	\$525,322	\$2,626,610
Construction Subtotal				\$47,103,600
Mobilization and Demobilization (5%)				\$2,355,200
Contingency (20%)				\$9,420,800
Professional Services (15%)				\$7,065,600
Construction Total				\$65,945,200
Easement/Acquisition (pipeline)	266	AC	\$4,000	\$1,064,000
Easement/Acquisition (well site and pump stations)	5	AC	\$8,000	\$40,000
Easement Subtotal				\$1,104,000
Project Total				\$67,050,000
2015 Present Worth of Capital Costs				\$69,256,000
2015 Present Worth of O&M Costs				\$7,805,000
Total 2015 Present Worth Cost				\$77,061,000
Total Average Day Water Demand from 2015-2040 (acre-ft)				66,960
Total Present Worth Cost/acre-ft				\$1,151

7.6 CONTRACT COST ANALYSIS

For alternatives that would provide average day demands (Blending with McLennan County well, New Surface WTP and Carrizo-Wilcox Pipeline – 2040 average day demand), the financial cost (\$/1,000 gallons) provided above would be the cost a wholesale provider could provide to its customers. When negotiating a contract rate between the regional water provider and the wholesale provider, the supplemental water purchase cost most likely would be based on the average day flow and not just the average of the average day flow (85 percent of the average day flow as noted above). As such, the negotiated contract price is likely to be higher for these alternatives. **Table 7-11** presents the estimated contract costs.

Table 7-11: Estimated Contract Costs for Alternatives Based on Average Day Demand (\$ per 1,000 gallons)

Alternative	Cost impact on retail provider	Cost required for wholesale provider
Blending with McLennan County well	\$3.84	\$4.52
New Surface WTP	\$5.48	\$6.45
Carrizo-Wilcox Pipeline – 2040 average day demand	\$4.33	\$5.09

7.7 FINANCIAL EVALUATION

Table 7-12 shows the summary costs for all alternatives for the project participants. Graphs showing a cost comparison of each alternative for each entity can be found in Appendix D.

Table 7-12: Cost Summary for All Alternatives (\$ per 1,000 gallons)

Entity	Blending - Robinson	Blending - McLennan County	Individual Treatment	New Plant	Carrizo-Wilcox Max Day with Waco	Carrizo-Wilcox Avg Day, No Waco	Carrizo-Wilcox Max Day, No Waco
Axtell WSC	\$0.00	\$3.84	\$1.25	\$5.48	\$1.87	\$4.33	\$7.00
Birome WSC	\$0.00	\$3.84	\$2.00	\$5.48	\$1.87	4.33	\$7.00
Prairie Hill WSC	\$5.04	\$0.00	\$2.19	\$5.48	\$1.87	4.33	\$7.00
EOL WSC	\$5.04	\$0.00	\$1.44	\$5.48	\$1.87	4.33	\$7.00
Moore Water System	\$5.04	\$0.00	\$2.29	\$5.48	\$1.87	4.33	\$7.00
Pure WSC	\$0.00	\$3.84	\$0.00	\$5.48	\$1.87	4.33	\$7.00
LTG WSC	\$0.00	\$3.84	\$2.34	\$5.48	\$1.87	4.33	\$7.00
City of Mount Calm	\$0.00	\$3.84	\$4.01	\$5.48	\$1.87	4.33	\$7.00
M.S. WSC	\$5.04	\$0.00	\$3.21	\$5.48	\$1.87	4.33	\$7.00
RMS WSC	\$5.04	\$0.00	\$0.89	\$5.48	\$1.87	4.33	\$7.00
H&H WSC	\$5.04	\$0.00	\$0.00	\$5.48	\$1.87	4.33	\$7.00

Table 7-12: Cost Summary for All Alternatives (\$ per 1,000 gallons) - Continued

Entity	Blending - Robinson	Blending - McLennan County	Individual Treatment	New Plant	Carrizo- Wilcox Max Day with Waco	Carrizo- Wilcox Avg Day, No Waco	Carrizo- Wilcox Max Day, No Waco
McLennan County WCID 2	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	4.33	\$7.00
Ross WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	4.33	\$7.00
Gholson WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	4.33	\$7.00
Chalk Bluff WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	4.33	\$7.00
City of Mart	\$0.00	\$0.00	\$0.00	\$5.48	\$0.00	\$0.00	\$0.00
City of Marlin	\$0.00	\$0.00	\$0.00	\$5.48	\$0.00	\$0.00	\$0.00

Section 8.0

POTENTIAL FUNDING SOURCES

Funding sources for the FHLM Regional Water System are dependent on the selected alternative and financial viability of each political entity within the study area. Also, the type of funding source selected to finance the engineering design and construction costs will depend on the organizational structure of the entity that owns and operates the regional system.

A number of potential funding sources exist for rural utilities, which typically provide service to less than 50,000 people. Both state and federal agencies offer grant and loan programs to assist rural communities in meeting their infrastructure needs. Most are available to “political subdivisions” such as counties, municipalities, school districts, special districts, or authorities of the state with some programs providing access to private individuals.

Grant funds are typically available to those entities that demonstrate financial need based on a median household income (MHI) value below 75 to 80 percent of the State’s MHI value. The funds may be used for planning, design, and construction of water infrastructure projects. Some funds may be used to finance the consolidation or regionalization of neighboring water utilities. Three Texas agencies that offer financial assistance for water infrastructure are described below:

- **Texas Water Development Board (TWDB)** has several programs that offer loans at interest rates lower than the market offers to finance projects for public water systems that facilitate compliance with state and federal regulations. Additional subsidies may be available for disadvantaged communities. Low interest rate loans with short- and long-term finance options at tax exempt rates for water projects give an added benefit by making construction purchases qualify for a sales tax exemption. Generally, the program targets customers with eligible water projects for all political subdivisions of the state (at tax exempt rates).
- **Texas Department of Agriculture (TDA, formerly TDRA and ORCA)** is a Texas state agency with a focus on rural Texas by making state and federal resources accessible to rural communities. Funds from the U.S. Department of Housing and Urban Development Community Development Block Grants (CDBG) are administered by TDA for small, rural communities with populations less than 50,000 that cannot directly receive federal grants. These communities are known as non-entitlement areas. One of the program objectives is to meet a need having a particular urgency, which represents an immediate threat to the health and safety of residents, principally for low- and moderate-income persons.
- **U.S. Department of Agriculture Rural Development (USDA Rural Development)** coordinates federal assistance to rural Texas to help rural Americans improve their quality of life. The Rural Utilities Service (RUS) programs provide funding for water systems. The application process, eligibility requirements, and funding structure vary for each of these

programs. There are many conditions that must be considered by each agency to determine eligibility and ranking of projects. The principal factors that affect this choice are population, percent of the population under the State MHI, health concerns, compliance with standards, Colonia status, and compatibility with regional and state plans.

In addition to Federal and State water programs, funding sources may also originate from revenue bonds and developer participation towards the regional infrastructure of the system. An overview of all of these financing mechanisms is presented below.

8.1 FEDERAL AND STATE INFRASTRUCTURE PROGRAMS

There are a variety of funding programs available to entities through Federal and State infrastructure programs. Depending on the type of organization that owns the proposed regional water facilities, funding is most likely to be obtained from programs administered by the TWDB, TDA and/or USDA Rural Development. Information required by these agencies for initial applications may include financial analyses, records demonstrating health concerns, failing infrastructure, and financial need.

8.1.1 TWDB Funding Options

The programs offered by the TWDB include the Drinking Water State Revolving Fund (DWSRF), State Loan Program (DFund), State Participation Fund, and Economically Distressed Areas Program (EDAP).

8.1.1.1 Drinking Water State Revolving Fund

The Drinking Water State Revolving Fund (DWSRF) provides loans at interest rates lower than the market to political subdivisions with the authority to own and operate a water system. The DWSRF also includes Disadvantaged Communities funds that provide even lower interest rates for those meeting the respective criteria.

The DWSRF offers fixed and variable rate loans at subsidized interest rates. The maximum repayment period for a DWSRF loan is 30 years from the completion of project construction. A cost-recovery loan origination charge of 2.25 percent is imposed to cover administrative costs of operating the DWSRF; however, there is no additional interest rate subsidy for those financing the origination charge.

TWDB accepts Project Information Forms (PIFs) from prospective loan applicants throughout the year; however, applicants submit their PIFs by early March (deadline posted each year) to be included on the DWSRF Intended Use Plan (IUP) for consideration of loan-forgiveness funding. The Project Information Form describes the applicant's existing water facilities, facility needs, the nature of the project being considered and project cost estimates. This information is used to rate each proposed project and place them in priority order on the IUP. Applicants eligible for funding through the DWSRF program are notified during the summer to attend a pre-application meeting and submit an application for financial assistance. TWDB will typically take 60 to 90 days to review a complete application and to present the funding request formally to

the Board for approval. Once approved, the applicant could then proceed with closing on the funding.

8.1.1.2 State Loan Program: Texas Water Development Fund (DFund)

The Texas Water Development Fund (DFund) is a diverse lending program directly from state funding sources. As it does not receive federal subsidies, it is more streamlined. The loans can incorporate more than one project under the umbrella of one loan. Political subdivisions of the state are eligible for tax exempt rates. Projects can include purchase of treatment plants, pump stations, storage tanks, distribution lines, and land acquisitions. The loan requires that the applicant pledge revenue or taxes. The maximum financing life is 50 years, and the average financing period is approximately 20 years. The lending rate scale varies according to several factors, but is set by the TWDB based on cost of funds to the board, risk factors of managing the board loan portfolio, and market rate scales.

The application materials must include an engineering feasibility report, environmental information, rates and customer base, operating budgets, financial statements, and project information. The TWDB considers the needs of the area; benefits of the project; the relationship of the project to the overall state water needs and the State Water Plan; and the availability of all sources of revenue to the rural utility for the ultimate repayment of the loan. TWDB will typically take 60 to 90 days to review a complete application and to present the funding request formally to the Board for approval. Once approved, the applicant could then proceed with closing on the funding.

8.1.1.3 State Water Plan Funding: State Participation Fund

The State Participation Fund encourages the optimum regional development of projects by funding excess infrastructure capacity for consideration of future needs. This program allows the TWDB to provide funding and assume temporary ownership interest in a regional water project when the local sponsors (i.e. political subdivision of the state, including a water supply corporation) are unable to assume debt for an optimally sized facility.

State Participation Funding can only be used to finance the portion of water infrastructure projects that is designated as 'excess capacity'. For new water supply and state water plan projects, TWDB can fund as much as 80 percent of project costs, as long as the local sponsor finances at least 20 percent of the total project cost; the total capacity of the proposed project also must serve at least 20 percent of existing needs.

For other State Participation projects, the TWDB can fund as much as 50 percent of costs, provided that the local sponsor finances at least 50 percent of the total project cost; the total capacity of the proposed project also must serve at least 50 percent of existing needs.

8.1.1.4 State Water Implementation Fund for Texas (SWIFT)

The Texas Legislature created the State Water Implementation Fund for Texas (SWIFT) to provide affordable, ongoing state financial assistance for projects listed in the State Water Plan. The constitutional amendment for SWIFT, known as Proposition 6, enables the one-time

investment of two billion dollars from the state's Rainy Day Fund to create a loan program for water projects across Texas. This new program became effective on Nov. 6, 2014, and replaces the Water Infrastructure Fund (WIF), WIF Deferred and eventually the State Participation Fund.

As a result, SWIFT will provide approximately \$27 billion in financial assistance over the next 50 years and approximately \$800 million in each of the next 10 years. SWIFT financing includes the following three options: (1) Deferral of Principal and Interest – interest does not accrue, and principal payments are deferred for up to eight years or until the end of construction, whichever comes first; (2) Subsidized Loan Interest Rates; and (3) Board Participation. Types of eligible projects include conservation and reuse, building new pipelines, desalinating groundwater, as well as numerous other water management strategies.

8.1.1.5 Economically Distressed Areas Program (EDAP)

The EDAP Program was originally designed to assist areas along the U.S./Mexico border in areas that were economically distressed. In 2008, this program was extended to apply to the entire state as long as specific requirements are satisfied. This program provides financial assistance through the provision of grants and loans to communities where present facilities are inadequate to meet resident's minimal needs. Eligible communities are those that have median household incomes less than 75 percent of the state household income.

The county where the project is located must adopt model rules for the regulation of subdivisions prior to application for financial assistance. If the applicant is a city, the city must also adopt Model Subdivision Rules of TWDB (31 TAC Chapter 364). The program funds design, construction, improvements, and acquisition, and includes measures to prevent future substandard development. The TWDB works with the applicant to find ways to leverage other state and federal financial resources. The loan requires that the applicant pledge revenue or taxes. The maximum financing life is 50 years, and the average financing period is approximately 20 years. The lending rate scale varies according to several factors, but it is set by the TWDB based on cost of funds to the board, risk factors of managing the board loan portfolio, and market rate scales. The TWDB seeks to make reasonable loans with minimal loss to the state. Most projects have a financial package with the majority of the project financed with grants; many recipients have received 100 percent grant funds.

8.1.2 TDA Funding Options

The Texas Department of Agriculture (TDA, previously TDRA and ORCA) seeks to strengthen rural communities and assist them with community and economic development and healthcare by providing a variety of rural programs, services, and activities. Of their many programs and funds, the most appropriate programs related to drinking water are the Community Development (CD) Fund and Texas Small Towns Environment Program (STEP). These programs offer attractive funding packages to help make improvements to water systems to mitigate potential health concerns.

8.1.2.1 Community Development Fund

The CD Fund is a competitive grant program for water and wastewater system improvements. Funds are distributed between 24 state planning regions where funds are allocated to address each region's utility priorities. Funds can be used for various types of public works projects, including water system improvements. Cities with a population of less than 50,000 that are not eligible for direct CDBG funding from the U.S. Department of Housing and Urban Development are eligible. Funds are awarded on a competitive basis decided twice a year by regional review committees. Awards are no less than \$75,000 and cannot exceed \$800,000.

8.1.2.2 Texas Small Towns Environment Program

Under special occasions some communities are invited to participate in grant programs when self-help is a feasible method for completing a water project, the community is committed to self-help, and the community has the capacity to complete the project. The purpose is to significantly reduce the cost of the project by using the communities' own human, material, and financial capital. Projects typically are repair, rehabilitation, improvements, service connections, and yard services. Reasonable associated administration and engineering cost can be funded. A letter of interest is first submitted, and after CDBG staff determines eligibility, an application may be submitted. Awards are only given twice per year on a priority basis so long as the project can be fully funded (\$350,000 maximum award). Ranking criteria are project impact, local effort, past performance, percent of savings, and benefit to low to medium-income persons.

8.1.3 USDA Rural Development Funding Options

USDA Rural Development established a Revolving Fund Program (RFP) administered by the staff of the Water and Environment Program (WEP) to assist communities with water and wastewater systems. The purpose is to fund technical assistance and projects to help communities bring safe drinking water and sanitary, environmentally sound, waste disposal facilities to rural Americans in greatest need.

WEP provides loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste, and storm drainage facilities in rural areas and cities and towns with a population of 10,000 or less. Recipients must be public entities such as municipalities, counties, special purpose districts, Indian tribes, and corporations not operated for profit. Projects include all forms of infrastructure improvement, acquisition of land and water rights, and design fees. A request for a combination of grants and loans vary on a case by case basis, and some communities may have to wait through several funding cycles until funds become available.

8.2 REVENUE BONDS

In addition to Federal and State water programs, a water utility may pledge future earnings to fund improvements to the water system through the issuance of revenue bonds. A revenue bond is a special type of municipal bond, and the income generated by the improvement or expansion of the water project would be used for repayment. Unlike general obligation bonds, only the revenues specified in the legal contract between the bond holder and bond issuer are required to be used for repayment of the principal and interest of the revenue bonds. Since the

pledge of security is not as great as that of general obligation (G.O.) bonds, revenue bonds may carry a slightly higher interest rate than G.O. bonds.

8.3 DEVELOPER PARTICIPATION

Developer participation typically occurs through two means: upfront capital contributions or payment of impact fees for a water/wastewater infrastructure project. Under a regional system where several political subdivisions are participating, a single independent organization or entity is recommended to manage and/or operate the regional system, such as a river authority or regional utility authority. River authorities, a regional utility authority, or other similar entities may require a developer to completely finance the entire cost of an infrastructure project and then turn it over to the utility to own and operate on their behalf. A utility may also require a developer to pledge capital towards an infrastructure project through an upfront cash payment or a letter of credit for the utility to drawdown on if needed to reduce the level of risk on the project.

The utility may also require that developers contribute toward the cost of new water/wastewater infrastructure through the payment of impact fees. The intent of this funding source is that the cost of new infrastructure serving new utility customers will not be subsidized by the existing utility rate payers. In essence, growth pays for growth.

Section 9.0

CONCLUSIONS AND RECOMMENDATIONS

The recommended alternative for FHLM is based on several factors: the overall economics based on a present worth analysis, a financial analysis of the impact on the cost of water to participating customers, the availability of groundwater and surface water, and the need for a water supply below the arsenic MCL. The recommended facility plan is also based on an implementation plan that allows the recommended plan to be permitted, constructed and operational in a reasonable amount of time and a facility plan that has adequate operations, management and governance.

For a true regional approach, the Roth Team recommends implementing the Carrizo-Wilcox Regional Groundwater Project since it involves securing additional long-term water supplies and diversifies the participants' water portfolio in a cost-effective manner. The Carrizo-Wilcox Regional Groundwater Project has two different approaches: one that includes only the project participants, and one that includes a potential large water user. The proposed regional project that includes only the project participants would involve constructing a pipeline from the Carrizo-Wilcox Aquifer to serve the participants' 2040 average day demands. The project that includes other potential water users is proposed to meet the max day demands of the project participants and the potential large water user would contract for the remaining supply available in Limestone County. This alternative also affords the participants the opportunity to look for other regional providers (such as City of Waco) or entities to become part of the regional facility, thereby lowering the costs. Although the Cities of Mart and Marlin are currently exploring other opportunities, they could also be included as part of this recommended alternative if interested.

This regional alternative allows for the most flexibility of participants, as well as the opportunity for a phased construction approach; the facilities for the customers who have immediate needs for arsenic removal would be constructed immediately and other participants can be phased in as needed. This project would also address the DFC situation with the Trinity Aquifer by using a different groundwater source. Additionally, with this alternative using a groundwater source, the possible issues of blending surface water and groundwater would be avoided. The Carrizo-Wilcox Regional Groundwater Project is the most cost-effective alternative for a majority of participants (total capital and O&M cost approximately \$1.87 per 1,000 gallons).

Individual Treatment provides the shortest development time period for entities under USEPA enforcement for Arsenic violations (total cost ranges from \$0.89 to \$4.01 per 1,000 gallons); however, this alternative does not address the needs of the region as a whole. The Arsenic violators should pursue negotiating an Agreed Order with USEPA to implement the Carrizo-Wilcox Regional Groundwater Project. Otherwise, these entities should pursue implementing Individual Treatment or one of the Blending Alternatives as a solution to satisfy USEPA requirements.

APPENDIX A

**WATER CONSERVATION AND
DROUGHT CONTINGENCY PLANS**

SECTION H.
DROUGHT CONTINGENCY
AND
EMERGENCY WATER DEMAND MANAGEMENT PLAN
AXTELL WATER SUPPLY CORPORATION

1. INTRODUCTION

The goal of this plan is to cause a reduction in water use in response to drought or emergency conditions so that the water availability can be preserved. Since emergency conditions can occur rapidly, responses must also be enacted quickly. This plan has been prepared in advance considering conditions that will initiate and terminate the rationing program.

A Drought/Emergency Management Committee consisting of two Board Members and the System Manager will monitor usage patterns and public education efforts and will make recommendations to the Board on future conservation efforts, demand management procedures or any changes to this plan. The Committee will develop public awareness notices, bill stuffers, and other methods that will begin and continue as a constant type of reminder that water should be conserved at all times, not just during a drought or emergency. This Committee will also review and evaluate any needed amendments or major changes due to changes in the Axtell Water Supply Corporation service area population, distribution system or supply. This review and evaluation will be done on a regular basis of five years unless

The plan will be implemented according to the three stages of rationing as imposed by the Board. Section D describes the conditions that will trigger these stages. conditions necessitate more frequent amendments,

2. PUBLIC INVOLVEMENT

Opportunity for the public to provide input into the preparation of the Plan was provided by the Board of the Axtell Water Supply Corporation by scheduling and providing public notice of a public meeting to accept input on the Plan. Notice of the meeting was provided to all customers. In the adoption of this plan, the Board considered all comments from customers.

3. COORDINATION WITH REGIONAL WATER PLANNING GROUP

Being located within the Brazos Region G, a copy of this Plan has been provided to Brazos G Regional Water Planning Group.

4. TRIGGER CONDITIONS

The Drought Emergency Management Committee is responsible for monitoring water supply and demand conditions on a monthly basis (or more frequently if conditions warrant) and shall determine when conditions warrant initiation or termination of each stage of the plan, that is, when the specified triggers are reached. The Committee will monitor monthly operating reports, water supply or storage tank levels and/or rainfall as needed to determine when trigger conditions are reached. The triggering

conditions described below take into consideration: the vulnerability of the water source under drought of record conditions; the production, treatment and distribution capacities of the Axtell Water Supply, and member usage based upon historical patterns.

- a. **Stage I - Mild Condition:** Stage I water allocation measures may be implemented when one or more of the following conditions exist:
 - 1) Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days.
 - 2) Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month.
 - 3) There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.

- b. **Stage II - Moderate Conditions:** Stage II water allocation measures may be implemented when one of the following conditions exist:
 - 1) Water consumption has reached 90 percent of the amount available for three consecutive days.
 - 2) The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days.

- c. **Stage III - Severe Conditions:** Stage III water allocation measures may be implemented when one of the following five conditions exist:
 - 1) Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer.
 - 2) Water consumption of 95 percent or more of the maximum available for three (3) consecutive days.
 - 3) Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period.
 - 4) Natural or man-made contamination of the water supply source(s).
 - 5) The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation.
 - 6) Reduction of wholesale water supply due to drought conditions.
 - 7) Other unforeseen events which could cause imminent health or safety risks to the public.

5. STAGE LEVELS OF WATER ALOCATIONS

The stage levels of water allocations are to be placed in effect by the triggers in Section D. The Axtell Water Supply Corporation shall institute monitoring and enforce penalties for violations of the Drought Plan for each of the Stages listed below. The water allocation measures are summarized below.

- a. **Stage I - Mild Conditions**
 - 1) Alternate day, time of day, or duration restrictions for outside water usage allowed. (Axtell Water Supply Corporation will notify Customers which restriction is in effect)
 - 2) The system will reduce flushing operations.
 - 3) Reduction of customers' water use will be encouraged through notices on bills or other method.

b. Stage II - Moderate Conditions

- 1) All outside water use is prohibited (except for a livestock or other exemption or variance granted under this section).
- 2) Make public service announcements as conditions change via local media (TV, radio, newspapers, etc.).

c. Stage III - Severe Conditions

- 1) All outside watering prohibited.
- 2) Water use will be restricted to a percentage of each member's prior month usage. This percentage may be adjusted as needed according to demand on the system. Notice of this amount will be sent to each customer.
- 3) Corporation shall continue enforcement and educational efforts.

NOTE:

- Refer to your water purchase contract for additional restrictions/requirements that may be imposed by stipulations from the wholesale supplier.
- There may be additional restrictions imposed by Governmental Entities.
- Meters will be read as often as necessary to insure compliance with this program for the benefit of all the customers.

6. INITIATION AND TERMINATION PROCEDURES

Once a trigger condition occurs, the Axtell Water Supply Corporation, or its designated responsible representative, shall, based on recommendation from the Chairperson of the Drought/Emergency Management Committee, decide if the appropriate stage of rationing shall be initiated. The initiation may be delayed if there is a reasonable possibility the water system performance will not be compromised by the condition. If water allocation is to be instituted, written notice to the customers shall be given.

Written notice of the proposed water allocation measure shall be mailed or delivered to each affected customer upon the initiation of each stage. In addition, upon adoption of Stage II or Stage III, a notice will be placed in a local newspaper or announced on a local radio or television station. The customer notice shall contain the following information:

- a. The date water allocation shall begin,
- b. The expected duration,
- c. The stage (level) of water allocations to be employed,
- d. Penalty for violations of the water allocation program, and
- e. Affected area or areas.

A sample Customer Notice of water allocation conditions is included in Miscellaneous Transaction Forms of this tariff.

If the water allocation program extends 30 days then the Chairperson of the Drought/Emergency Management Committee or manager shall present the reasons for the allocations at the next scheduled Board Meeting and shall request the concurrence of the Board to extend the allocation period.

When the trigger condition no longer exists then the responsible official may terminate the water

allocations provided that such an action is based on sound judgment. Written notice of the end of allocations shall be given to customers. A water allocation period may not exceed 60 days without extension by action of the Board.

7. PENALTIES FOR VIOLATIONS

- a. **First Violation** – The member will be notified by a written notice of their specific violation and their need to comply with the tariff rules. The notice will show the amount of penalty to be assessed for continued violations.
- b. **Second Violation** - The Axtell Water Supply Corporation may install a flow restricting device in the customer's service line to limit the amount of water that will pass through the meter in a 24 hour period. The cost of this shall be the actual cost to do the work and shall be paid by the customer.
- c. **Subsequent Violations** – The Axtell Water Supply Corporation may terminate service for up to 7 days and charge for the service call to restore service.
- d. **Termination** –Service will remain off until any delinquent penalty or other assessment is fully paid including a charge for the service call to restore service.

These provisions apply to all customers of the Corporation.

NOTE: PENALTY Axtell Water Supply Corporation is allowed to charge a reasonable penalty to customers that fail to comply with the Rationing Procedures in accordance with TAC 291.41 (j) if:

- (1) the penalty is clearly stated in the tariff;
- (2) the penalty is reasonable and does not exceed six (6) times the minimum monthly bill stated in the water supply corporation's current tariff; and
- (3) the water supply corporation has deposited the penalty in a separate account dedicated to enhancing water supply for the benefit of all the water supply corporation's customers.

8. EXEMPTIONS OR WAIVERS

The Drought/Emergency Management Committee may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health or sanitation for the public or the person requesting such variance and if one or more of the following conditions are met:

- a. Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- b. Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the Drought/Emergency Management Committee within 5 days after the Plan or a particular drought response stage has been invoked or after a condition justifying the variance first occurs. All petitions for variances shall be reviewed by the Committee and shall include the following:

- Name and address of the petitioner(s).
- Purpose of water use.
- Specific provision(s) of the Plan from which the petitioner is requesting relief.
- Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Plan.

- Description of the relief requested.
- Period of time for which the variance is sought.
- Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- Other pertinent information, as requested by the Committee.

Variations granted by the Committee shall be subject to the following conditions, unless specifically waived or modified by the Committee or Board of Directors:

- Variations granted shall include a timetable for compliance.
- Variations granted shall expire when the water allocation is no longer in effect, unless the petitioner has failed to meet specified requirements. No variance allowed for a condition requiring water allocation will continue beyond the termination of water allocation under Section F. Any variance for a subsequent water allocation must be petitioned again. The fact that a variance has been granted in response to a petition will have no relevance to the Committee's decision on any subsequent petition.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

9. IMPLEMENTATION

The Axtell Water Supply Corporation establishes a Drought/Emergency Management Committee by Resolution, the chairperson of which will be the responsible representative to make Drought and Emergency Water Management actions. This Committee will review the procedures in this plan annually or more frequently. Modifications may be required to accommodate system growth, changes in water use demand, available water supply and/or other circumstances.

This Plan was adopted by the Board of the Axtell Water Supply Corporation at a properly noticed meeting held on July 9, 2002

BIROME WATER SUPPLY CORPORATION

WATER CONSERVATION PLAN

July 2006

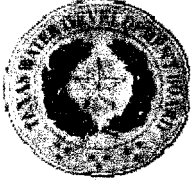
Revised August 27,2009

BIROME WATER SUPPLY CORPORATTON

WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

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TEXAS WATER DEVELOPMENT BOARD

UTILITY PROFILE

The purpose of the Utility Profile is to assist with water conservation plan development and to ensure that important information and data be considered when preparing your water conservation plan and its target and goals. Please complete all questions as completely and objectively as possible. See *Water Conservation Plan Guidance Checklist* (WRD-022) for information on other water conservation provisions. You may contact the Municipal Water Conservation Unit of the TWDB at 512-936-2391 for assistance.

APPLICANT DATA

Name of Utility: B. Rome WSC
 Address & Zip: RT1 Box 73 Mt. Calm, TX 76673
 Telephone Number: _____ Fax: 254-822-1995
 Form Completed By: Charles Beseda Title: MANAGER
 Signature: Charles Beseda Date: 7-24-06

Name and Phone Number of Person/Department responsible for implementing a water conservation program:

Name: CHARLES BESEDA Phone: 254-749-5784

UTILITY DATA

I. CUSTOMER DATA

A. Population and Service Area Data

1. Please attach a copy of your Certificate of Convenience and Necessity (CCN) from the TCEQ
2. Service area size (square miles): _____



Texas Commission on Environmental Quality

By These Presents Be It Known To All That

Birome Water Supply Corporation

having duly applied for certification to provide water utility service for the convenience and necessity of the public, and it having been determined by this commission that the public convenience and necessity would in fact be advanced by the provision of such service by this Applicant, is entitled to and is hereby granted this

Certificate of Convenience and Necessity No. 10013

to provide continuous and adequate water utility service to that service area or those service areas in Limestone, Hill and McLennan Counties as by final Order or Orders duly entered by this Commission, which Order or Orders resulting from Application No. 33893-C are on file at the Commission offices in Austin, Texas; and are matters of official record available for public inspection; and be it known further that these presents do evidence the authority and the duty of Birome Water Supply Corporation to provide such utility service in accordance with the laws of this State and Rules of this Commission, subject only to any power and responsibility of this Commission to revoke or amend this Certificate in whole or in part upon a subsequent showing that the public convenience and necessity would be better served thereby.

Issued at Austin, Texas, this _____

For the Commission

3. Current population of service area: ~~7497~~ 1491
4. Current population served by utility: a: water 1491
 b: wastewater 0
5. Population served by water utility for the previous five years:
6. Projected population for service area in the following decades:

Year	Population	Year	Population
<u>2005</u>	<u>1491</u>	2010	<u>1710</u>
<u>2004</u>	<u>1473</u>	2020	<u>2538</u>
<u>2003</u>	<u>1452</u>	2030	<u>3762</u>
<u>2002</u>	<u>1422</u>	2040	<u>5577</u>
<u>2001</u>	<u>1401</u>	2050	<u>8277</u>

7. List source(s)/method(s) for the calculation of current and projected population:
Current population used from company data
Projected population figured on a 40%
growth rate.

B. Active Connections

1. Current number of active connections by user type. If not a separate classification, check whether multi-family service is counted as Residential or Commercial

<u>Treated water users:</u>	<u>Metered</u>	<u>Not-metered</u>	<u>Total</u>
Residential-Single-Family	<u>497</u>	_____	_____
Residential-Multi-Family	_____	_____	_____
Commercial	_____	_____	_____
Industrial	_____	_____	_____
Public	_____	_____	_____
Other	_____	_____	_____

2. List the net number of new connections per year for most recent three years:

Year	<u>2005</u>	<u>2004</u>	<u>2003</u>
Residential - Single-Family	<u>6</u>	<u>7</u>	<u>13</u>
Residential-Multi-Family	<u> </u>	<u> </u>	<u> </u>
Commercial	<u> </u>	<u> </u>	<u> </u>
Industrial	<u> </u>	<u> </u>	<u> </u>
Public	<u> </u>	<u> </u>	<u> </u>
Other	<u> </u>	<u> </u>	<u> </u>

C. High Volume Customers

List annual water use for the five highest volume retail and wholesale customers (Please indicate if treated or raw water delivery.)

	<u>Customer</u>	<u>Use (1,000gal./yr.)</u>	<u>indicate Treated OR Raw</u>
5. (1)	<u>C. Stanley</u>	<u>276</u>	<u>Treated</u>
6. (2)	<u>J Scott</u>	<u>276</u>	<u>Treated</u>
7. (3)	<u>J. Hernandez</u>	<u>275</u>	<u>Treated</u>
8. (4)	<u>P. Moore</u>	<u>268</u>	<u>Treated</u>
9. (5)	<u>R Regain</u>	<u>261</u>	<u>Treated</u>
1.	<u>B. Doskil</u>	<u>640</u>	<u>Treated</u>
2.	<u>C. Williams</u>	<u>327</u>	<u>Treated</u>
3.	<u>G. Pickra</u>	<u>320</u>	<u>Treated</u>
4.	<u>M. Dawson</u>	<u>310</u>	<u>Treated</u>

II. WATER USE DATA FOR SERVICE AREA

A. Water Accounting Data

1. Amount of water use for previous five years (in 1,000 gal.):

Please indicate: Diverted Water _____
 Treated Water ✓

Year	2005	2004	2003	2002	2001
January	5931.5	4337.5	3428.8	3710.5	3178.8
February	6348.3	3739.4	2549.9	2504.4	6428.5
March	4270.3	meter out	2501.6	2612.1	3984.5
April	2517.7	" "	3255.7	3329.4	4912.2
May	3332.2	3396.1	3298.3	3480.5	3375.5
June	4371.6	meter out	3309.4	2830.1	4539.4
July	6117.4	9108.6	3947.8	2618.1	7085.0
August	5938.9	4089.7	5389.0	3837.5	meter out
September	4493.9	5663.0	4235.6	4318.2	meter out
October	4030.9	5425.8	4035.6	3148.7	3587.8
November	5078.5	5081.6	3901.4	2844.6	3461.7
December	3983.7	4932.6	3840.0	2255.0	3260.2
Total	56414.9	45774.3	43703.1	37489.1	43813.6

Please indicate how the above figures were determined (e.g., from a master meter located at the point of a diversion from a stream or located at a point where raw water enters the treatment plant, or from water sales).

At point where raw water comes into treatment plant. Master meter

2. Amount of water (in 1,000 gallons) delivered (sold) as recorded by the following account types (See #1, Appendix A) for the past five years.

Year	Residential	Commercial	Industrial	Wholesale	Other	Total Sold
2005	32535.6	_____	_____	_____	_____	32536.6
2004	28709.2	_____	_____	_____	_____	28709.2
2003	28749.4 31475.1	_____	_____	_____	_____	31475.1
2002	28749.4	_____	_____	_____	_____	28749.4
2001	26631.2	_____	_____	_____	_____	26631.2

3. List previous five years records for water loss
(See #2, Appendix A)

Year	Amount (gal.)
2005	9,152,587
2004	17,065,100
2003	12,228,000
2002	8,739,700
2001	17,182,400

4. List previous five years records for annual peak-to-average daily use ratio
(See #3, Appendix A)

Year	Average MGD	Peak MGD	Ratio
2005	.15	.74	7.93
2004	.13	.74	5.69
2003	.12	.74	6.17
2002	.10	.74	7.40
2001	.12	.74	6.17

5. Total per capita water use for previous five years (See #4, Appendix A):

Year	Population	Total Diverted (or Treated Less Wholesale Sales (1,000 gal.))	Per Capita (gpcd)
2005	1491	56,414,900	103
2004	1473	45,774,300	85
2003	1452	43,703,100	82 82
2002	1422	37,489,100	72 72
2001	1401	43,813,600	85

6. Seasonal water use for the previous five years (in gallons per person per day)
(See #5, Appendix A):

Year	Population	Base Per Capita Use	Summer Per Capita Use
2005	1491	121	122
2004	1473	98	99
2003	1452	75	96
2002	1422	66	72
2001	1401	102	118

B. Projected Water Demands

Project water supply requirements for at least the next ten years using population trends, historical water use, and economic growth, etc. Indicate sources of data and how projected water demands were determined.

Attach additional sheets if necessary.

See projected water demand for next 10 years.

Projected Water Demands for next 10 years

YEAR	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of Taps	497	517	537	558	580	603	627	652	678	705	733
New Taps	20	20	21	22	23	24	25	26	27	28	29
Total meters at year end	517	537	558	580	603	627	652	678	705	733	762
Projected Population	1551	1611	1674	1740	1809	1881	1955	2033	2114	2198	2286

Present Supply from Birome WSC can services 858 taps for a population of 2575.
 All data is projected @ 4% growth rate which is Birome WSC current growth rate

III. WATER SUPPLY SYSTEM

A. Water Supply Sources

List all current water supply sources and the amounts available with each:

	<u>Source</u>	<u>Amount Available</u>
Surface Water:	_____	_____ MGD
Groundwater:	<u>Trinity</u>	<u>.74</u> MGD
Contracts:	_____	_____ MGD
Other:	_____	_____ MGD

B. Treatment and Distribution System

1. Design daily capacity of system: .74 MGD
2. Storage Capacity: Elevated _____ MGD, Ground .18 MGD
3. If surface water, do you recycle filter backwash to the head of the plant?
Yes _____ No _____. If yes, approximately _____ MGD.
4. Please describe the water system. Include the number of treatment plants, wells, and storage tanks. If possible, include a sketch of the system layout.

Birone WSC HAS 2 wells CAP @ 515 gpm

plant #1 2 wells and distribution with 2 55,000 gal storage tanks.

plant #2 HAS 1 30,000 gal storage tank and distribution system.

plant #3 HAS 8,000 gal storage and distribution system.

plant #5 HAS 30,000 storage tank and distribution system.

IV. WASTEWATER UTILITY SYSTEM

A. Wastewater System Data *N/A*

1. Design capacity of wastewater treatment plant(s): _____ MGD
2. Is treated effluent used for irrigation on-site _____, off-site _____, plant washdown _____, or chlorination/dechlorination _____?
If yes, approximately _____ gallons per month. Could this be substituted for potable water now being used in these areas _____?
3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed of. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and, if wastewater is discharged, the receiving stream. Please provide a sketch or map which locates the plant(s) and discharge points or disposal sites.

B. Wastewater Data for Service Area *N/A*

1. Percent of water service area served by wastewater system: ____%
2. Monthly volume treated for previous three years (in 1,000 gallons):

Year	_____	_____	_____
January	_____	_____	_____
February	_____	_____	_____
March	_____	_____	_____
April	_____	_____	_____
May	_____	_____	_____
June	_____	_____	_____
July	_____	_____	_____
August	_____	_____	_____
September	_____	_____	_____
October	_____	_____	_____
November	_____	_____	_____
December	_____	_____	_____
Total	_____	_____	_____

SECTION II WATER CONSERVATION PLAN

A. TARGETS AND GOALS

5 Year Target

Reduce per capita water consumption by 5 gallons per day
Meaning a reduction From 103 gpcd to 98 gpcd as per the 2005
Utility Profile

10 Year Target

Reduce per capita water consumption by 10 gallons per day
Meaning a reduction From 103 gpcd to 93 gpcd as per the 2005
Utility Profile

B. SCHEDULE FOR IMPLEMENTING PLAN TO ACHIEVE TARGETS AND GOALS

Plan for Reducing Per Capita Water Use

Birome will adopt a customer education program which is described in D below.
Birome will encourage customers to utilize and install water saving plumbing fixtures as
described in E & F below.
Birome will adopt a water conservation pricing structure.

Plan for reducing Unaccounted for Water

Birome has implemented plan for reducing unaccounted for water and a leak reduction program
and is described below in items H and I.

C. METHOD FOR TRACKING IMPLEMENTATION AND EFFECTIVENESS

Birome will track annual water use (water sold) and initially compare to annual water use in
2005 prior to plan implementation.

After the second year of plan implementation and following years, annual water use will be
tracked and compared to water use the previous year and water use in 2005.

Birome will track annual water loss and compare to annual water loss in 2005 prior to plan
implementation.

After the second year of plan implementation and following years, annual water loss will be
tracked and compared to water loss the previous year and water use in 2005.

Birome will calculate its ILI, infrastructure leakage index, annually, and compare the value to
the one for the previous year.

All hot water lines
Swimming Pools

-Insulated
-New pools must have recirculating filtration
equipment

F. RETROFIT PROGRAM:

Customers in existing buildings, which do not have water saving devices, will be encouraged to replace their old plumbing fixtures. The advertising Program will help inform them of the advantages of installing water saving devices. Birome Water Supply Corporation will work to encourage local Plumbing and hardware stores to stock retrofit devices and fixtures.

G. WATER RATES STRUCTURES:

Existing rates, which were adopted in May 4, 2009, encourage water conservation throughout the Corporation's area because present rates provide no discount for volume usage. The existing uniform water rate structure includes an increasing block rate structure, which further encourages water conservation.

H. METERING:

BIROME currently meters 100% of water usage, and has a policy of testing all meters, which appear to have abnormally high, or low water usage. Incorporated into the Water Conservation Plan, Birome will set up a meter-testing schedule to assure be continued accuracy of all meters.

Birome has a computer, which is used for billing. The computer can be used to identify high or low rate users and keep track of total water use.

BIROME WATER SUPPLY CORPORATION

RESOLUTION NO. 1.

A RESOLUTION OF THE BOARD OF DIRECTORS OF BIROME WATER SUPPLY CORPORATION ADOPTING THE ATTACHED BIROME WATER SUPPLY CORPORATION WATER CONSERVATION PLAN.

BE IT RESOLVED BY THE BOARD OF DIRECTORS: that on this 27th day of August , 2009, we do hereby adopt the attached BIROME WATER SUPPLY CORPORATION WATER CONSERVATION PLAN. Any violation of this Plan may cause the forfeiture of membership in Birome WSC and/or termination of water service. Water service termination penalties will only apply to violations of mandatory rationing imposed by the Corporation.

ADOPTED THIS 27th day of August 2009 at the Regular meeting of the Board of Directors at which a quorum was present.

(Seal)

BIROME WSC

ATTEST:

FOR THE BOARD OF DIRECTORS

Milton Stuckly
President



Gene Hawthorne
Secretary-Treasurer



BIROME WATER SUPPLY CORPORATION
Board of Directors
Special Meeting
May 4, 2009

The Birome Water Supply Corporation held a special meeting on May 4, 2009, 7:00 p.m. at the BWSC office building, Mt. Calm, Texas.

1. Call to Order.

Vice President Ronnie Childre called the meeting to order at 7:03 p.m.

2. Establish Quorum.

A quorum was established. Members Present: Joyce Childre, Ronnie Childre, Gene Hawthorne, Clarence Janek, Evelyn Johnson, Gerald Pica, Olin Ricketts. Absent: Milton Stuckly, Larry Matula.

3. Verification of Posting.

The meeting had been posted but could not yet be verified.

4. Discussion/approve bid specifications for concrete pad for generator.

Charles Beseda read the bid specifications for a concrete pad for the generator. Clarence Janek moved to accept the bid specs. with Olin Ricketts seconding. The motion carried. Charles is to type a spec. sheet to be filed with these minutes.

5. Discuss/approve bid specifications for electrical generator.

Charles next stated that a set of specs. for wiring in the generator would be provided by the company that sold us the generator. Olin Ricketts moved to accept the company specs. as our bid specs. Joyce Childre seconded and the motion carried.

6. Discuss/approve resolution for \$1,909,000.00 loan from Water Development Board.

Charles read the resolution from the Water Development Board to advance our loan from approximately one point four million dollars to one million nine hundred nine thousand dollars. After some discussion Gene Hawthorne moved to accept the resolution. Evelyn Johnson seconded and the motion carried with a vote of ^{six} ~~seven~~ for and none against.

7. Discuss approve 2009 Budget.

At this point President Stuckly arrived and chaired the rest of the meeting. Charles presented a copy of the 2009 proposed budget. After brief discussion Joyce Childre moved to accept the proposed budget and Clarence Janek seconded. The motion carried and a copy of the budget is filed with these minutes.

8. Discuss/approve water conservation rate.

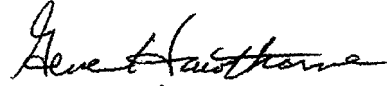
Charles next stated that we need to approve a water conservation rate. After much discussion Gene Hawthorne moved to set a rate of \$5.00/thousand gallons for each

thousand gallons above five thousand gallons used during the time water rationing is declared. Gerald Pica seconded and the motion carried.

9. Adjourn.

Joyce Childre moved to adjourn. Gerald Pica seconded and the motion carried. President Stuckly declared the meeting adjourned at 8:22 p.m.

Respectfully submitted,



Gene Hawthorne
Secretary/treasurer

CITY OF MARLIN
WATER CONSERVATION PLAN

Prepared 8 February 2013 for
CITY OF MARLIN TEXAS
101 Fortune Street
Marlin, Texas 76661
PWS #0730002
RN102886892
CN600506604

Compiled by:
KSA Engineers, Inc.
4833 Spicewood Springs Drive
Austin, TX 78759
(512) 342-6868

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Water Conservation and Drought Contingency Plans

INTRODUCTION

The City of Marlin has a current combined Water Conservation and Drought Contingency Plan entitled “Water Conservation and Drought Contingency Plan” (Attachment A). This original document was prepared in 2002 by Hunter Associates Texas, Ltd. The City Council adopted this Plan via ordinance on October 8, 2002, and the Plan was subsequently approved by the TCEQ.

Effective October 7, 2004, the Texas Commission on Environmental Quality (TCEQ) adopted revised rules and regulations pertaining to Water Conservation and Drought Contingency plans requiring inclusion of new elements not previously required in such plans. The City of Marlin’s current Plan substantially complies with the revised rules. However, the TCEQ has reviewed the plan and found that a minor update is required. Therefore, this document shall be considered the amendment to the current Water Conservation portion of the Water Conservation and Drought Contingency Plan.

The City of Marlin is to adopt the City of Marlin Water Conservation Plan by Ordinance 13-010 (Attachment B). The ordinance of the City Council to adopt the Water Conservation Plan shall authorize the City to implement, enforce, and administer the program outline in this Water Conservation Plan. This ordinance supersedes the September 2002 Water Conservation & Drought Contingency Plans. Specifically, the 2013 ordinance includes the following provisions:

Updated utility profile, 5-year and 10-year target goals for reduction in municipal use expressed in gallons per capita per day (gpcpd) including a schedule for implementing the plan to achieve the targeted reductions, a method of tracking the implementation and effectiveness, continuing educating the City on water conservation, describes the City water rate structure and enforcement procedures.

Each of these elements is detailed below:

UTILITY PROFILE

POPULATION AND CUSTOMER DATA

The City’s Water Services Department manages a water distribution service area of 4.6 square miles and serves a population of over 5,967 residents. The City provides drinking water to its customers through a network of nearly 55 miles of transmission and distribution mains that provide service to over 2,363 water connections. See Attachment C for the full Utility Profile.

The official U.S. Census population count for the city in 2010 was 5,967, a decrease of about 10% from the 1990 Census. Population projections for Marlin, described in the Brazos G Regional Water Planning Area's 2011 Brazos G Regional Water Plan, forecast the City's population will reach 7,155 by 2020, and 7,455 by 2030. In comparison, the City's water consumption peak day demand is expected to increase to almost 2,749 ac-ft (2.45 MGD) by 2020 and over 2,800 ac-ft (2.5 MGD) by 2030. References to the Brazos G Regional Water Planning Area's 2011 Brazos G Regional Water Plan are in Attachment D.

WATER USE DATA

Table 1 below summarizes key water use statistics for 2008 to 2011. Average per person usage is given in gallons per capita per day (gpcd). Average peak daily water demand is given in million gallons per day (MGD). The peak day to average day ratio is based on the Texas Commission on Environmental Quality (TCEQ) maximum daily demand (30 TAC §290.38. (41))

§290.38. (41) **Maximum daily demand** -- In the absence of verified historical data or in cases where a public water system has imposed mandatory water use restrictions within the past 36 months, maximum daily demand means 2.4 times the average daily demand of the system.

The maximum daily demand for the City is 5.65 MGD, reached in 2011. The City's water production and pumping system capacity is currently 3.024 MGD and 20.052 MGD, respectively.

Table 1. Municipal Water Demand 2008-2011

Year	2008	2009	2010	2011
Peak GPCD	588	727	492	576
Annual Average GPCD	245	303	205	240
Peak Day (MGD)	3.89	4.81	3.26	3.44
Average Day (MGD)	1.62	2.00	1.36	1.43
Peaking Factor	2.4	2.4	2.4	2.4

WATER PRODUCTION AND DELIVERY SYSTEM

The City utilizes surface water for its public water supply and has developed its own water production facilities. The City receives most of their water supply from the City Lakes and purchases the rest of their water from the Brazos River Authority. The purchased water is pumped from the Brazos River by their pump station (located on the west side on the city along Highway 7) to the City Lake; the City Lake is located on the Northeast part of the city.

SPECIFIC, QUANTIFIED 5 & 10-YEAR TARGETS

WATER LOSS GOALS

Marlin is undertaking a comprehensive effort to reduce unaccounted-for water, and to improve the quality of data in water loss estimates. The City currently has loans to replace meters and water lines throughout the city. It is expected that water loss percentages will fluctuate annually with weather and demand conditions, and that some fluctuations will occur as a result of improved data collection. Marlin intends to increase its water conservation, and reduce its percentage of lost water as follows:

Table 2. Water Conservation Plan 5- and 10- Yr Goals

Description	Historic 5-yr (Average)	Current (2011)	5-yr Goal (Yr)	10-yr Goal (Yr)
Total GPCD	218	240	220	210
Water Conserved (GPCD)			20	30
Residential GPCD	48	54	50	49
Water Loss (GPCD)	54	111	90	85
Water Loss (%)	24.8	46.3	39.1	38.6

IMPLEMENTATION SCHEDULE

The way the city plans on obtaining these water loss goals are described below:

1. Reduce per capita consumption through education by presenting non-wasteful uses of water and techniques that can be employed to conserve water. Information will be distributed in the local newspapers and other media outlets during high-use seasons to expand public awareness.
2. Once a year, the City will review consumption patterns and its income and expense levels and evaluate whether or not the current water rates are effective and appropriate. A progressive water rate structure may be considered by the City and adjustments will be made as needed.
3. The City will provide information regarding the water rate structure to each of its customers once a year. City will also provide customers with historical water use for the previous 12 months upon request.

4. A leak detection and repair program will be maintained as well as a meter testing and repair/replacement program. Accounting data of the water produced versus consumption will be monitored to determine water loss and unaccounted water.
5. Replacement of water lines found to be leaking or in generally poor condition will be completed as quickly as practical to ensure minimal water loss.

TRACKING OF WATER CONSERVATION PLAN EFFECTIVENESS

The City will keep track of the Water Conservation Plan's progress via the following four processes.

1. In order to track the effectiveness of water conservation measures, and to monitor the water distribution system efficiency, the City is updating their master meters, and universal metering system. The master meter will measure any water diverted from the source into the water distribution system. The universal metering system will measure water used by customers and by public sites. These provide the data required to track annual water use, and evaluate progress towards the City's goals.
2. The City will collect information about its programs and the population to evaluate the effectiveness of the program at least once every five years. For literature pieces, the number of such pieces and topics covered will be documented. The number of news programs or advertisements will also be documented and the total population of the service area will be tracked.
3. Guidelines for meter selection based on customer usage, meter replacement policies, and records on each meter in the system will be recorded and maintained.
4. To control water theft, and water loss (both real and apparent), the City has developed schedules for meter inspection and maintenance, and visual line inspection. This schedule will be part of a continuous program of leak detection, repair, and water loss accounting.
 - a. These will be done on a monthly basis:
 - i. Visual inspection of all distribution lines
 - ii. Inspection of all commercial meters to check accuracy
 - iii. A water audit to detect water theft and abandoned services
 - b. All residential meters will be inspected for accuracy and tampering every four years with 25% inspected each year.
 - c. Any leaks or faulty meters discovered during these inspections or reported to the City will be repaired or replaced as soon as is reasonably possible.

CONTINUING PUBLIC EDUCATION & INFORMATION

Through education and information dissemination, the City will continue to inform its water customers of the benefits of water conservation. The City will accomplish this by implementing the following steps:

1. The City will prepare a mail-out and newspaper article containing information describing the newly adopted water conservation program.
2. The City will provide information to all new customers describing the water conservation and drought contingency programs upon application for service.
3. On an annual basis the City will request that local newspapers publish water conservation literature.
4. The City Manager will report annually on the effectiveness of the City's water conservation measures and the per capita water usage. If the Water Conservation Plan is not effective, the City Manager will make recommendations for modifying the plan to increase its effectiveness. The City Manager will send a copy of the annual report to the executive administrator of the Texas Water Development Board.

WATER RATE STRUCTURE

The City utilizes an inclining water rate structure to encourage customers to reduce both peak and overall water usage, while fairly allocating cost of service to each customer class. Under an inclining rate structure, the rate per thousand gallons increases as the amount of water used increases. The City currently has adopted a cost-based rate structure which discourages excessive water use. The water rates for the City are documented in Attachment E.

This rate structure will be reviewed on a regular basis to ensure that the rates adequately recover the cost of service and meet the goals of this water conservation plan.

ENFORCEMENT PROCEDURE AND PLAN ADOPTION

The water conservation and drought contingency plans will be put into effect by notices being given to water customers through the local newspaper. The City Manager or his/her duly appointed representative will act as the Administrator of the Water Conservation and Drought Contingency Plans. The Administrator will oversee the

execution and implementation of all elements of the plan and be responsible for overseeing and keeping adequate records for program verification.

OTHER

Attachment F is provided as documentation that the regional water planning group for the City's service area has been notified of the Water Conservation Plan update.

**ATTACHMENT A.
WATER CONSERVATION AND DROUGHT CONTINGENCY
PLAN - SEPTEMBER 2002**

The City of Marlin, Texas
Falls County

**Water Conservation &
Drought Contingency Plans**



The City of Marlin, Texas

PO Box 980

Marlin, TX 76661

September 2002

34020

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1.0 INTRODUCTION

The Public Works Department of the City of Marlin, Texas has developed a Water Conservation Plan fulfilling the requirements of Title 30, Chapter 288, Subchapter A of the Texas Administrative Code. The objective of the water conservation plan is to conserve water. This will be accomplished by reducing the consumption of water.

The City of Marlin currently has strategies for reducing water consumption. These strategies include, but not limited too, a rate structure discouraging the excess use of water, metering devices with an accuracy of plus or minus 5% radio advertisements highlighting water conservation tips, regular inspections of water lines, and a program for replacing meters. The benefits of conserving water are protecting the most valuable resource (water), reducing the amount of water treated by water and wastewater plants therefore reducing operating expenses, and reducing consumer water bills.

2.0 DESCRIPTION OF SERVICE AREA

The City of Marlin is located in Falls County, Central Texas. The City is about 25 miles East of I-35 between Temple and Waco. The Brazos River is about 5 miles Southwest of Marlin, and it is a source of water for the City. The city service area (see Attachment # 1) is approximately 6.9 square miles with population of 6,628 according to the 2000 U.S. Census Bureau (see Attachment # 2). The projected population for 2050 is 9,169, which will increase the water demand 38%.

3.0 GOALS

The City of Marlin has and will continue to conserve water via programs discussed later in this report. Marlin intends to reduce the water consumption in the service area by 55.7%, from 219 gpcd to 122 gpcd by the year 2050. This will be accomplished by realizing the following water conservation goals:

- Periodic distribution of water conservation literature to the citizens of Marlin
- Continue radio announcements giving water conservation tips
- Continue to replace old meters
- Test all meters periodically
- Continue regular inspection of water lines
- Continue unaccounted for losses of less than 15%
- Continue a water rate structure discouraging excess water consumption
- Look into developing a Water Recycling and Reuse Program
- Look into adopting water saving amendments to the Plumbing Code

4.0 UTILITY EVALUATION DATA

The City of Marlin currently acquires its water supply from the Brazos River and the New Marlin Reservoir. The City also has a contract with the Brazos River Authority for 2000 acre-feet. The amount of water available from the New Marlin Reservoir is 4000 acre-feet with an additional 4000 acre-feet from the Brazos River when rains are adequate. The design daily capacity of the water treatment plant is 3.024 MGD. Marlin also has an elevated tank with a capacity of 1.05 MGD and a ground storage tank with a capacity of 0.925 MGD. (See Attachment # 3 for a map of the water system)

5.0 WATER CONSERVATION PLAN

The Water Conservation Plan consist of (15) components; the first (8) components are the minimum requirements of Title 30, Chapter 288, Subchapter A of the Texas Administrative Code and the remaining (7) are additional conservation strategies. Each component is described in detail.

5.1 Metering

The City of Marlin currently meters 100% of the water used, both residential and commercial and they only use meters with 5% accuracy. The City currently has a meter replacement program which replaces 200-300 of the oldest meters every year. Therefore, each meter will be replace approximately every ten years.

The City also tests and replaces or repairs any meters that appear to have abnormally high or low water usage. The City has established a regular schedule for testing meters. The schedule is as follows:

1. Production (Master) meters – test annually
2. 1" and larger meters – test annually
3. 1" and smaller meters – test once every five years

5.2 Education and Information

The City of Marlin will educate and inform the public in order to promote water conservation among its customers. The City currently has radio advertising highlighting water conservation tips. The City plans to inform both residential and commercial customers with the following type of information to encourage water conservation:

1. Distribution of educational materials to all customers four times during the first year of the program and two times per year thereafter. These distributions will be timed in accordance with peak summer and winter demand periods.
2. Publications of articles in the local paper at times corresponding to the distribution mentioned above and more often if conditions warrant.
3. New customers will receive water conservation literature.

Attachment F1 Water Conservation Plan 2002

The first distribution of the first year will include information promoting the Water Conservation Plan. The distribution will explain the need for this plan, encourage customers to start conserving water, list simple ways to conserve water, and will be accompanied by an article in the Gonzales paper and a City proclamation for Water Conservation Awareness Week.

The second distribution of the first year will include brochures promoting indoor water conservation. The third distribution will include brochures promoting outdoor water conservation. The fourth distribution will include brochures promoting water saving fixtures. An article in the Marlin Paper will accompany each distribution in the first year. Appendix B has a list of sources of water conservation literature and educational materials.

5.3 Water Rate Structure

The most recent water rate structure that encourages water conservation was adopted on MARCH 24, 1998. The City's water and sewer rates discourage the use of large quantities of water (see Attachment No. 5). The City will explain the water rate structure to new accounts (customers).

5.4 Implementation and Enforcement

The Director of Utilities of the City of Marlin is responsible for the implementation and enforcement of this plan. This plan will be enforced by the following methods:

1. City Council adopting a resolution supporting this plan and its goals.
2. The water rate structure will be enforced; the water will be disconnected for any customers not paying the monthly bill.
3. The building inspector will not certify new construction unless it meets adopted plumbing codes.

5.5 Coordination with Regional Planning Group

The City of Marlin has sent a copy of this plan to the Brazos Regional Water Planning Group for their review.

5.6 Leak Detection and Repair

The City of Marlin currently has a leak detection and repair program that includes the following:

1. Monthly water use accounting by computer billing.
2. Frequent monitoring of elevated and ground storage tanks to detect water-main breaks.

Attachment F1 Water Conservation Plan 2002

3. Visual Inspection by meter readers and employees who keep a watch out for abnormal conditions that could lead to leaks.
4. An adequate maintenance staff, which is available to repair any leaks.
5. In the event that a major leak is detected, the City will consider conducting a leak detection survey of the suggested area and possibly use the Texas Water Development Board personnel to assist the City in setting up a leak detection survey program.

5.7 Record Management System

The City of Marlin computer system records the amount of water pumped and delivered and the amount of sales. The amount of water losses is found by subtracting the amount of water pumped from the amount of water sold. This system records the water sales according to the account: residential, commercial, industrial, or public and institutional.

5.8 Wholesale Customers

The City of Marlin does not have a wholesale customer.

5.9 Plumbing Codes

The City of Marlin should consider adopting an amendment to their plumbing code that requires the use of water saving fixtures for all new construction and for replacement of plumbing in existing structures. The standards for residential and commercial fixtures are given in the following table.

Fixture	Maximum Usage
Tank-type toilets	1.5 gallons per flush
Flush valve toilets	3.0 gallons per flush
Tank-type urinals	3.0 gallons per flush
Flush valve urinals	1.0 gallons per flush
Shower heads	3.0 gallons per minute
Lavatory & kitchen faucets	2.75 gallons per minute
All hot water lines	Insulated
Swimming pools	New pools must have recirculating filtration equipment

5.10 Retrofit Program

The City of Marlin has not adopted a retrofit program. The distributions mentioned above should include literature that encourages customers to replace their old plumbing fixtures with new water saving fixtures.

5.11 Recycling and Reuse

The City of Marlin has looked into recycling and reusing water, but no formal action has been taken.

5.12 Pressure Control in Distribution System

The City's distribution system does not have insufficient or excessive pressure; therefore, there are no proposed changes.

5.13 Water Conservation Landscaping

The City has not adopted regulations requiring property owners to plant vegetation requiring little water. The distributions mentioned above should include suggestions on landscaping and irrigation procedures that will conserve water. In addition, the city should encourage local plant nurseries, commercial landscapers and other in the landscaping industry to promote water conserving landscaping practices.

5.14 Contracts with Other Political Subdivisions or Water Supply Corporations

In the event the City of Marlin contracts to sell water to other political subdivisions or water supply corporations, the contract will require that the purchaser adopt the City's water conservation plan or develop and adopt their own plan in accordance with the Texas Water Development Board regulations.

5.15 Conservation Plan Annual Report

A member of the City staff should file an Annual Report addressing the progress and effectiveness of the Water Conservation Plan. The report should include the following:

1. Public information that has been issued
2. Implementation progress and status of the City's water conservation program
3. Effectiveness of the water conservation plan reducing water use by providing consumption data
4. Public response to the water conservation plan

Appendix A



Water Utility Profile



The purpose of the Water Utility Profile is to assist an applicant with water conservation plan development and to ensure that important information and data be considered when preparing your water conservation plan and goals. This form should be used by applicants for financial assistance (submitted to the TWDB) or by an entity applying for a water right (submitted to the TNRCC). Please complete all questions as completely and objectively as possible. You may contact the Municipal Water Conservation Unit of the TWDB at 512-936-2391 for assistance, or the Resource Protection Team at 512-239-4691 if submitted to the TNRCC.

Name of Utility: City of Marlin

Address & Zip: PO Box 980 Marlin, TX 76661-0980

Telephone Number: 254-883-3371 **Fax:** 254-883-1456

Form Completed By: Jeff Morris, P.E. - information provided by City of Marlin

Title: Project Manager

Signature: *Jeff Morris* **Date:** 9/5/2002

Name and Phone Number of Person/Department responsible for implementing a water conservation program:
Tom Winder, City Manager

I. CUSTOMER DATA

A. Population and Service Area Data

1. Please attach a copy of your Certificate of Convenience and Necessity (CCN) from the TNRCC, and a service-area map. See Attachment No. 1
2. Service area size (square miles): 6.9 square miles
3. Current population of service area: 6,628

Attachment F1 Water Conservation Plan 2002

4. Current population served by utility: a: water 6,628
 b: wastewater 6,628
5. Population served by water utility for the previous five years:
6. Projected population for service area in the following decades:

<u>Year</u>	<u>Population</u>	<u>Year</u>	<u>Population</u>
2001	_6,628_	_2010_	_7,367_
2000	_6,628_	_2020_	_7,774_
1999	_6,386_	_2030_	_8,225_
1998	_6,386_	_2040_	_8,684_
1997	_6,386_	_2050_	_9,169_

7. List source(s)/method(s) for the calculation of current and projected population:

_U.S. Bureau of Census (1997-2001)_____

_Texas Water Development Board (2010-2040)_____

_See Attachment No. 2_____

B. Active Connections

1. Current number of active connections by user type. Check whether multi-family service is counted as Residential or Commercial

<u>Treated water users:</u>	<u>Metered</u>	<u>Not-metered</u>	<u>Total</u>
Residential	_2092_	_____	_2092_
Commercial	_250_	_____	_250_
Industrial	_02_	_____	_02_
Public	_73_	_____	_73_
Other	_34_	_____	_34_

Attachment F1 Water Conservation Plan 2002

2. List the net number of new connections per year for most recent three years:

Year	1999	2000	2001
Residential	3	10	11
Commercial	1		
Industrial			
Public			
Other			

C. High Volume Customers

List annual water use for the five highest volume retail and wholesale customers (please indicate if treated or raw water delivery)

	<u>Customer</u>	<u>Use (1,000gal./yr.)</u>	<u>Treated/Raw Water</u>
(1)	TDOT	38,575	Treated
(2)	Tx Youth Comm.	13,886	Treated
(3)	Jon-Lin	11,752	Treated
(4)	Elmwood Nursing	5,403	Treated
(5)	M&M Apts.	4,880	Treated

II. WATER USE DATA FOR SERVICE AREA

A. Water Accounting Data

1. Amount of water use for previous five years (in 1,000 gal.):

Please indicate : Diverted Water X
 Treated Water

Year	<u> 1997 </u>	<u> 1998 </u>	<u> 1999 </u>	<u> 2000 </u>	<u> 2001 </u>
January	<u> 40,917 </u>	<u> 54,229 </u>	<u> 39,174 </u>	<u> 38,539 </u>	<u> 50,655 </u>
February	<u> 33,194 </u>	<u> 44,954 </u>	<u> 36,225 </u>	<u> 34,484 </u>	<u> 42,482 </u>
March	<u> 39,323 </u>	<u> 37,198 </u>	<u> 37,622 </u>	<u> 29,468 </u>	<u> 41,271 </u>
April	<u> 35,271 </u>	<u> 36,581 </u>	<u> 36,202 </u>	<u> 32,168 </u>	<u> 40,195 </u>
May	<u> 35,067 </u>	<u> 44,094 </u>	<u> 36,605 </u>	<u> 30,483 </u>	<u> 47,902 </u>
June	<u> 36,568 </u>	<u> 51,072 </u>	<u> 39,759 </u>	<u> 33,141 </u>	<u> 53,071 </u>
July	<u> 48,134 </u>	<u> 59,331 </u>	<u> 45,264 </u>	<u> 46,885 </u>	<u> 58,997 </u>
August	<u> 44,830 </u>	<u> 52,354 </u>	<u> 54,963 </u>	<u> 60,373 </u>	<u> 65,357 </u>
September	<u> 42,901 </u>	<u> 47,125 </u>	<u> 54,930 </u>	<u> 56,084 </u>	<u> 52,243 </u>
October	<u> 41,502 </u>	<u> 39,797 </u>	<u> 58,287 </u>	<u> 46,115 </u>	<u> 48,779 </u>
November	<u> 39,869 </u>	<u> 35,013 </u>	<u> 50,311 </u>	<u> 41,443 </u>	<u> 43,461 </u>
December	<u> 39,857 </u>	<u> 40,307 </u>	<u> 50,582 </u>	<u> 44,036 </u>	<u> 47,550 </u>
Total	<u> 477,433 </u>	<u> 542,055 </u>	<u> 539,924 </u>	<u> 493,276 </u>	<u> 591,963 </u>

Please indicate how the above figures were determined (e.g., from a master meter located at the point of a diversion from a stream or located at a point where raw water enters the treatment plant, or from water sales).

 Master meter where raw water enters plant

Attachment F1 Water Conservation Plan 2002

2. Amount of water (in 1,000 gallons) delivered (sold) as recorded by the following account types (See #1, Appendix A) for the past five years.

<u>Year</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Wholesale</u>	<u>Other</u>	<u>Total Sold</u>
1997	<u>218,244</u>	<u>95,328</u>	<u>68,849</u>	<u>N/A</u>	<u>N/A</u>	<u>382,421</u>
1998	<u>233,356</u>	<u>157,495</u>	<u>98,709</u>	<u>N/A</u>	<u>N/A</u>	<u>489,560</u>
1999	<u>184,977</u>	<u>85,442</u>	<u>62,252</u>	<u>N/A</u>	<u>N/A</u>	<u>332,671</u>
2000	<u>187,296</u>	<u>88,112</u>	<u>74,567</u>	<u>N/A</u>	<u>N/A</u>	<u>349,975</u>
2001	<u>165,416</u>	<u>84,933</u>	<u>64,206</u>	<u>N/A</u>	<u>N/A</u>	<u>314,556</u>

3. List previous five years records for unaccounted-for water use (See #2, Appendix A)

4. List previous five years records for annual peak-to-average daily use ratio (See #3, Appendix A)

<u>Year</u>	<u>Amount (gal.)</u>	<u>%</u>	<u>Year</u>	<u>Average MGD</u>	<u>Peak MGD</u>	<u>Ratio</u>
1997	<u>95,012,000</u>	<u>20</u>	1997	<u>1.32</u>	<u>2.23</u>	<u>1.69</u>
1998	<u>52,495,000</u>	<u>9.7</u>	1998	<u>1.49</u>	<u>2.63</u>	<u>1.77</u>
1999	<u>207,253,000</u>	<u>38</u>	1999	<u>1.48</u>	<u>2.83</u>	<u>1.91</u>
2000	<u>143,301,000</u>	<u>29</u>	2000	<u>1.35</u>	<u>2.34</u>	<u>1.73</u>
2001	<u>279,407,000</u>	<u>47</u>	2001	<u>1.63</u>	<u>2.56</u>	<u>1.57</u>

5. Municipal per capita water use for previous five years (See #4, Appendix A):

<u>Year</u>	<u>Population</u>	<u>Total Diverted (or Treated) (1,000 gal.)</u>	<u>Industrial Sales (1,000 gal.)</u>	<u>Municipal Per Capita Use (gpcd)</u>
1997	<u>6,386</u>	<u>477,433</u>	<u>68,849</u>	<u>175</u>
1998	<u>6,386</u>	<u>542,055</u>	<u>98,709</u>	<u>190</u>
1999	<u>6,386</u>	<u>539,924</u>	<u>62,252</u>	<u>205</u>
2000	<u>6,628</u>	<u>493,276</u>	<u>74,567</u>	<u>173</u>
2001	<u>6,628</u>	<u>593,963</u>	<u>64,206</u>	<u>219</u>

6. Seasonal water use for the previous five years (in gallons/person/day) (See #5, Appendix A):

<u>Year</u>	<u>Population</u>	<u>Base Per Capita Use</u>	<u>Summer Per Capita Use</u>	<u>Seasonal Use</u>
1997	<u>6,386</u>	<u>195</u>	<u>225</u>	<u>30</u>
1998	<u>6,386</u>	<u>242</u>	<u>277</u>	<u>35</u>
1999	<u>6,386</u>	<u>197</u>	<u>238</u>	<u>41</u>
2000	<u>6,628</u>	<u>207</u>	<u>235</u>	<u>28</u>
2001	<u>6,628</u>	<u>230</u>	<u>297</u>	<u>67</u>

Attachment F1 Water Conservation Plan 2002

B. Projected Water Demands

Provide estimates for total water demands for the planning horizon of the utility. Indicate sources of data and how projected water demands were determined. Attach additional sheets if necessary.

Diverted Water	2001 - 592 MG	(Pop = 6628)
	2010 - 658 MG	(Pop = 7367)
	2020 - 694 MG	(Pop = 7774)
	2030 - 735 MG	(Pop = 8225)
	2040 - 776 MG	(Pop = 8684)
	2050 - 819 MG	(Pop = 9169)

III. WATER SUPPLY SYSTEM

A. Water Supply Sources

List all current water supply sources and the amounts available with each:

	<u>Source</u>	<u>Amount Available</u>
Surface Water:	Brazos River _New Marlin Reservoir_	3.57 3.57 MGD
Groundwater:	_N/A_	_____ MGD
Contracts:	_Brazos River Authority_	1.07 MGD
Other:	_N/A_	_____ MGD

B. Treatment and Distribution System

1. Design daily capacity of system: 3.024 MGD
2. Storage Capacity: Elevated 1.05 MGD, Ground 0.925 MGD
3. If surface water, do you recycle filter backwash to the head of the plant?
Yes X No _____. If yes, approximately 0.17 MGD.
4. Please describe the water system. Include the number of treatment plants, wells, and storage tanks. If possible, include a sketch of the system layout.

WTP Description:

- 1 water treatment plant
- 0 wells
- 4 elevated storage tanks
- 2 ground storage tanks

See Water System Map in Attachment No. 3.

IV. WASTEWATER UTILITY SYSTEM

A. Wastewater System Data

1. Design capacity of wastewater treatment plant(s): 2.0 MGD
2. Is treated effluent used for irrigation on-site NO, off-site NO, plant washdown NO, or chlorination/dechlorination NO?
If yes, approximately _____ gallons per month. Could this be substituted for potable water now being used in these areas _____?

3. Briefly describe the wastewater system(s) of the area serviced by the water utility.
Describe how treated wastewater is disposed of. Where applicable, identify treatment plant(s) with the TNRCC name and number, the operator, owner, and, if wastewater is discharged, the receiving stream. Please provide a sketch or map which locates the plant(s) and discharge points or disposal sites.

Two waste water treatment plants (one plant is a trickling filter plant rated @ 1.25 MGD; the other plant is an aerated lagoon type plant rated @ 2 MGD);

8 lift stations

6"-18" lines with one 18" pvc force main.

The treated wastewater is disposed of in the Brazos River (below Whitney Lake in segment No. 1242 of the Brazos River Basin).

See map in Attachment No. 4

B. Wastewater Data for Service Area

Attachment F1 Water Conservation Plan 2002

1. Percent of water service area served by wastewater system: 95 %
2. Monthly volume treated for previous three years (in 1,000 gallons):

Year	1999	2000	2001
January	45,405	49,586	48,538
February	41,207	44,433	38,728
March	45,212	44,059	40,807
April	45,121	44,172	40,735
May	47,212	54,429	47,673
June	51,305	48,964	52,838
July	55,467	66,292	61,678
August	66,270	68,311	62,096
September	66,125	61,074	51,237
October	66,480	50,042	48,454
November	58,327	46,243	44,445
December	59,122	47,268	48,229
Total	647,253	624,873	525,549

V. UTILITY OPERATING DATA

- A. List (or attach) water and wastewater rates, and rate structure for all classes.

See Attachment No. 5

- B. Other relevant data: Please indicate other data or information that is relevant to both the applicant's water management operations and design of a water conservation plan.

Attachment F1 Water Conservation Plan 2002

Received
11/4/02
KK

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Kathleen Hartnett White, *Commissioner*
Margaret Hoffman, *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

October 30, 2002

Tom Winder, City Manager
City of Marlin
P.O. Drawer 980
Marlin, Texas 76661

CERTIFIED MAIL

RE: City of Marlin
Application to Extend Time to Commence and Complete Construction
TWC § 11.145, Requiring Mailed Notice and Publication
Brushy Creek, Brazos River Basin
Falls County, Texas

DONE
AA

Dear Mr. Winder:

This acknowledges the receipt, on September 5, 2002, of the City of Marlin's "Water Conservation & Drought Contingency Plans."

Before the application can be declared administratively complete, we will need the following:

Pursuant to an Interoffice Memorandum from our Resource Protection Team (copy enclosed), the **City of Marlin must submit evidence indicating the official adoption of the September 2002 water conservation and drought contingency plan.**

Please provide the requested information no later than November 15, or the application will be returned pursuant 30 TAC § 281.18.

If you have any questions, please do not hesitate to contact me at (512)239-2270 or via e-mail at talleman@tceq.state.tx.us.

Sincerely,

Tom Allemand - Mail Code 160
Project Manager
Water Rights Permitting Team
Water Supply Division

Enclosure

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Tom Allemand, Project Manager
Water Rights Permitting Team
Water Supply Division

Date: October 30, 2002

From: Dean Minchillo, Water Conservation Specialist
Resource Protection Team
Water Supply Division

Subject: Review of Water Conservation Plan for Administrative Completeness.
City of Marlin, Texas

(D) 10/30/02

Certificate of Adjudication No. 12-4355, as amended, authorizes the owner to maintain two existing reservoirs and dams, New Marlin Reservoir and Marlin City Lake Reservoir, on Big Sandy Creek, tributary of Big Creek, tributary of Mussel Run Creek, tributary of the Brazos River, Brazos River Basin, Falls County, Texas. New Marlin Reservoir impounds, not to exceed, 3,135 acre-feet of water per annum and Marlin City Lake Reservoir impounds, not to exceed, 791 acre-feet of water per annum.

Owner is also authorized to impound, not to exceed, 6,560 acre-feet of water in the Soil Conservation Service Dam, SCS Site No. 19 on Brushy Creek, tributary of Big Creek.

Certificate of Adjudication No. 12-4355, as amended, authorizes the owner to divert and use, not to exceed, 4,000 acre-feet of water per annum from New Marlin Reservoir and Brushy Creek Reservoir for municipal purposes, to divert and use, not to exceed, 2,000 acre-feet of water per annum from the Brazos River for municipal purposes, to divert and use, not to exceed, 2,000 acre-feet of water per annum from the Brazos River for industrial purposes, and to use the impounded water of the aforesaid reservoirs for recreational purposes, and to use the aforesaid Marlin City Lake for municipal use as a sedimentation basin.

Applicant seeks an extension of time to commence and complete construction of Brushy Creek Dam with a proposed start date of May 8, 2004 and a completion date of May 8, 2009. The original commencement and completion dates were April 19, 1991 and April 19, 1996. The currently authorized dates are April 19, 1998 and April 19, 2003.

TAC § 295.9(1) states:

Applications to appropriate or to use water for municipal use, industrial or mining use, or irrigation use. The water conservation and drought contingency plans submitted with an application to appropriate or to use state water for municipal use, industrial or mining use, or irrigation use must be submitted in accordance with guidelines set forth in Chapter 288 of the title (related to Water Conservation Plans, Drought Contingency Plans, Guidelines and Requirements).

Attachment F1 Water Conservation Plan 2002

The water conservation plan, submitted by the City of Marlin, was reviewed for administrative sufficiency for municipal use. In order to find the plan administratively sufficient per 30 TAC Chapter 288.2, the following is required:

The City of Marlin must submit evidence indicating the official adoption of the September 2002 water conservation and drought contingency plan.

Upon receipt of the requested required information, the Water Conservation Staff of the Resource Protection Team will review the plans for administrative completeness per §288.2 and §288.20.

Attachment

cc: Bill Billingsley, Resource Protection Team

ORDINANCE NO. 02-25

AN ORDINANCE ADOPTING THE CITY OF MARLIN WATER CONSERVATION PLAN AND DROUGHT CONTINGENCY PLAN DATED OCTOBER 2002 AND DECLARING AN EMERGENCY.

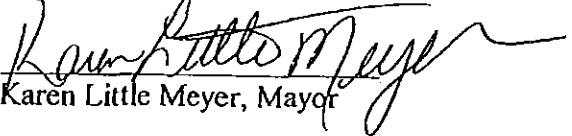
BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARLIN, TEXAS.

WHEREAS, the City of Marlin Texas has formulated a PLAN for conserving water and a PLAN to lessen the effect of droughts; and

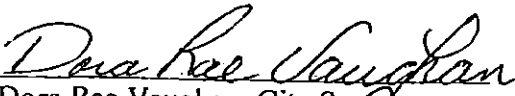
WHEREAS, the City of Marlin believes that it is in the best interest of the citizens of Marlin to conserve it's water supply; therefore,

PASSED, APPROVED AND ADOPTED THIS THE 8TH DAY OF OCTOBER 2002.

CITY OF MARLIN


Karen Little Meyer, Mayor

ATTEST:


Dora Rae Vaughan, City Secretary

ORDINANCE NO. 02-25

AN ORDINANCE ADOPTING THE CITY OF MARLIN WATER CONSERVATION PLAN AND DROUGHT CONTINGENCY PLAN DATED OCTOBER 2002 AND DECLARING AN EMERGENCY.

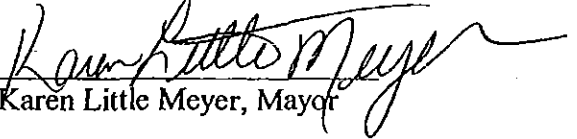
BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARLIN, TEXAS.

WHEREAS, the City of Marlin Texas has formulated a PLAN for conserving water and a PLAN to lessen the effect of droughts; and


WHEREAS, the City of Marlin believes that it is in the best interest of the citizens of Marlin to conserve it's water supply; therefore,

PASSED, APPROVED AND ADOPTED THIS THE 8TH DAY OF OCTOBER 2002.

CITY OF MARLIN


Karen Little Meyer, Mayor

ATTEST:


Dora Rae Vaughan, City Secretary

Attachment No. 3

Water System Map

VI. CONSERVATION GOALS

Please use the data provided in this survey to establish conservation goals (additional data may be used).

- A. Water conservation goals for municipal utilities are generally established to maintain or reduce consumption, as measured in:
1. gallons per capita per day used;
 2. unaccounted-for water uses;
 3. peak-day to average-day ratio; and/or
 4. an increase in reuse or recycling of water.
- B. TNRCC/TWDB conservation staff assess the reasonableness of water conservation goals based on whether the applicant addresses the following steps:
1. identification of a water or wastewater problem;
 2. completion of the utility profile;
 3. selection of goals based on the technical potential to save water as identified in the utility profile; and
 4. performance of a cost-benefit analysis of conservation strategies.

Attachment F1 Water Conservation Plan 2002

If at least the first three steps have been completed and are summarized in the water conservation plan, then staff can conclude that there is substantiated basis for the goals, and that the water conservation plan is integrated into water management. Therefore, the established conservation goals can be deemed reasonable.

C. Complete the following in gallons per capita per day (gpcd) to quantify the water conservation goals for the utility's service area:

1. Estimation of the technical potential for reducing per capita water use
(see Appendix B).

	<u>Conservation Scenario</u>
(See Attachment # 6 for calculations)	<u>Mostly Likely</u>
a. Reduction in unaccounted-for uses:	<u>70</u>
b. Reduction in indoor water use due to water-conserving plumbing fixtures:	<u>20.5 most likely</u> <u>21.7 advanced</u>
c. Reduction in seasonal use:	<u>3.03 most likely 8.66 advanced</u>
d. Reduction in water use due to public education programs:	<u>3.85 most likely 9.62 advanced</u>

TOTAL TECHNICAL POTENTIAL FOR REDUCING PER CAPITA WATER USE: 97.38 most likely, 109.98 gpcd

*Subtract these totals from the dry-year per capita use to calculate the long-run planning goal.

2. Planning goal

The planning goal equals the dry year per capita water use minus the total technical potentials calculated in number one above.

Planning goal (in gpcd): 122 most likely, 109 advanced

Goal to be achieved by year: 2050

3. Needed reduction in per capita use to meet planning goal

Current per capita use: 219

Planning goal (from #2 above): 122 most likely, 109 advanced

Difference between current use and goal: 97 most likely, 110 advanced
(Represents needed reduction in per capita use to meet goal.)

Appendix A

Definitions of Utility Profile terms

1. **Residential** sales should include residential sales to residential class customers only.
Industrial sales should include manufacturing and other heavy industry.
Commercial sales should include all retail businesses, offices, hospitals, etc.
Wholesale sales should include water sold to another utility for a resale to the public for human consumption.

2. **Unaccounted-for water** is the difference between water diverted or treated (as reported in Section IIA1, p. 4) and water delivered (sold)(as reported in Section IIA2, p. 4). Unaccounted-for water can result from:
 1. inaccurate or incomplete record keeping;
 2. meter error;

Attachment F1 Water Conservation Plan 2002

3. unmetered uses such as firefighting, line flushing, and water for public buildings and water treatment plants;

4. leaks; and

5. water theft and unauthorized use.

3. The peak-day to average-day ratio is calculated by dividing the maximum daily pumpage (in million gallons per day) by the average daily pumpage. Average daily pumpage is the total pumpage for the year (as reported in Section II A 1, p. 4) divided by 365 and expressed in million gallons per day.

4. **Municipal per capita use** is defined as total municipal water use dividing by the population and the 365 days. Total municipal water use is calculated by subtracting the **industrial sales** and **wholesale** from the total water diverted or treated (as reported in Section II A 1, p. 4).

Total municipal water use = Total water diverted or treated - industrial sales - wholesale
Municipal per capita use (gpcd) = Total municipal water use/population/365 days

Note: The AWWA considers the municipal per capita use as the most representative figure to use in long-range water supply and conservation planning.

5. Seasonal water use is the difference between base (winter) daily per capita use and summer daily per capita use. To calculate the base daily per capita use, average the monthly diversions for December, January, and February, and divide this average by 30. Then divide this figure by the population. To calculate the summer daily per capita use, use the months of June, July, and August.

Appendix B

Estimating the Technical Potential for Reducing Per Capita Water Use

The technical potential for reducing per capita water use is the range in potential water savings that can be achieved by implementing specific water conservation measures. The bottom of the range represents the potential savings under a "most likely," or real-world conservation scenario. The top of the range represents the potential savings under an "advanced" conservation scenario. The conservation measures include:

- reducing unaccounted-for water uses;
- reducing indoor water use due to water-conserving plumbing fixtures;
- reducing seasonal water use; and
- reducing water use through public education programs.

Guidelines and examples for calculating the technical potential water savings for each of these conservation

Attachment F1 Water Conservation Plan 2002

measures are given below.

I. Reducing unaccounted-for water uses

The TNRCC considers unaccounted-for water uses of 15% or less as acceptable for communities serving more than 5,000 people. Smaller, older systems that have a larger service area may legitimately experience larger losses. Losses above 15% may be an area of concern, and provide a conservation potential.

The bottom of the range for technical potential savings for unaccounted-for uses is zero. To calculate the top of the range, see the following example:

Unaccounted-for uses = 19.5%
Dry-year per capita water use = 250 gallons per capita per day (gpcd)
<u>Potential for reduction in unaccounted-for use</u> = $(250 \text{ gpcd} \times 19.5\%) - (250 \text{ gpcd} \times 15\%)$
= $48.75 \text{ gpcd} - 37.5 \text{ gpcd}$
= 11.25 gpcd
Technical Potential Savings Range = 0 to 11.25 gpcd

II Reducing Indoor Water Use due to Water-Conserving Plumbing Fixtures

The TNRCC uses 20.5 gpcd as the most reliable figure upon which to base potential water savings, which represents the "most likely" conservation scenario. This figure is based upon the estimate that by 2050, 90% of pre-1990 homes, and all new homes will have been equipped with water conserving plumbing fixtures.

The figure used for the "advanced" conservation scenario, 21.7 gpcd, is an estimate of the average savings that would result from a home equipped exclusively with water-conserving plumbing fixtures. This figure is considered "advanced" because in a typical city, 100% of the homes are not exclusively equipped with water-conserving fixtures.

III. Reducing Seasonal Water Use

The Texas Water Development Board (TWDB) has calculated seasonal use as a percentage of average annual per capita use for East Texas (20%), West Texas (25%), and a statewide average of 22.5%. Seasonal water use is calculated by multiplying the average annual per capita use in gpcd by the appropriate percentage.

The technical potential for reduction in seasonal use is then calculated by multiplying the seasonal use by 7% for the "most likely" conservation scenario, and by 20% for the "advanced" scenario. Below is an example calculation:

Average annual per capita use = 185 gpcd
Geographical location = West Texas
Seasonal use = $(185 \text{ gpcd} \times 25\%) = 46.25 \text{ gpcd}$
Potential reduction in seasonal use (Most Likely scenario) = $(46.25 \times 7\%) = 3.24 \text{ gpcd}$

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Potential reduction in seasonal use (Advanced scenario) = $(46.25 \times 20\%) = 9.25$ gpcd

Technical Potential Savings Range = 3.24 to 9.25 gpcd

IV. Reducing Water Use through Public Education Programs

The technical potential for water conservation from public education programs is estimated to be from 2% of the average annual per capita use for the "most likely" conservation scenario to 5% for the "advanced" scenario, according to the "Water Conservation Guidebook," published in 1993 by the American Water Works Association. Below is an example calculation:

Average annual per capita use = 185 gpcd

Potential reduction in water use (Most Likely scenario) = $(185 \times 2\%) = 3.7$ gpcd

Potential reduction in water use (Advanced scenario) = $(185 \times 5\%) = 9.25$ gpcd

Technical Potential Savings Range = 3.7 to 9.25 gpcd

To calculate the total technical potential for reducing municipal per capita water use, simply add the individual technical potential amounts calculated in items I - IV above. In this case the total technical potential range equals 27.44 gpcd to 51.45 gpcd.

Summary of Technical Potential Calculations		
Conservation Measure	Calculation Procedure	Example Result
Reducing unaccounted-for uses	$(\text{Dry-year demand}) \times (\text{Unacc.-for percentage if more than 15\%, minus 15\%})$	0 to 11.25 gpcd
Reducing indoor water use due to water-efficient plumbing fixtures	20.5 gpcd ("rule of thumb") to 21.7 gpcd (advanced)	20.5 to 21.7 gpcd
Reducing seasonal water use	Seasonal use $(\text{Avg. use} \times 22.5\%) \times 7\%$ and 20%	3.24 to 9.25 gpcd
Reducing water use through public education programs	Average use $\times 2\%$ and 5%	3.7 to 9.25 gpcd
Total Technical Potential Savings		27.44 to 51.45 gpcd

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To calculate the long-run planning goal, subtract these totals from the dry-year water demand.
For example:

Long-run planning goal = (Dry year water demand) minus (total technical potential)
= 250 gpcd - 27.44 gpcd = 222.56 gpcd ("most likely" scenario)
= 250 gpcd - 51.45 gpcd = 198.55 gpcd ("advanced" scenario)

Long-run planning goal for municipal water use = 222.56 to 198.55 gpcd

Appendix B

**DROUGHT CONTINGENCY PLAN
FOR THE
City of Marlin
10-4-02**

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the City of Marlin hereby adopts the following regulations and restrictions on the delivery and consumption of water.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the City of Marlin by means of a city council meeting, which was open to the public for input.

Section III: Public Education

The City of Marlin will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by local newspapers.

Section IV: Coordination with Regional Water Planning Groups

The service area of the City of Marlin is located within Region G and the City of Marlin has provided a copy of this Plan to the Texas Water Development Board.

Section V: Authorization

The City Manager of Marlin or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The City Manager or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the City of Marlin. The terms "person" and "customer" as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by City of Marlin

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

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Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

- (a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
- (b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
- (c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
- (d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
- (e) flushing gutters or permitting water to run or accumulate in any gutter or street;
- (f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;
- (g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
- (h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
- (i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The City Manager or his/her designee shall monitor water supply and/or demand conditions on a daily basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified "triggers" are reached.

The triggering criteria described below are based on the Marlin City Lake level. The Water Treatment Plant operator at the Marlin City Lake takes sight level readings daily and alerts City management when and if significant drops of lake water level are detected. These site readings are routinely compiled weekly and a report is submitted to the City Manager.

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation

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Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII - Definitions, when summer months are present and the water demand is high. This shall be observed annually beginning on May 1 through September 30.

Requirements for termination

Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when the Treatment Plant reading of the clearwell is 4 feet below "full" for a 7 day period.

Requirements for termination

Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when the Treatment Plant reading of the clearwell is 6 feet below "full" for a 7 day period.

Requirements for termination

Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when the levels in the treated water reservoirs are continually falling to a level threatening a system outage.

Requirements for termination

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Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when the total daily water demand equals or exceeds the Water Treatment Plant capacity for 3 consecutive days or when one or both of the following occurs:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or
2. Natural or man-made contamination of the water supply source(s).

Requirements for termination

Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 48 hours.

Stage 6 Triggers -- WATER ALLOCATION

Requirements for initiation

Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when the Treatment Plant reading of the clearwell is 8 feet below "full" for a 3 day period.

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days.

Section IX: Drought Response Stages

The City Mayor or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification

Notification of the Public:

The City Manager or his/ here designee shall notify the public by means of:

1. Posting notices of the drought condition at City Hall

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2. General circulation of newspapers
3. Notifying Waco TV stations KXXV, KWTX, and local cable company
4. Distributing information concerning the City's drought contingency plan and explaining the need for such a plan

Additional Notification:

The City Manager or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Mayor and members of the City Council
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
TNRCC
Major water users

Stage 1 Response -- MILD Water Shortage Conditions

Goal: Achieve a voluntary 5 percent reduction in total water use.

Supply Management Measures:

- (a) Reduced or discontinued flushing of water mains
- (b) Use of reclaimed water for non-potable purposes

Voluntary Water Use Restrictions:

Encourage the public not to waste water and voluntarily reduce water use by:

- (a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.
- (b) All operations of the City of Marlin shall adhere to water use restrictions prescribed for Stage 2 of the plan.

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(c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response -- MODERATE Water Shortage Conditions

Goal: Achieve a 10 percent reduction in total water use.

Supply Management Measures:

- (a) Reduced or discontinued flushing of water mains
- (b) Reduced or discontinued irrigation of public landscaped areas
- (c) Use of an alternative supply source(s)
- (d) Use of reclaimed water for non-potable purposes

Water Use Restrictions. Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

Continue implementation of all relevant actions in preceding phase, and the following public water-uses, not essential for public health or safety, are prohibited:

- (a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is

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contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

- (c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the City of Marlin.
- (f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the City of Marlin.
- (g) All restaurants are prohibited from serving water to patrons except upon request of the patron.
- (h) The following uses of water are defined as non-essential and are prohibited:
 - 1. wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
 - 2. use of water to wash down buildings or structures for purposes other than immediate fire protection;
 - 3. use of water for dust control;
 - 4. flushing gutters or permitting water to run or accumulate in any gutter or street; and
 - 5. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

Goal: Achieve a 15 percent reduction in total water use.

Supply Management Measures:

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- (a) Reduced or discontinued flushing of water mains
- (b) Reduced or discontinued irrigation of public landscaped areas
- (c) Use of an alternative supply source(s)
- (d) Use of reclaimed water for non-potable purposes

Water Use Restrictions. All requirements of Stage 2 shall remain in effect during Stage 3 except:

- (a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.
- (b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the City of Marlin.
- (c) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

Goal: Achieve a 20 percent reduction in total water use.

Supply Management Measures:

- (a) Reduced or discontinued flushing of water mains
- (b) Reduced or discontinued irrigation of public landscaped areas
- (c) Use of an alternative supply source(s)
- (d) Use of reclaimed water for non-potable purposes

Water Use Restrictions. All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

- (a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip

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irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.
- (c) The filling, refilling, or adding of water to swimming pools, wading pools, and jacuzzi-type pools is prohibited.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

Goal: Achieve a 25 percent reduction in total water use.

Supply Management Measures:

- (a) Reduced or discontinued flushing of water mains
- (b) Reduced or discontinued irrigation of public landscaped areas
- (c) Use of an alternative supply source(s)
- (d) Use of reclaimed water for non-potable purposes

Water Use Restrictions. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

- (a) Irrigation of landscaped areas is absolutely prohibited.

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- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Stage 6 Response -- WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the City Manager is hereby authorized to allocate water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

"Household" means the residential premises served by the customer's meter. "Persons per household" includes only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer's household is comprised of two (2) persons unless the customer notifies the City of Marlin of a greater number of persons per household on a form prescribed by the City Manager. The City Manager shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the City of Marlin offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the City Manager. When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the City of Marlin on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the City of Marlin in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the City Manager shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a

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household or fails to timely notify the City of Marlin of a reduction in the number of person in a household shall be fined not less than \$50.00.

Residential water customers shall pay the following surcharges:

\$6.00 for the first 1,000 gallons over allocation.

\$9.00 for the second 1,000 gallons over allocation.

\$12.00 for the third 1,000 gallons over allocation.

\$15.00 for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (e.g., apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer's meter serves two dwelling units unless the customer notifies the City of Marlin of a greater number on a form prescribed by the City Manager. The City Manager shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the City of Marlin offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the City Manager. If the number of dwelling units served by a master meter is reduced, the customer shall notify the City of Marlin in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the City Manager shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the City of Marlin of a reduction in the number of person in a household shall be fined not less than \$50.00. Customers billed from a master meter under this provision shall pay the following monthly surcharges:

\$6.00 for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.

\$9.00, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.

\$12.00, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.

\$15.00, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Commercial Customers

A monthly water allocation shall be established by the City Manager, or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately 75% percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the City of Marlin to determine the allocation. Upon request of the customer or at the initiative of the City Manager, the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the City Manager or a special water allocation review committee. Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is 8,500 gallons through 25,000 gallons per month:

- \$6.00 per thousand gallons for the first 1,000 gallons over allocation.
- \$9.00 per thousand gallons for the second 1,000 gallons over allocation.
- \$12.00 per thousand gallons for the third 1,000 gallons over allocation.
- \$15.00 per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is 25,000 gallons per month or more:

- 2 times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
- 3 times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
- 4 times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
- 5 times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Industrial Customers

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A monthly water allocation shall be established by the City Manager, or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer's allocation shall be approximately 90% of the customer's water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer's allocation shall be further reduced to 85% of the customer's water usage baseline. The industrial customer's water use baseline will be computed on the average water use for the 12 month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The City Manager shall give his/her best effort to see that notice of each industrial customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the City of Marlin to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the City Manager, the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer's normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the City Manager or a special water allocation review committee. Industrial customers shall pay the following surcharges:

Customers whose allocation is 2,000,500 gallons through 2,675,250 gallons per month:

- \$6.00 per thousand gallons for the first 1,000 gallons over allocation.
- \$9.00 per thousand gallons for the second 1,000 gallons over allocation.
- \$12.00 per thousand gallons for the third 1,000 gallons over allocation.
- \$15.00 per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is 2,675,250 gallons per month or more:

- 2 times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
- 3 times the block rate for each 1,000 gallons from 5 percent

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through 10 percent above allocation.

4 times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.

5 times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Section X: Enforcement

- (a) No person shall knowingly or intentionally allow the use of water from the City of Marlin for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by City Manager, or his/her designee, in accordance with provisions of this Plan.
- (b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than one hundred dollars (\$100) and not more than five hundred dollars (\$500). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the City Manager shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at \$50.00, and any other costs incurred by the City of Marlin in discontinuing service. In addition, suitable assurance must be given to the City Manager that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.
- (c) Any person, including a person classified as a water customer of the City of Marlin, in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the

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water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

- (d) Any employee of the City of Marlin, police officer, or other person(s) designated by the City Manager, may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the Marlin Municipal Court on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in Marlin Municipal Court to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in Marlin Municipal Court, a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in Marlin Municipal Court before all other cases.

Section XI: Variances

The City Manager, or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the City of Marlin within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the City Manager, or his/her designee, and shall include the following:

- (a) Name and address of the petitioner(s).
- (b) Purpose of water use.
- (c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
- (d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- (e) Description of the relief requested.

Attachment F1 Water Conservation Plan 2002

- (f) Period of time for which the variance is sought.
- (g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (h) Other pertinent information.

Variances granted by the City of Marlin shall be subject to the following conditions, unless waived or modified by the City Manager or his/her designee:

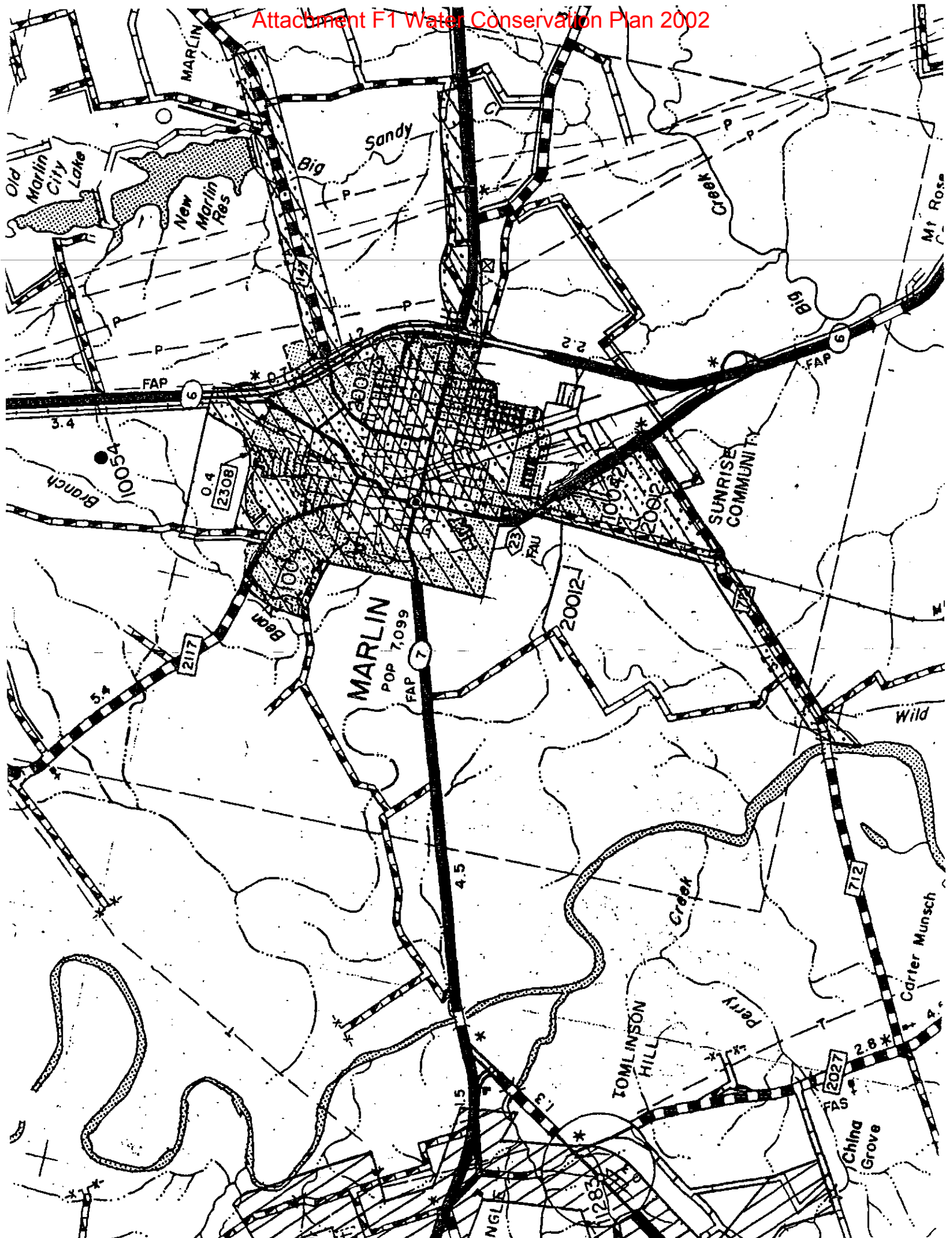
- (a) Variances granted shall include a timetable for compliance.
- (b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Attachment No. 1

Certificate of Convenience and Necessity (CCN)
&
Service-Area Map

Attachment F1 Water Conservation Plan 2002



Attachment F1 Water Conservation Plan 2002

Attachment No. 2

U.S. Bureau of Census
&
Texas Water Development Board

Attachment F1 Water Conservation Plan 2002

U.S. Census Bureau

American FactFinder

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GCT-PH1. Population, Housing Units, Area, and Density: 2000
 Data Set: [Census 2000 Summary File 1 \(SF 1\) 100-Percent Data](#)
 Geographic Area: Texas -- Place

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see <http://factfinder.census.gov/home/en/datanotes/expsf1u.htm>.

Geographic area	Population	Housing units	Area in square miles			Density per square mile of land area	
			Total area	Water area	Land area	Population	Housing units
Texas	20,851,820	8,157,575	268,580.82	6,783.70	261,797.12	79.6	31.2
PLACE							
Abbott city, Hill County	300	144	0.58	0.00	0.58	518.0	248.6
Abernathy city	2,839	1,081	1.18	0.00	1.18	2,402.0	914.6
Hale County (part)	2,131	803	0.93	0.00	0.93	2,289.2	862.6
Lubbock County (part)	708	278	0.25	0.00	0.25	2,820.1	1,107.3
Ablene city	115,930	45,618	110.61	5.48	105.13	1,102.7	433.9
Jones County (part)	5,488	452	17.06	3.91	13.15	417.3	34.4
Taylor County (part)	110,442	45,166	93.55	1.57	91.98	1,200.7	491.0
Abram-Perezville CDP, Hidalgo County	5,444	3,060	5.26	0.19	5.07	1,073.9	603.6
Ackerly city	245	96	0.31	0.00	0.31	792.5	310.5
Dawson County (part)	163	61	0.15	0.00	0.15	1,121.5	419.7
Martin County (part)	82	35	0.16	0.00	0.16	500.5	213.6
Addison town, Dallas County	14,166	8,205	4.43	0.00	4.43	3,200.0	1,853.4
Adrian city, Oldham County	159	82	0.88	0.00	0.88	179.9	92.8
Agua Dulce CDP, El Paso County	738	233	8.09	0.00	8.09	91.3	28.8
Agua Dulce city, Nueces County	737	257	0.32	0.00	0.32	2,338.1	815.3
Airport Road Addition CDP, Brooks County	132	45	2.11	0.00	2.11	62.5	21.3
Alamo city, Hidalgo County	14,760	6,208	5.72	0.00	5.72	2,580.8	1,085.5
Alamo Heights city, Bexar County	7,319	3,460	1.85	0.00	1.85	3,964.9	1,874.4
Alba town	430	232	1.11	0.00	1.11	387.8	209.2
Rains County (part)	0	0	0.01	0.00	0.01	0.0	0.0
Wood County (part)	430	232	1.10	0.00	1.10	392.6	211.8
Albany city, Shackelford County	1,921	880	1.47	0.00	1.47	1,305.9	598.2
Aldine CDP, Harris County	13,979	4,403	8.09	0.00	8.09	1,727.0	543.9
Aledo city, Parker County	1,726	625	1.90	0.00	1.90	909.2	329.2
Alfred-South La Paloma CDP, Jim Wells County	451	187	4.47	0.01	4.46	101.1	41.9
Alice city, Jim Wells County	19,010	6,998	12.30	0.40	11.90	1,597.4	588.0
Alice Acres CDP, Jim Wells County	491	141	5.90	0.00	5.90	83.2	23.9
Allen city, Collin County	43,554	15,227	26.34	0.00	26.34	1,653.6	578.1
Alma town, Ellis County	302	114	5.03	0.00	5.03	60.0	22.7
Alpine city, Brewster County	5,786	2,852	4.08	0.00	4.08	1,416.5	698.2
Alto town, Cherokee County	1,190	534	1.68	0.00	1.68	707.1	317.3
Alto Bonito CDP, Starr County	589	153	0.12	0.00	0.12	4,692.8	1,261.9
Alton city, Hidalgo County	4,384	1,175	2.11	0.00	2.11	2,075.5	556.3
Alton North CDP, Hidalgo County	5,051	1,255	4.19	0.00	4.19	1,205.3	299.5
Alvarado city, Johnson County	3,288	1,266	3.91	0.01	3.90	842.5	324.4
Alvin city, Brazoria County	21,413	8,442	17.34	0.91	16.43	1,302.9	513.7
Alvord town, Wise County	1,007	434	1.38	0.00	1.38	732.0	315.5
Amarillo city	173,627	72,408	90.31	0.45	89.86	1,932.1	805.8
Potter County (part)	99,833	41,088	64.43	0.38	64.06	1,558.5	641.4
Randall County (part)	73,794	31,320	25.88	0.07	25.81	2,859.3	1,213.6
Ames city, Liberty County	1,079	444	3.17	0.00	3.17	340.5	140.1
Amherst city, Lamb County	791	341	0.83	0.00	0.83	951.4	410.2

Attachment F1 Water Conservation Plan 2002

Geographic area	Population	Housing units	Area in square miles			Density per square mile of land area	
			Total area	Water area	Land area	Population	Housing units
Manor city, Travis County	1,204	436	1.14	0.00	1.14	1,051.7	380.8
Mansfield city	28,031	9,172	36.51	0.04	36.48	768.5	251.4
Ellis County (part)	129	48	1.52	0.00	1.52	84.7	31.5
Johnson County (part)	622	198	6.89	0.00	6.89	90.3	28.7
Tarrant County (part)	27,280	8,926	28.10	0.04	28.06	972.1	318.1
Marvel city, Brazoria County	3,046	1,148	23.30	0.00	23.30	130.7	49.3
Marathon CDP, Brewster County	455	287	5.25	0.00	5.25	86.6	54.6
Marble Falls city, Burnet County	4,959	2,085	6.70	0.55	6.14	807.1	339.3
Marfa city, Presidio County	2,121	1,126	1.57	0.00	1.57	1,354.6	719.1
Marietta town, Cass County	112	75	0.58	0.00	0.58	194.0	129.9
Marion city, Guadalupe County	1,099	395	0.71	0.00	0.71	1,544.0	554.9
Markham CDP, Matagorda County	1,138	446	2.29	0.00	2.29	497.5	195.0
Marlin city, Falls County	6,628	2,826	4.57	0.05	4.52	1,465.4	624.8
Marquez city, Leon County	220	113	1.20	0.00	1.20	183.3	94.1
Marshall city, Harrison County	23,935	9,923	29.64	0.08	29.57	809.5	335.6
Marshall Creek town, Denton County	431	167	0.23	0.00	0.23	1,864.5	722.4
Mart city	2,273	934	1.34	0.00	1.34	1,692.0	695.2
Limestone County (part)	0	0	0.08	0.00	0.08	0.0	0.0
McLennan County (part)	2,273	934	1.26	0.00	1.26	1,804.8	741.6
Martindale city, Caldwell County	953	363	2.02	0.00	2.02	472.4	179.9
Mason city, Mason County	2,134	1,103	3.68	0.00	3.68	579.7	299.6
Matador town, Motley County	740	395	1.30	0.00	1.30	569.5	304.0
Mathis city, San Patricio County	5,034	1,715	1.99	0.00	1.99	2,532.0	862.6
Maud city, Bowie County	1,028	473	1.49	0.00	1.49	691.3	318.1
Mauriceville CDP, Orange County	2,743	1,021	8.51	0.00	8.51	322.4	120.0
Maypearl city, Ellis County	746	263	0.47	0.00	0.47	1,590.2	560.6
Meadow town, Terry County	658	236	1.60	0.00	1.60	411.3	147.5
Meadowlakes city, Burnet County	1,293	599	0.79	0.01	0.77	1,673.2	775.1
Meadows Place city, Fort Bend County	4,912	1,616	0.94	0.00	0.94	5,247.8	1,726.5
Medina CDP, Zapata County	2,960	999	1.77	0.01	1.77	1,675.2	565.4
Megargel town, Archer County	248	132	0.61	0.00	0.61	404.4	215.3
Melissa city, Collin County	1,350	501	4.59	0.00	4.59	294.4	109.3
Melvin town, McCulloch County	155	100	0.47	0.00	0.47	329.2	212.4
Memphis city, Hall County	2,479	1,245	2.24	0.00	2.24	1,105.2	555.1
Menard city, Menard County	1,653	851	2.06	0.00	2.06	803.5	413.6
Mercedes city, Hidalgo County	13,649	5,455	8.64	0.06	8.58	1,591.2	636.0
Meridian city, Bosque County	1,491	600	2.17	0.01	2.16	689.3	277.4
Merkel town, Taylor County	2,637	1,202	1.96	0.00	1.96	1,342.0	611.7
Mertens town, Hill County	146	65	0.44	0.00	0.44	332.3	148.0
Merizon city, Irion County	839	364	1.52	0.00	1.52	551.4	239.2
Mesquite city	124,523	46,245	43.46	0.05	43.42	2,868.1	1,065.2
Dallas County (part)	124,522	46,244	43.22	0.05	43.17	2,884.4	1,071.2
Kaufman County (part)	1	1	0.25	0.00	0.25	4.1	4.1
Mexia city, Limestone County	6,563	2,750	5.15	0.00	5.15	1,273.9	533.8
Miami city, Roberts County	588	283	1.17	0.00	1.17	504.0	242.6
Midland city	94,996	39,855	66.79	0.19	66.61	1,426.2	598.3
Martin County (part)	0	0	8.95	0.10	8.85	0.0	0.0
Midland County (part)	94,996	39,855	57.85	0.09	57.76	1,644.8	690.1
Midlothian city, Ellis County	7,480	2,792	37.89	0.19	37.71	198.4	74.0
Midway city, Madison County	288	151	1.60	0.00	1.60	179.6	94.2
Midway North CDP, Hidalgo County	3,946	902	2.07	0.00	2.07	1,908.7	436.3
Midway South CDP, Hidalgo County	1,711	461	1.24	0.00	1.24	1,376.3	370.8
Mila Doce CDP, Hidalgo County	4,907	1,147	3.29	0.00	3.29	1,492.2	348.8
Milam CDP, Sabine County	1,329	1,010	33.40	0.57	32.84	40.5	30.8
Milano city, Milam County	400	192	1.96	0.01	1.95	205.3	98.5
Mildred town, Navarro County	405	147	2.28	0.07	2.21	182.8	66.4
Miles city, Runnels County	850	361	1.34	0.00	1.34	636.2	270.2
Milford town, Ellis County	685	311	1.83	0.00	1.83	374.6	170.1

Attachment F - Water Conservation Plan 2002
2002 State Water Plan
Population Projections by City

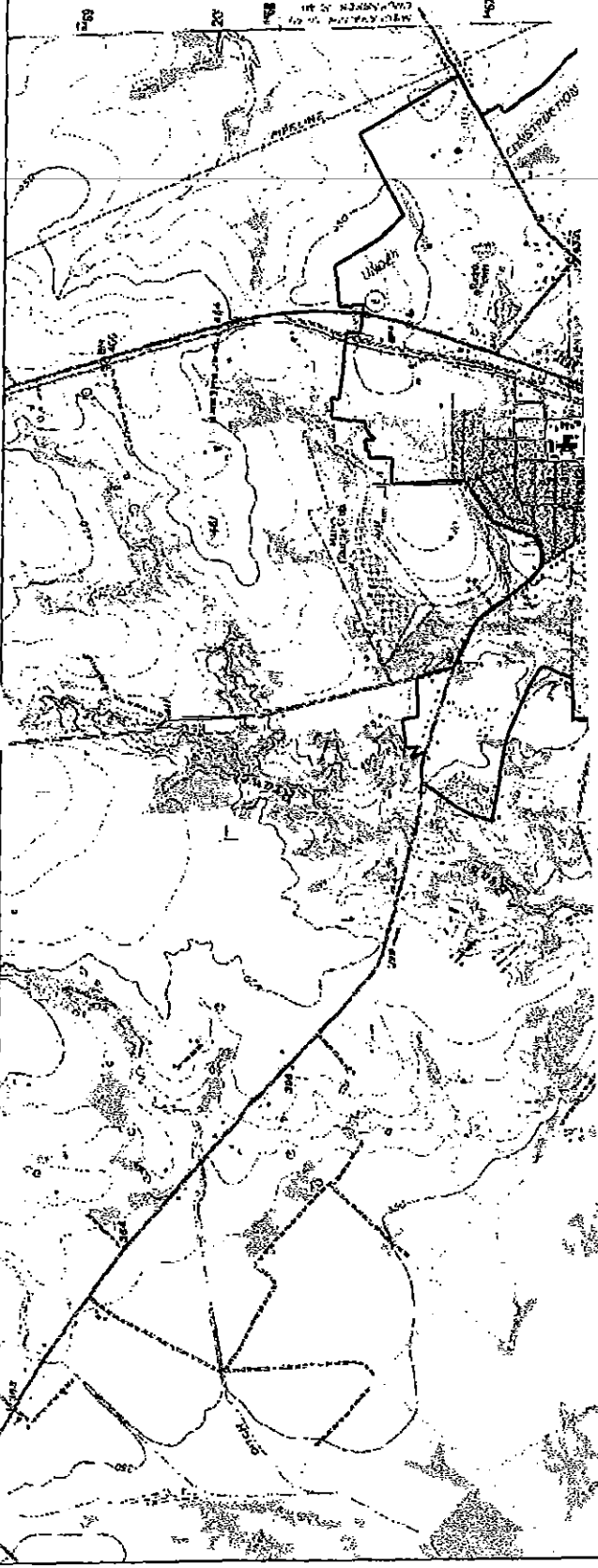
Population Projections by City for 2000-2050:

CITY	P1990 Census	P2000	P2010	P2020	P2030	P2040	P2050
BERNATHY	2,720	3,131	3,390	3,636	3,827	3,943	4,064
BILENE	106,654	119,932	132,480	146,339	157,693	169,927	178,617
ODISON	8,783	12,802	15,292	17,038	18,803	20,762	22,156
BUA DULCE	794	744	721	674	668	666	665
AMO	8,210	12,821	16,566	19,256	22,367	24,143	26,060
AMO HEIGHTS	6,502	7,039	7,391	7,759	7,868	7,959	8,051
BANY	1,962	2,043	2,143	2,800	2,850	2,900	3,000
CHINE (CDP)	11,133	12,798	12,938	13,030	13,106	13,197	13,274
EDO	1,169	1,633	2,282	3,187	4,453	5,173	5,173
CE	19,788	22,123	23,649	24,910	25,105	24,982	24,860
EN	18,309	44,000	80,000	106,300	117,000	121,000	125,136
INE	5,637	6,479	7,521	8,981	9,916	10,942	12,074
O	1,027	1,137	1,235	1,335	1,443	1,556	1,656
ON	3,069	5,098	6,035	6,946	7,855	8,572	9,354
DO	2,918	3,266	4,039	4,851	5,718	6,348	7,047
IN	19,220	24,075	28,723	33,822	40,240	45,715	51,935
ORD	865	1,089	1,131	1,154	1,175	1,217	1,292
RILLO	157,615	177,644	197,586	219,534	239,155	261,723	286,692
S	989	1,368	1,538	1,747	1,983	2,156	2,345
ERST	742	722	684	634	587	568	554
HUAC	1,993	2,476	3,361	4,456	5,165	5,707	6,306
ERSON	320	469	511	547	577	556	536
ERSON MILL (CDP)	9,468	13,832	14,704	15,347	16,243	17,214	18,014
REWS	10,678	12,029	13,472	14,551	15,045	15,300	15,559
ETON	17,140	23,870	28,737	34,037	40,661	46,372	52,884
	904	1,168	1,282	1,381	1,487	1,552	1,622
ETTA	672	945	1,329	1,870	2,630	3,699	5,203
IN	2,644	2,772	2,940	3,084	3,236	3,378	3,526
ONY	3,328	4,403	5,378	6,422	7,519	8,380	9,340
N	1,212	1,350	1,397	1,474	1,478	1,455	1,432
SAS PASS	7,180	9,458	10,977	12,739	14,424	16,332	18,492
ER CITY	1,748	1,855	1,916	1,925	1,910	1,868	1,806
E	1,575	2,226	7,081	11,935	14,983	16,550	18,282
IN	261,721	318,653	336,400	366,760	384,917	399,173	413,986
	812	942	1,020	1,072	1,116	1,150	1,173
RTON	1,608	1,747	1,927	2,113	2,355	2,617	2,908
RMONT	1,214	1,199	1,194	1,182	1,152	1,106	1,062

	7,711	9,424	4,211	4,040
MAGNOLIA	940	1,410	1,859	2,249
MALAKOFF	2,038	2,378	2,615	2,824
MANOR	1,041	1,424	1,862	2,208
MANSFIELD	15,607	26,463	34,066	46,214
MANVEL	3,733	5,152	6,084	7,080
MARBLE FALLS	4,007	5,975	7,435	8,995
MARFA	2,424	2,612	2,986	3,428
MARION	984	1,051	1,078	1,104
MARKHAM (CDP)	1,206	1,464	1,551	1,612
MARLIN	6,386	6,947	7,367	7,774
MARSHALL	23,682	25,316	27,835	29,631
MART	2,004	2,323	2,592	2,751
MARTINDALE	904	1,108	1,182	1,238
MASON	2,041	2,157	2,172	2,179
MATADOR	790	757	727	679
MATHIS	5,423	6,440	7,105	7,871
MAUD	1,049	1,023	1,112	1,202
MAYPEARL	781	962	980	1,010
MCALLEN	84,021	116,891	128,278	139,070
MCCAMEY	2,493	2,665	2,943	3,142
MCGREGOR	4,683	5,228	5,670	5,845
MCKINNEY	21,283	50,000	100,000	145,000
MCLEAN	849	891	931	970
MCNEAIR	2,000	2,457	2,643	2,908
MCQUEENEY (CDP)	2,063	2,130	2,294	2,432
MEADOW	547	620	632	631
MEADOW LAKES	514	1,010	1,045	1,058
MEADOWS	4,606	7,261	9,061	11,407
MELISSA	557	952	1,200	1,300
MEMPHIS	2,465	2,338	2,306	2,264
MENARD	1,606	1,652	1,670	1,715
MERTON	50	51	45	35
MERCEDES	12,694	15,962	18,745	21,797
MERIDIAN	1,390	1,520	1,662	1,818
MERKEL	2,469	3,416	3,782	4,130
MERTZON	778	731	767	779
MESQUITE	101,484	117,742	138,042	159,638
MEXIA	6,933	7,410	7,561	8,042
MIAAMI	675	710	748	737
MIDLAND	89,443	109,885	127,222	144,454
MIDLOTHIAN	5,141	9,185	11,938	14,789
MILES	793	898	916	915
MILFORD	711	919	976	1,017
MINEOLA	4,321	4,838	5,457	6,076
MIRAL WELLS	14,870	15,856	16,612	17,408

Attachment No. 4

Wastewater System Map



--- BOUNDARY OF TREATMENT FACILITIES

THIS DRAWING CONTAINS AN EXCERPT FROM THE USGS QUADRANGLE ENTITLED "MARLIN"

**MARLIN, TEXAS
WWTP DISCHARGE APPL.
ATTACHMENT #3-SITE MAP**



DESIGN BY:	SCALE:	SHEET 1 OF 1	
DRAWN BY:	1" = 3000'		
JKM	CADD ID:		
JOB NUMBER:	USGS.DWG		
A-9302E	DATE:		
	2/8/00		

Attachment No. 5

Water and Wastewater Rates

Attachment F1 Water Conservation Plan 2002

Water Rates

There shall be charged and collected from each residential consumer of water inside the city limits a monthly minimum charge of \$14.00, including the first two thousand (2,000) gallons of water consumed, plus a charge per rate of consumption thereafter as follows:

Rates For Water Service Inside City Limits (Residential)

There shall be charged and collected from each residential customer of water inside the City Limits a monthly minimum charge of \$14.00, including the first 2,000 gallons of water consumed, plus a rate of consumption thereafter as follows:

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
0 to 2,000 gallons	\$ -0-
2,001 to 15,000 gallons	3.00
15,001 to 25,000 gallons	3.15
25,001 gallons and above	3.30

That the Code of Ordinances of the City of Marlin relative to water rates be amended and such rates for water services are found to be reasonable and necessary due to the higher cost of service outside the City Limits, and such rates shall hereafter be as follows:

Rates For Water Service Outside City Limits (Residential)

There shall be charged and collected from each residential consumer of water outside the City Limits a monthly minimum charge of \$23.25; including the first 2,00 gallons of water consumed, plus a rate of consumption thereafter as follows:

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
0 to 2,000 gallons	\$ -0-
2,001 to 15,000 gallons	3.00
15,001 to 25,000 gallons	3.15
25,001 gallons and above	3.30

CHURCHES AND SCHOOLS. Churches shall be billed as Residential Inside City Limits connections, except those outside the City Limits and they shall be billed as Residential Outside City Limits connections. Schools shall be billed as Commercial connections in like manner.

Attachment F1 Water Conservation Plan 2002

COMMERCIAL INSIDE CITY LIMITS. There shall be charged and collected from each consumer of water a monthly minimum charge of \$26.50 per month for the first 2,000 gallons of water used by Commercial Outside the City Limits consumer, plus a rate of consumption thereafter as follows:

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
0 to 2,000 gallons	\$ -0-
2,001 to 5,000 gallons	3.45
5,001 to 15,000 gallons	3.35
15,001 to 25,000 gallons	3.25
25,001 to 50,000 gallons	3.00
50,001 to 500,000 gallons	2.90
over 500,000 gallons	2.25

COMMERCIAL OUTSIDE THE CITY LIMITS. There shall be charged and collected from each consumer of water a monthly minimum charge of \$26.50 per month for the first 2,000 gallons of water used by Commercial Outside the City Limits consumer, plus a rate of consumption thereafter as follows:

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
0 to 2,000 gallons	\$ -0-
2,001 to 5,000 gallons	3.45
5,001 to 15,000 gallons	3.35
15,001 to 25,000 gallons	3.25
25,001 to 50,000 gallons	3.00
50,001 to 500,000 gallons	2.90
over 500,000 gallons	2.25

Attachment F1 Water Conservation Plan 2002

Wastewater Rates

All users or accounts of the City of Marlin Sanitary Sewer System within the city limits shall be charged as follows:

RESIDENTIAL RATE – A minimum flat rate of \$15.00 for the first 5,000 gallons of the monthly water usage and \$3.00 per thousand gallons over 5,000 gallons of monthly water usage.

COMMERCIAL RATE – A commercial rate of \$2.25 per thousand gallons of monthly water usage.

Attachment No. 6

Calculations for Conservation Goals

Attachment F1 Water Conservation Plan 2002

Reduction in unaccounted-for uses:

Dry-year per capita water use = 219gpcd

$$\begin{aligned}\text{Potential for reduction in unaccounted-for use:} &= (219 \text{ gpcd} * 47\%) - (219 \text{ gpcd} * 15\%) \\ &= 102.93 - 32.85 \\ &= 70.08\end{aligned}$$

Reduction in seasonal use:

$$\begin{aligned}\text{Average annual per capita use} &= (175 \text{ gpcpd} + 190 \text{ gpcpd} + 205 \text{ gpcpd} + 173 \text{ gpcpd} + 219 \text{ gpcpd}) \\ &= 192.4 \text{ gpcd}\end{aligned}$$

Geographical location = Central Texas = 22.5%

$$\text{Seasonal use} = 192.4 \text{ gpcd} * 22.5\% = 43.29 \text{ gpcd}$$

$$\text{Potential reduction in seasonal use (most likely scenario)} = 43.29 \text{ gpcd} * 7\% = 3.03 \text{ gpcd}$$

$$\text{Potential reduction in seasonal use (advanced scenario)} = 43.29 \text{ gpcd} * 20\% = 8.66 \text{ gpcd}$$

Reduction in water use due to public education programs:

Average annual per capita use = 192.4

$$\text{Potential reduction in water use (most likely scenario)} = 192.4 \text{ gpcd} * 2\% = 3.85 \text{ gpcd}$$

$$\text{Potential reduction in water use (advanced scenario)} = 192.4 \text{ gpcd} * 5\% = 9.62 \text{ gpcd}$$

**ATTACHMENT B.
ORDINANCE 13-010**

ORDINANCE NO. 13-010

AN ORDINANCE ADOPTING THE CITY OF MARLIN AMENDED WATER CONSERVATION PLAN DATED MARCH 2013; REGULATORY COMPLIANCE ISSUES AND THE NEED FOR A CONSERVATION PLAN TO PROTECT THE CITY'S WATER RESOURCES CREATES THE EMERGENT NEED FOR THE IMMEDIATE PASSAGE OF THIS ORDINANCE WITHOUT TWO (2) READINGS, AND THE VOTE ADOPTING THIS ORDINANCE IS IN ADDITION A VOTE TO DECLARE SUCH EMERGENT NEED AND TO ADOPT THIS ORDINANCE TO BECOME EFFECTIVE IMMEDIATELY WITHOUT THE NECESSITY OF A FURTHER READING.

WHEREAS, the City of Marlin Texas has formulated a PLAN for conserving water; and

WHEREAS, the City of Marlin believes that it is the best interest of the citizens of Marlin to conserve its water supply, and

WHEREAS, effective March 12,2013, the Water Conservation Plan is required to be reviewed and updated every five years to include specific quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use, in gallons per capita per day;

NOW, THEREFORE BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARLIN TEXAS:

SECTION 1: That the City Council hereby approves and adopts the amended Water Conservation Plan attached hereto.

SECTION 2: That this ordinance shall take effect immediately from and after its passage.

SECTION 3. It is hereby declared to be the intention of the City Council that the sections, paragraphs, sentences, clauses and phrases of this ordinance are severable, and if any phrase, clause, sentence, paragraph or section of this ordinance shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs and sections of this ordinance, since the same would have been enacted by the City Council without the incorporation in this ordinance of any such unconstitutional phrase, clause, sentence, paragraph or section.

SECTION 4. This ordinance shall become effective upon passage and publication in accordance with laws of the State of Texas and the Charter of the City of Marlin.

SECTION 5. The fact that the present ordinances and regulations of the City of Marlin, Texas, are inadequate to properly safeguard the health, safety, morals, peace and general welfare of the public creates an emergency which requires that this ordinance become effective from and after the date of its passage and publication, and it is accordingly so ordained.

SECTION 6. The City Secretary is hereby directed to publish the caption of this Ordinance at least one time in the official City newspaper.

SECTION 7. It is found and declared that the City Council meeting at which this Ordinance has been adopted was open to the public and was noticed and held in accordance with Chapter 551 of the government code.

PASSED this 12th day of March, 2013 by a vote of 6 AYES to 0 NAYS with 1 Absentions.



Elizabeth Nelson
Elizabeth Nelson, Mayor

Sandra Herring
Sandra Herring, City Secretary

ATTACHMENT C. CITY OF MARLIN UTILITY PROFILE



TEXAS WATER DEVELOPMENT BOARD UTILITY PROFILE (TWDB - 1965) (Formerly WRD 264)

The purpose of the Utility Profile is to assist with water conservation plan development and to ensure that important information and data be considered when preparing your water conservation plan and its target and goals. Please complete all questions as completely and objectively as possible. See *Water Conservation Plan Guidance Checklist* (TWDB-1968) for information on other water conservation plan provisions. You may contact the Municipal Water Conservation Unit of the TWDB at 512.463.7955 or wcpteam@twdb.state.tx.us for assistance.

APPLICANT DATA

Name of Utility: City of Marlin

Public Water Supply Identification Number (PWS ID): 0730002

Address: 101 Fortune Street City: Marlin

State: TX Zip Code: 76661 Email: w.mcdonald@marlintx.net

Telephone Number: (254) 883-1450 Fax: (254) 883-1456

Regional Water Planning Group: G

Groundwater Conservation District: None

Form Completed By: William McDonald Title: City Manager

Signature: *William McDonald* Date: 12-26-2012

Contact information for the person or department responsible for implementing the water conservation program:

Name: William McDonald Phone: (254) 883-1450

Email: w.mcdonald@marlintx.net

UTILITY DATA

A. Population and Service Area Data

1. Current population of service area: 5,967

2. Current population served by utility: Water: 5,967

Wastewater: 5,967

3. Population served by water utility for the previous five years starting with the most recent year:

Year	Population

4. Projected population for service area in the following decades:

Year	Population
2010	
2020	
2030	
2040	
2050	

5. List source(s)/method(s) for the calculation of current and projected population:

B. Active Connections

1. Current number of active connections by user type. If not a separate classification, check whether multi-family service is counted as **Residential** or **Commercial**

Water User Type*	Metered	Un-metered	Total
Residential Single Family			
Residential Multi-family			
Commercial/Institutional			
Industrial			
Other (please describe):			

* See Appendix A #1.

2. List the net number of new connections per year for most recent three years:

Water User Type*			
Residential Single Family			
Residential Multi-family			
Commercial/Institutional			
Industrial			
Other (please describe):			

* See Appendix A #1.

C. High Volume Customers

List annual water use for the five highest volume retail and wholesale customers.
Please indicate if treated or raw water delivery.

Customer	Water User Type*	Annual Water Use (in gallons)	Treated	Raw

* See Appendix A #1

D. Water Supply System

- Design daily capacity of system: _____ **gallons** per day
- Storage Capacity: Elevated _____ **gallons** per day
Ground _____ **gallons** per day
- If surface water, do you recycle filter backwash to the head of the plant?
Yes **No** . If yes, approximately _____ **gallons** per day.

E. Water Accounting Data

- Amount of water use in **gallons** for previous five years.
Please indicate whether: **Treated Water** or **Raw Water**

YEAR					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
TOTAL					

Please indicate how the above figures were determined (e.g., from a master meter located at the point of a diversion from a stream or located at a point where raw water enters the treatment plant).

2. Amount of water sold in **gallons** as recorded by Water User Type for the previous five years (See Appendix A #1)

Year	Residential Single Family	Residential Multi Family	Commercial/ Institutional	Industrial	Other	Wholesale	Total Sold

3. GPCD and Seasonal Water Use for the previous five years

Year	Population	Total Water Use	Total gallons per capita per day (GPCD)*	Residential GPCD**	SEASONAL WATER USE***	
					Winter per capita per day	Summer per capita per day
Five Year Average						

- * Total GPCD (See Appendix A #2):
- ** Residential GPCD (See Appendix A #3):
- *** Seasonal Water Use (See Appendix A #4)

4. Water Loss Data for the previous five years (See Appendix A #5)

Year	Water Loss expressed in gallons	Water Loss expressed in GPCD	Water Loss expressed as a percentage
Five Year Average			

5. Peak Day Use (in **gallons**) to Average Daily Use (in **gallons**) Ratio for the previous five years
 (See Appendix A #6)

Year	Average Daily Use	Peak Day Use	Ratio

F. Projected Demands

Estimate water supply requirements for at least the next ten years using population trends, historical water use, and economic growth, etc.

Year	Population	Water Demand (in gallons)

Indicate sources of data and how projected water demands were determined. Attach additional sheets if necessary.

G. Wastewater System Data

1. Design capacity of wastewater treatment plant(s): _____ **gallons** per day
2. Is treated effluent used for:

Use	Total Annual Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other (please describe):	

Could treated effluent be substituted for certain potable water now being used? **Yes** **No**

H. Wastewater Data for Service Area

1. Percent of water service area served by wastewater system: _____ %
2. Monthly wastewater volume in **gallons**, treated for previous five years.

YEAR					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
TOTAL					

**ATTACHMENT D.
2011 BRAZOS G REGIONAL WATER PLAN**

Brazos G Regional Water Planning Area

2011 Brazos G Regional Water Plan

Volume I – Executive Summary and Regional Water Plan

Prepared by:

Brazos G Regional Water Planning Group

With administration by:

Brazos River Authority



With technical assistance by:



In association with:

Freese and Nichols, Inc.

R.W. Harden and Associates, Inc.

Hicks and Company, Inc.

Fletcher Communications

September 2010

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Table 2-1 (Continued)

City/County	Historical		Projections ¹						Percent Growth ² 1990-00	Percent Growth 2000-60
	1990	2000	2010	2020	2030	2040	2050	2060		
<i>Coryell County</i>										
Copperas Cove (P)	24,079	29,455	34,762	40,893	46,866	51,092	54,790	57,765	2.04%	1.13%
Elm Creek WSC (P)		320	470	643	812	931	1,036	1,120	NA	2.11%
Fort Gates WSC		2,000	2,279	2,602	2,916	3,138	3,333	3,490	NA	0.93%
Fort Hood CDP (P)	18,559	16,429	16,429	16,429	16,429	16,429	16,429	16,429	-1.21%	0.00%
Gatesville	11,492	15,591	19,637	24,312	28,866	32,088	34,908	37,177	3.10%	1.46%
Kempner WSC		3,409	5,039	6,922	8,756	10,054	11,190	12,104	NA	2.13%
County-Other	10,083	7,774	9,091	10,613	12,096	13,146	14,063	14,801	-2.57%	1.08%
<i>Coryell County Total</i>	<i>64,213</i>	<i>74,978</i>	<i>87,707</i>	<i>102,414</i>	<i>116,741</i>	<i>126,878</i>	<i>135,749</i>	<i>142,886</i>	<i>1.56%</i>	<i>1.08%</i>
<i>Eastland County</i>										
Cisco	3,813	3,851	3,859	3,869	3,801	3,697	3,576	3,415	0.10%	-0.20%
Eastland	3,690	3,769	4,017	4,028	3,957	3,849	3,723	3,555	0.21%	-0.10%
Gorman	1,290	1,236	1,239	1,242	1,220	1,187	1,148	1,096	-0.43%	-0.20%
Ranger	2,803	2,584	2,590	2,596	2,551	2,481	2,399	2,292	-0.81%	-0.20%
Rising Star	859	835	837	839	824	802	775	740	-0.28%	-0.20%
Stephens County Rural WSC (P)		13	13	13	13	12	12	12	NA	-0.13%
County-Other	6,033	6,009	5,781	5,795	5,695	5,538	5,356	5,116	-0.04%	-0.27%
<i>Eastland County Total</i>	<i>18,488</i>	<i>18,297</i>	<i>18,336</i>	<i>18,382</i>	<i>18,061</i>	<i>17,566</i>	<i>16,989</i>	<i>16,226</i>	<i>-0.10%</i>	<i>-0.20%</i>
<i>Erath County</i>										
Dublin	3,190	3,754	4,167	4,611	5,011	5,413	6,479	7,149	1.64%	1.08%
Stephenville	13,502	14,921	15,959	17,076	18,082	19,094	21,775	23,462	1.00%	0.76%
County-Other	11,299	14,326	16,540	18,922	21,067	23,227	28,946	32,544	2.40%	1.38%
<i>Erath County Total</i>	<i>27,991</i>	<i>33,001</i>	<i>36,666</i>	<i>40,609</i>	<i>44,160</i>	<i>47,734</i>	<i>57,200</i>	<i>63,155</i>	<i>1.66%</i>	<i>1.09%</i>
<i>Falls County</i>										
Bell-Milam Falls WSC (P)		915	1,223	1,609	2,004	2,351	2,627	2,952	NA	1.97%
Bruceville-Eddy (P)		2	4	6	8	10	12	14	NA	3.30%
East Bell County WSC (P)		612	729	876	1,026	1,158	1,263	1,386	NA	1.37%
Elm Creek WSC (P)		32	46	64	83	99	112	127	NA	2.32%
Lott		724	724	724	724	724	724	724	NA	0.00%
Marlin	6,386	6,628	6,862	7,155	7,455	7,718	7,927	8,173	0.37%	0.35%
Rosebud	1,638	1,493	1,493	1,493	1,493	1,493	1,493	1,493	-0.92%	0.00%
Tri-County SUD (P)		2,614	2,975	3,428	3,891	4,298	4,622	5,003	NA	1.09%
West Brazos WSC (P)		1,820	2,298	2,898	3,511	4,050	4,478	4,982	NA	1.69%
County-Other	9,688	3,736	3,246	2,631	2,001	1,449	1,009	492	-9.09%	-3.32%
<i>Falls County Total</i>	<i>17,712</i>	<i>18,576</i>	<i>19,600</i>	<i>20,884</i>	<i>22,196</i>	<i>23,350</i>	<i>24,267</i>	<i>25,346</i>	<i>0.48%</i>	<i>0.52%</i>
<i>Fisher County</i>										
Bitter Creek WSC (P)		1,150	1,165	1,166	1,196	1,219	1,230	1,266	NA	0.16%
Roby	616	673	682	683	702	716	723	745	0.89%	0.17%
Rotan	1,913	1,611	1,562	1,559	1,461	1,385	1,347	1,230	-1.70%	-0.45%
County-Other	2,313	910	855	851	738	652	610	476	-8.91%	-1.07%
<i>Fisher County Total</i>	<i>4,842</i>	<i>4,344</i>	<i>4,264</i>	<i>4,259</i>	<i>4,097</i>	<i>3,972</i>	<i>3,910</i>	<i>3,717</i>	<i>-1.08%</i>	<i>-0.26%</i>
<i>Grimes County</i>										
Navasota	6,296	6,789	7,111	7,470	7,753	7,950	8,107	8,262	0.76%	0.33%
Wickson Creek SUD (P)		2,792	4,614	6,646	8,249	9,363	10,253	11,128	NA	2.33%
County-Other	12,532	13,971	14,910	15,957	16,783	17,357	17,816	18,267	1.09%	0.45%
<i>Grimes County Total</i>	<i>18,828</i>	<i>23,552</i>	<i>26,635</i>	<i>30,073</i>	<i>32,785</i>	<i>34,670</i>	<i>36,176</i>	<i>37,657</i>	<i>2.26%</i>	<i>0.79%</i>

Table 2-4 (Continued)

Water User Group	Per Capita Use Rates ^{1,4}							Reduction due to Plumbing Fixtures Act (2010 to 2060)
	Base (2000)	2010	2020	2030	2040	2050	2060	
LIMESTONE COUNTY-OTHER	104	100	97	94	91	90	90	10
LIPAN ³		255	253	250	248	248	248	7
LITTLE RIVER-ACADEMY	141	137	134	131	128	127	127	10
LOMETA	138	134	131	128	126	125	126	8
LORENA	206	201	197	194	192	191	191	10
LOTT	122	120	116	113	110	109	109	11
MANSFIELD	212	235	243	241	241	241	242	0
MANVILLE WSC	123	119	117	115	114	114	114	5
MARLIN	350	346	343	340	337	336	336	10
MART	125	121	118	115	113	112	112	9
MCGREGOR	179	175	172	169	166	164	164	11
MCLENNAN COUNTY-OTHER	221	217	213	211	208	207	207	10
MERIDIAN	130	126	123	120	117	116	116	10
MERKEL	148	144	141	138	135	134	134	10
MEXIA	165	162	159	156	152	150	150	12
MILAM COUNTY-OTHER	138	135	132	129	126	124	124	11
MILANO WSC	99	95	91	89	87	86	86	9
MINERAL WELLS	175	171	168	166	163	162	162	9
MOFFAT WSC	84	81	78	76	74	73	73	8
MOODY	127	124	120	117	114	113	113	11
MORGAN ³		116	115	113	112	110	110	6
MORGANS POINT RESORT	104	100	97	95	94	93	93	7
MOUNTAIN PEAK WSC	166	161	159	158	156	156	156	5
MUNDAY	161	157	154	151	148	146	146	11
NAVASOTA	182	179	175	172	169	168	168	11
NEWCASTLE	93	91	86	83	81	79	79	12
NOLAN COUNTY-OTHER	94	91	87	84	81	80	80	11
NOLANVILLE	124	119	116	113	110	109	109	10
NORTH BOSQUE WSC	185	180	177	176	175	174	174	6
OAK TRAIL SHORES SUBDIVISION	134	130	128	125	123	122	122	8
PALO PINTO COUNTY-OTHER	134	130	126	123	121	120	120	10
PARKER WSC	121	117	114	111	110	109	109	8
PENDLETON WSC	85	80	78	75	73	72	72	8
POTOSI WSC	103	100	97	95	92	91	91	9
RANGER	113	109	106	103	100	98	98	11
RIESEL	95	91	88	85	83	82	82	9
RIO VISTA	88	84	80	77	75	74	74	10
RISING STAR	82	79	76	73	70	68	68	11
ROBERTSON COUNTY WSC	77	72	69	67	66	65	65	7
ROBERTSON COUNTY-OTHER	120	117	114	112	110	109	109	8
ROBINSON	122	118	115	112	109	108	108	10
ROBY	103	99	98	95	92	91	91	8
ROCKDALE	188	200	200	200	200	200	200	0
ROGERS	159	156	153	150	147	145	145	11
ROSCOE	121	117	113	110	107	106	106	11

Table 2-5 (Continued)

City/County	Historical		Projections ¹					
	1990	2000	2010	2020	2030	2040	2050	2060
Stephens County Rural WSC (P)		1	2	2	2	1	1	1
County-Other	1,128	835	784	767	734	696	660	631
<i>Eastland County Total</i>	<i>3,066</i>	<i>3,003</i>	<i>2,962</i>	<i>2,909</i>	<i>2,796</i>	<i>2,662</i>	<i>2,535</i>	<i>2,421</i>
<i>Erath County</i>								
Dublin	428	454	485	516	544	576	682	753
Stephenville	2,397	2,624	2,717	2,850	2,957	3,058	3,464	3,732
County-Other	1,388	1,541	1,705	1,886	2,053	2,211	2,724	3,062
<i>Erath County Total</i>	<i>4,213</i>	<i>4,619</i>	<i>4,907</i>	<i>5,252</i>	<i>5,554</i>	<i>5,845</i>	<i>6,870</i>	<i>7,547</i>
<i>Falls County</i>								
Bell-Milam Falls WSC (P)		138	178	229	281	327	362	407
Bruceville-Eddy (P)		1	2	3	4	5	5	6
East Bell County WSC (P)		67	77	89	101	112	120	132
Elm Creek WSC (P)		3	5	6	8	9	11	12
Lott		99	97	94	92	89	88	88
Marlin	1,281	2,599	2,660	2,749	2,839	2,913	2,983	3,076
Rosebud	182	177	171	166	161	156	152	152
Tri-County SUD (P)		234	253	280	305	327	347	375
West Brazos WSC (P)		159	190	230	267	304	331	368
County-Other	1,250	418	360	286	213	146	97	47
<i>Falls County Total</i>	<i>2,713</i>	<i>3,895</i>	<i>3,993</i>	<i>4,132</i>	<i>4,271</i>	<i>4,388</i>	<i>4,496</i>	<i>4,663</i>
<i>Fisher County</i>								
Bitter Creek WSC (P)		121	117	114	113	111	110	113
Roby	54	78	76	75	75	74	74	76
Rotan	214	291	278	271	249	231	222	203
County-Other	457	199	185	181	155	134	124	97
<i>Fisher County Total</i>	<i>725</i>	<i>689</i>	<i>656</i>	<i>641</i>	<i>592</i>	<i>550</i>	<i>530</i>	<i>489</i>
<i>Grimes County</i>								
Navasota	1,210	1,384	1,426	1,464	1,494	1,505	1,526	1,555
Wickson Creek SUD (P)		303	625	878	1,044	1,175	1,286	1,396
County-Other	1,564	1,236	1,269	1,287	1,317	1,303	1,317	1,351
<i>Grimes County Total</i>	<i>2,774</i>	<i>2,923</i>	<i>3,320</i>	<i>3,629</i>	<i>3,855</i>	<i>3,983</i>	<i>4,129</i>	<i>4,302</i>
<i>Hamilton County</i>								
Hamilton	637	570	554	542	531	521	513	513
Hico	241	291	302	297	292	288	285	285
County-Other	471	499	431	407	384	375	356	355
<i>Hamilton County Total</i>	<i>1,349</i>	<i>1,360</i>	<i>1,287</i>	<i>1,246</i>	<i>1,207</i>	<i>1,184</i>	<i>1,154</i>	<i>1,153</i>
<i>Haskell County</i>								
Haskell	450	585	559	538	518	503	487	472
Rule	127	86	81	77	72	69	66	62
Stamford (P)	8	8	8	8	8	8	8	8
County-Other	240	257	235	221	203	192	180	166
<i>Haskell County Total</i>	<i>825</i>	<i>936</i>	<i>883</i>	<i>844</i>	<i>801</i>	<i>772</i>	<i>741</i>	<i>708</i>

4C.10.2 City of Marlin**4C.10.2.1 Description of Supply**

The City of Marlin obtains its water supply from surface water from local reservoirs and the Brazos River. The City owns and operates two existing reservoirs—Marlin City Lake and New Marlin Reservoir—that impound runoff from Big Sandy Creek. The City also owns water rights that authorize diversion of 4,000 acft/yr from the Brazos River and have contracted with the Brazos River Authority for 1,200 acft/yr from the BRA System. Currently, the City utilizes surface water from the two existing reservoirs as its primary supply and diverts water from Brazos River only in an emergency, to supplement the supply in the two existing reservoirs.

4C.10.2.2 Water Supply Plan

The supplies projected are not adequate to meet the City's water demand through 2060.

The following plan is recommended by the Brazos G RWPG for the City of Marlin:

- Conservation.
- Additional supply from Brushy Creek Reservoir

4C.10.2.3 Costs**a. Conservation**

- Date to be Implemented: before 2010 – use rate exceeds 140 gpcd
- Annual Cost: maximum of \$161,500 in 2060

b. Brushy Creek Reservoir (Volume II, Section 4B.12.10)

- Cost Source: Transmission and Treatment (Volume II, Section 4B.17)
- Date to be Implemented: 2010
- Total Project Cost: \$18,553,000
- Annual Cost: \$1,012,000

Table 4C.10-2.
Recommended Plan Costs by Decade for the City of Marlin

<i>Plan Element</i>	2010	2020	2030	2040	2050	2060
Projected Surplus/(Shortage) (acft/yr)	(1,860)	(1,949)	(2,039)	(2,113)	(2,183)	(2,276)
Conservation						
Supply From Plan Element (acft/yr)	46	112	141	169	242	340
Annual Cost (\$/yr)	\$21,850	\$53,200	\$66,975	\$80,275	\$114,950	\$161,500
Unit Cost (\$/acft)	\$475	\$475	\$475	\$475	\$475	\$475
Brushy Creek Reservoir						
Supply From Plan Element (acft/yr)	2,090	2,090	2,090	2,090	2,090	2,090
Annual Cost (\$/yr)	\$1,012,000	\$1,012,000	\$449,000	\$449,000	\$140,000	\$140,000
Unit Cost (\$/acft)	\$485	\$485	\$215	\$215	\$67	\$67

4C.10.3 City of Rosebud

The City of Rosebud obtains its water supply from the Central Texas WSC, which treats and delivers water from Lake Belton. The City of Rosebud has contracted with Central Texas WSC for 693 acft/yr of supply and from BRA for 100 acft/yr, which exceeds its 2060 projected water demand of 152 acft/yr. No change in water supply is recommended.

4C.10.4 Tri-County SUD

Tri-County SUD obtains its water supply from the Trinity and Carrizo-Wilcox Aquifers. Tri-County SUD has adequate water supplies to meet its projected water demands. Therefore, no water supply plan is recommended. This WUG is located in multiple counties (Limestone, McLennan, Robertson, and Falls). The surplus shown in Table 4C.10-1 represents the cumulative totals for Tri-County SUD in all counties it serves.

4C.10.5 West Brazos WSC

4C.10.5.1 Description of Supply

This WUG is located in multiple counties (McLennan and Falls). The shortages shown in Table 4C.10-3 represent the cumulative totals for West Brazos WSC in both counties.

- Source: Groundwater – Trinity Aquifer, and
- Estimated Reliable Supply: 127 acft/yr.

ATTACHMENT E. WATER RATES



City of Marlin Water Office
 P.O. Box 980 – 101 Fortune Street
 Marlin, Texas 76661
 Phone (254) 883-1452 Fax (254) 883-3842

Elizabeth Nelson
 Mayor

Rosie Morin
 Council Member

Tommy Tate
 Council Member

Billie Jean Scaggs
 Council Member

Scottie Henderson
 Council Member

Cecil Sparks
 Council Member

Arthur Allen
 Council Member

William McDonald
 City Manager

Sandra Herring
 City Secretary

Denny Lessman
 Municipal Judge

Darrel Allen
 Police Chief

Curtis Keener
 Fire Chief

James Glenn
 Interim Public Works Dir.

Nancy Dominguez
 Utility Admin. Supervisor

Water Rates As of October 2012

Rates For Water Service Inside City Limits Residential

There shall be charged and collected from each residential customer of water inside the City limit's a monthly minimum charge of \$24.00, of which \$5.00 is for Water System Rehab Fund, and \$19.00 for the first 2,000 gallons of water consumed, plus a rate of consumption thereafter as follows: Amount Rate per 1,000 gallons

0	to	2,000	\$0.00
2,001	to	5,000	\$4.52
5,000	to	15,000	\$4.67
15,001	to	25,000	\$4.82
25,001	gallons and above		\$4.97

Rates For Water Service Outside City Limits Residential

There shall be charged and collected from each residential consumer off water outside the City limit's a monthly minimum charge of \$36.75, of which \$7.50 is for Water System Rehab Fund, and \$29.25 for the first 2,000 gallons of water consumed, plus a rate of consumption thereafter as follows: Amount Rate per 1,000 gallons

0	to	2,000	\$0.00
2001	to	5,000	\$4.52
5,001	to	15,000	\$4.67
15,001	to	25,000	\$4.82
25,001	gallons and above		\$4.97

Rates For Water Service Inside City Limits Commercial

There shall be charged and collected from each commercial customer of water inside the City limit's a monthly minimum charge of \$42.00, of which \$15.00 is for Water System Rehab Fund, and \$27.00 for the first 2,000 gallons of water consumed, plus a rate of consumption thereafter as

follows:	<u>Amount</u>	<u>Rate per 1,000 gallons</u>
	0 to 2,000	\$0.00
	2001 to 5,000	\$5.12
	5,001 to 15,000	\$5.02
	15,001 to 25,000	\$4.91
	25,001 to 50,000	\$4.67
	50,001 to 500,000	\$4.56
	500,001 gallons and above	\$4.25

Rates For Water Service Outside City Limits Commercial

There shall be charged and collected from each commercial consumer of water outside the City limit's a monthly minimum charge of \$52.30, of which \$20.00 is for Water System Rehab Fund, and \$32.30 for the first 2,000 gallons of water consumed, plus a rate of consumption thereafter as follows:

follows:	<u>Amount</u>	<u>Rate per 1,000 gallons</u>
	0 to 2,000	\$0.00
	2001 to 5,000	\$5.12
	5,001 to 15,000	\$5.02
	15,001 to 25,000	\$4.91
	25,001 to 50,000	\$4.67
	50,001 to 500,000	\$4.56
	500,001 gallons and above	\$4.25

Water Meter Demand Charges

5/8" X 3/4"	0.00 per month
1"	\$8.00 per month
1 1/2"	\$15.00 per month
2"	\$30.00 per month
3"	\$100.00 per month
4"	\$150.00 per month
6" and above	\$300.00 per month

Sanitary Sewer Service Rates

Residential

A minimum flat rate of \$18.00 for the first 5,000 gallons of water usage

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
5,001 to 10,000	\$3.75
10,001 and above	\$1.75

Commercial

A minimum flat rate of \$18.00 for the first 5,000 gallons of water usage

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
5,000 to 250,000	\$3.00
250,001 and above	\$1.75

Debt Service Rates

<u>Amount</u>	<u>Rate per 1,000 gallons</u>
0 to 2000	\$0
2001 and over	\$2.10

ATTACHMENT F. REGIONAL WATER PLANNING GROUP

4833 Spicewood Springs Road
Suite 204
Austin, TX 78759
512.342.6868



8 February 2013

Texas Water Development Board
Regional Water Planning
1700 North Congress Avenue
P.O. Box 13231
Austin, TX 78711-3231

Via Mail

RE: **City of Castroville**
Water Conservation Plan

Lann Bookout:

The City of Marlin is amending their Water Conservation Plan section of the Water Conservation and Drought Contingency Plans. On behalf of the City of Marlin, KSA Engineers is hereby submitting the City of Marlin Water Conservation Plan in accordance with Texas Commission on Environmental Quality rules.

The Water Conservation Plan consist of the City of Marlin Utility Profile, 5-year and 10-year target goals for reduction in municipal use expressed in gallons per capita per day (gpcpd) including a schedule for implementing the plan to achieve the targeted reductions, a method of tracking the implementation and effectiveness, continuing educating the City on water conservation, description of the City water rate structure and enforcement procedures.

If you have any questions concerning the Water Conservation Plan, please contact Stuart W. Cowell, E.I.T. at KSA Engineers, Inc., or William McDonald – City Manager – City of Marlin. Thank you.

Sincerely,
KSA ENGINEERS, INC.

A handwritten signature in blue ink that reads 'Stuart W. Cowell'.

Stuart W. Cowell, E.I.T.
Design Engineer

Enclosure: Water Conservation Plan (with copy of cover letter)
Water Conservation and Drought Contingency Plans – September 2002
Ordinance 13-010
City of Marlin Utility Profile
2011 Brazos G Regional Water Plan
City of Marlin Water Rates

c: William McDonald, City Manager (w/ encl)
Brent Bassett, Project Engineer (w/o encl)
MAR-021\ Task 013 - Water Conservation Plan Update\2011\To Be Reviewed

CITY OF MARLIN

**YEAR 2007 AMENDMENT TO:
WATER CONSERVATION AND
DROUGHT CONTINGENCY PLANS**

**City of Marlin
P.O. Box 980
Marlin, Texas 76661
(254) 883-1450**

March 2007

**Prepared by:
KSA ENGINEERS, INC.
4833 Spicewood Springs Road, Suite 204
Austin, Texas 78759
(512) 342-6868
Fax (512) 342-6877**

YEAR 2007 AMENDMENT

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Attachments:

- Attachment A. Conservation Utility Profile (TWDB Form WRD-264)
- Attachment B. Certificate of Convenience and Necessity (CCN) and Service Area Map
- Attachment C. Adoption Ordinance

Original Documents Attached:

City of Marlin - Water Conservation and Drought Contingency Plan - September 2002

YEAR 2007 AMENDMENT

The City of Marlin has a current combined Water Conservation and Drought Contingency Plan entitled "Water Conservation and Drought Contingency Plan". This original document was prepared in 2002 by Hunter Associates Texas, Ltd. The City Council adopted this Plan via ordinance on October 8, 2002, and the Plan was subsequently approved by the TCEQ.

Effective October 7, 2004, the Texas Commission on Environmental Quality (TCEQ) adopted revised rules and regulations pertaining to Water Conservation and Drought Contingency plans requiring inclusion of new elements not previously required in such plans. The City of Marlin's current Plan substantially complies with the revised rules. However, the TCEQ has reviewed the plan and found that a minor update is required. Therefore, this document shall be considered the 2007 Amendment to the current Water Conservation and Drought Contingency Plan. Specifically, the 2007 amendment includes the following provisions:

- 5-year and 10-year target goals for reduction in municipal use expressed in gallons per capita per day (gpcpd) including a schedule for implementing the plan to achieve the targeted reductions and a method of tracking the implementation and effectiveness.
- Adoption ordinance for the 2007 Amendment.

Each of these elements is detailed below:

A. Targeted Goals for Municipal Water Use Conservation

The TWDB's provides a tool for use in estimating the targeted goals for municipal water use conservation. The Water Conservation Utility Profile (TWDB Form WRD-264) was completed with updated information from the 2002 original plan. This profile is included as Attachment A. This form refers to the Certificate of Convenience and Necessity (CCN) and Service Area Map which is included as Attachment B to this 2007 Amendment Document.

In order to continue water conservation efforts, the City has established 5-year and 10-year target goals for reduction in municipal use including a schedule for implementing the plan to achieve the targeted reductions and a method of tracking the implementation and effectiveness. The following updated long-term goals have been adopted by the City of Marlin:

1. Education and information will be provided on a yearly basis to all customers presenting non-wasteful uses of water and techniques that can be employed to conserve water. Based on the TWDB

“most likely” scenario, a 2% savings in the average annual per capita use can be realized through education programs. This 2% goal equates to 3.8 gallons per capita per day (gpcpd) reduction (5-year average annual gpcpd of 192.4 multiplied by 2%).

2. As part of education measures, customers will be encouraged to retrofit old plumbing fixtures with water-conserving units. The TWDB has set a “most-likely” goal of 20.5 gpcpd by replacing old plumbing fixtures. Education will also help in reduction of summer usage. Seasonal water uses from June to August have represented approximately 30% of the total annual production over the last 5 years. This seasonal peak can be offset with an increasing water charge as the usage rises. The seasonal per capita usage is 38.48 gpcpd (calculated by multiplying the 5-year average annual gpcpd of 192.4 by 20% for a typical East Texas city). The “most likely” conservation scenario can achieve a 7% reduction in this use. The resulting gpcpd seasonal use reduction provides approximately 2.7 gpcpd in water savings (38.48 multiplied by 7%).
3. Unaccounted for water from water production to the consumers on the system will be reduced from the previous 3-year average of 38%. This loss should be reduced to no more than 15%. The associated potential savings by reducing unaccounted for water loss is 11.2 gpcpd (derived from multiplying dry-year per capita water use of 219 gpcpd by the difference in reduction of water loss from 38% to 15.0% = $219 \times (38\% - 15\%) = 50.4$ gpcpd). This goal will require on-going metering and operational adjustments as well as continual repair of old lines and meters in the distribution system. The result will be a decrease in per capita water consumption thus reducing water demands on the system.

These goals provide a total potential for reducing water use by 56.8 gpcpd. This would reduce the average year annual per capita use from 192.4 to 135.6 gpcpd. The City intends to meet one-half of this goal within 5 years of plan adoption (2012) and reduce the per capita water use from 192.4 gpcpd to 164 gpcpd. The City intends to meet the second-half of this goal within 10 years of plan adoption (2017) and will further reduce annual per capita water use from 164 gpcpd to 135.6 gpcpd.

B. Year 2007 Amendment Implementation

This 2007 Amendment to the original “Water Conservation and Drought Contingency Plan” adopted in October 2002 was adopted by City Ordinance of the City of Marlin as shown in Attachment C.

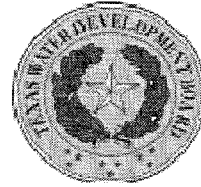
ATTACHMENT A

**Water Conservation Utility Profile
(TWDB Form WRD-264)**

Water Conservation Utility Profile



Jointly Produced by the Texas Water Development Board and the Texas Natural Resource Conservation Commission (Revised April 25, 2002)



The purpose of the Water Utility Profile is to assist an applicant with water conservation plan development and to ensure that important information and data be considered when preparing your water conservation plan and goals. This form should be used by applicants for financial assistance (submitted to the TWDB) or by an entity applying for a water right (submitted to the TNRCC). Please complete all questions as completely and objectively as possible. You may contact the Municipal Water Conservation Unit of the TWDB at 512-936-2391 for assistance, or the Resource Protection Team at 512-239-4691 if submitted to the TNRCC.

Name of Utility: City of Marlin

Address & Zip: P.O. Box 980 (101 Fortune Street), Marlin, Texas 76661

Telephone Number: 254-883-1450 Fax: 254-883-1456

Form Completed By: Stephen P. Dorman, P.E. of KSA Engineers, Inc.

Title: Project Manager

Signature: _____ Date: _____

Name and Phone Number of Person/Department responsible for implementing a water conservation program:

Randall Holly, City Manager, 254-883-1456

I. CUSTOMER DATA

A. Population and Service Area Data

1. Please attach a copy of your Certificate of Convenience and Necessity (CCN) from the TNRCC, and a service-area map. **CCN 10042 - See Attachment B
PWS ID #0730002**
2. Service area size (square miles): 6.9
3. Current population of service area: 6628
4. Current population served by utility: a: water 6628
b: wastewater 6628

5. Population served by water utility for the previous five years: 6. Projected population for service area in the following decades:

Year	Population	Year	Population
<u>1997</u>	<u>6,386</u>	2010	<u>7,367</u>
<u>1998</u>	<u>6,386</u>	2020	<u>7,774</u>
<u>1999</u>	<u>6,386</u>	2030	<u>8,225</u>
<u>2000</u>	<u>6,628</u>	2040	<u>8,684</u>
<u>2001</u>	<u>6,628</u>	2050	<u>9,169</u>

* *Marlin has experienced little to no growth since 1950*

7. List source(s)/method(s) for the calculation of current and projected population:

U.S. Bureau of Census (1997-2001);
Texas Water Development Board (2010-2040)

B. Active Connections

1. Current number of active connections by user type. Check whether multi-family service is counted as Residential X or Commercial _____

<u>Treated water users:</u>	<u>Metered</u>	<u>Not-metered</u>	<u>Total</u>
Residential	<u> 2,092 </u>	<u> 0 </u>	<u> 2,092 </u>
Commercial	<u> 250 </u>	<u> 0 </u>	<u> 250 </u>
Industrial	<u> 2 </u>	<u> 0 </u>	<u> 2 </u>
Public	<u> 73 </u>	<u> 0 </u>	<u> 73 </u>
Other (* <i>Prison</i>)	<u> 34 </u>	<u> 0 </u>	<u> 34 </u>

2. List the net number of new connections per year for most recent three years:

Year	<u>1999</u>	<u>2000</u>	<u>2001</u>
Residential	<u>3</u>	<u>10</u>	<u>11</u>
Commercial	<u>1</u>	<u>0</u>	<u>0</u>
Industrial	<u>0</u>	<u>0</u>	<u>0</u>
Public	<u>0</u>	<u>0</u>	<u>0</u>
Other	<u>0</u>	<u>0</u>	<u>0</u>

C. High Volume Customers

List annual water use for the five highest volume retail and wholesale customers (please indicate if treated or raw water delivery)

	<u>Customer</u>	<u>Use (1,000gal./yr.)</u>	<u>Treated/Raw Water</u>
(1)	<u>TDOT</u>	<u>38,575</u>	<u>Treated</u>
(2)	<u>Tx Youth Comm.</u>	<u>13,886</u>	<u>Treated</u>
(3)	<u>Jon-Lin</u>	<u>11,752</u>	<u>Treated</u>
(4)	<u>Elmwood Nursing</u>	<u>5,403</u>	<u>Treated</u>
(5)	<u>M&M Apts.</u>	<u>4,880</u>	<u>Treated</u>

3. List previous five years records for unaccounted-for water use (See #2, Appendix A)

<u>Year</u>	<u>Amount (gal.)</u>	<u>%</u>
<u>1997</u>	<u>95,012,000</u>	<u>20</u>
<u>1998</u>	<u>52,495,000</u>	<u>9.7</u>
<u>1999</u>	<u>207,253,000</u>	<u>38</u>
<u>2000</u>	<u>143,301,000</u>	<u>29</u>
<u>2001</u>	<u>279,407,000</u>	<u>47</u>

4. List previous five years records for annual peak-to-average daily use ratio (See #3, Appendix A)

<u>Year</u>	<u>Average MGD</u>	<u>Peak MGD</u>	<u>Ratio</u>
<u>1997</u>	<u>1.32</u>	<u>2.23</u>	<u>1.69</u>
<u>1998</u>	<u>1.49</u>	<u>2.63</u>	<u>1.77</u>
<u>1999</u>	<u>1.48</u>	<u>2.83</u>	<u>1.91</u>
<u>2000</u>	<u>1.35</u>	<u>2.34</u>	<u>1.73</u>
<u>2001</u>	<u>1.63</u>	<u>2.56</u>	<u>1.57</u>

5. Municipal per capita water use for previous five years (See #4, Appendix A):

<u>Year</u>	<u>Population</u>	<u>Total Diverted (or Treated) (1,000 gal.)</u>	<u>Industrial/Wholesale Sales (1,000 gal.)</u>	<u>Municipal Per Capita Use (gpcpd)</u>
<u>1997</u>	<u>6,386</u>	<u>477,433</u>	<u>68,849</u>	<u>175</u>
<u>1998</u>	<u>6,386</u>	<u>542,055</u>	<u>98,709</u>	<u>190</u>
<u>1999</u>	<u>6,386</u>	<u>539,924</u>	<u>62,252</u>	<u>205</u>
<u>2000</u>	<u>6,628</u>	<u>493,276</u>	<u>74,567</u>	<u>173</u>
<u>2001</u>	<u>6,628</u>	<u>593,963</u>	<u>64,206</u>	<u>219</u>

6. Seasonal water use for the previous five years (in gallons/person/day) (See #5, Appendix A):

<u>Year</u>	<u>Population</u>	<u>Base Per Capita Use</u>	<u>Summer Per Capita Use</u>	<u>Seasonal Use</u>
<u>1997</u>	<u>6,386</u>	<u>195</u>	<u>225</u>	<u>30</u>
<u>1998</u>	<u>6,386</u>	<u>242</u>	<u>277</u>	<u>35</u>
<u>1999</u>	<u>6,386</u>	<u>197</u>	<u>238</u>	<u>41</u>
<u>2000</u>	<u>6,628</u>	<u>207</u>	<u>235</u>	<u>28</u>
<u>2001</u>	<u>6,628</u>	<u>230</u>	<u>297</u>	<u>67</u>

B. Projected Water Demands

Provide estimates for total water demands for the planning horizon of the utility. Indicate sources of data and how projected water demands were determined. Attach additional sheets if necessary.

The following shows the results of the TWDB prediction of Marlin's future average daily water use. This information is based on the TWDB's draft 2006 Regional Water Plan.

<u>Year</u>	<u>Historical And Projected Population</u>	<u>Net Municipal Use (ac-ft/yr)¹</u>	<u>Net Municipal Use (gpd)²</u>	<u>Net Municipal Use (MGD)³</u>	<u>Calculated Per Capita Use (gpcpd)⁴</u>	<u>Calculated Average Annual Growth</u>
1990	6,386	1,281	1,143,525	1.14	179	
2000	6,628	2,599	2,320,080	2.32	350	
2010	6,862	2,660	2,374,533	2.37	346	-0.115%
2020	7,155	2,749	2,453,982	2.45	343	-0.089%
2030	7,455	2,839	2,534,323	2.53	340	-0.089%
2040	7,718	2,913	2,600,382	2.60	337	-0.089%
2050	7,927	2,983	2,662,869	2.66	336	-0.030%
2060	8,173	3,076	2,745,889	2.75	336	0.000%

III. WATER SUPPLY SYSTEM

A. Water Supply Sources

List all current water supply sources and the amounts available with each:

	<u>Source</u>	<u>Amount Available</u>
Surface Water:	Brazos River	3.57
	<u>New Marlin Lake</u>	<u>3.57</u> MGD
Groundwater:	<u>N/A</u>	<u> </u> MGD
Contracts:	<u>Brazos River Authority</u>	<u>1.07+</u> MGD
Other:	<u>N/A</u>	<u> </u> MGD

B. Treatment and Distribution System

1. Design daily capacity of system: 3.024 MGD
2. Storage Capacity: Elevated 1.1 MGD, Ground 0.925 MGD
3. If surface water, do you recycle filter backwash to the head of the plant? N/A
Yes No . If yes, approximately 0.17 MGD.
4. Please describe the water system. Include the number of treatment plants, wells, and storage tanks. If possible, include a sketch of the system layout.

The water system is comprised of the Old and New Marlin Lakes with a backup source from the Brazos River. The surface water treatment plant was originally designed to provide over 10 MGD of capacity, but current CT study approval limits capacity to 3.024 MGD. The distribution system includes two (2) elevated storage tanks with 800,000 and 200,000 gallons plus one additional 150,000 gallon tank which only serves the Hobby Prison. Ground storage tanks are also included in the system with one clearwell at the plant containing 500,000 gallons and a second tank of 200,000 gallon capacity which only serves the Hobby Prison. The booster pump station at the plant provides 4,200 gpm capacity and the station at the Hobby Prison provides 2,000 gpm of firm capacity pumpage to the prison.

IV. WASTEWATER UTILITY SYSTEM

A. Wastewater System Data

1. Design capacity of wastewater treatment plant(s): 2.0 MGD
2. Is treated effluent used for irrigation on-site NO, off-site NO, plant washdown NO, or chlorination/dechlorination NO?
If yes, approximately _____ gallons per month. Could this be substituted for potable water now being used in these areas? Not with the existing pond plants
3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed of. Where applicable, identify treatment plant(s) with the TNRCC name and number, the operator, owner, and, if wastewater is discharged, the receiving stream. Please provide a sketch or map which locates the plant(s) and discharge points or disposal sites.

The existing wastewater treatment plant is located approximately 2.5 miles southwest of Marlin adjacent to the Brazos River. The treatment facility was originally designed for an average daily capacity of 2.0 MGD (1,389 gpm). Based on the best available information, the plant was designed to treat standard municipal wastewater with influent pollutant loads of 200 mg/L BOD₅ and 200 mg/L TSS. Since the plant is pond system, the pollutant loadings must be reduced to 30 mg/L BOD₅ and 90 mg/L TSS. These and other effluent limits are defined in the plant's wastewater discharge permit.

The City of Marlin holds a TCEQ permit for discharging treated effluent into waters of the State of Texas. The facility is authorized to discharge directly into the Brazos River. The Texas Pollutant Discharge Elimination System (TPDES) permit number for the plant is 10110-002 (TX0021725) and the permit is currently being renewed by TCEQ. The previous permit expired on December 1, 2003. The current permit was issued on September 20, 2004 by the TCEQ. The permit will expire at midnight on December 1, 2008.

B. Wastewater Data for Service Area

1. Percent of water service area served by wastewater system: 95 %
2. Monthly volume treated for previous three years (in 1,000 gallons):

Year	1999	2000	2001
January	45,405	49,586	48,538
February	41,207	44,433	38,728
March	45,212	44,059	40,807
April	45,121	44,172	40,735
May	47,212	54,429	47,673
June	51,305	48,964	52,838
July	55,467	66,292	61,678
August	66,270	68,311	62,096
September	66,125	61,074	51,237
October	66,480	50,042	48,454
November	58,327	46,243	44,445
December	59,122	47,268	48,229
Total	647,253	624,873	525,549

V. UTILITY OPERATING DATA

A. List (or attach) water and wastewater rates, and rate structure for all classes.

Table 1. Water Rates

Residential Schedule:	Water Usage (Amount in Gallons)	Rate (Base or per 1,000 gallons)
Water (Inside City)	First 2,000 or less	\$16.00 base rate
	2,001 to 15,000	\$3.00 / 1,000
	15,001 to 25,000	\$3.15 / 1,000
	All over 25,000	\$3.30 / 1,000
Water (Outside City)	First 2,000 gallons or less	\$26.25 base rate
	2,001 to 15,000	\$3.00 / 1,000
	15,001 to 25,000	\$3.15 / 1,000
	All over 25,000	\$3.30 / 1,000
Commercial Schedule:	Water Usage (Amount in Gallons)	Rate (Base or per 1,000 gallons)
Water (Inside City)	First 2,000 or less	\$24.00 base rate
	2,001 to 5,000	\$3.45 / 1,000
	5,001 to 15,000	\$3.35 / 1,000
	15,001 to 25,000	\$3.25 / 1,000
	25,001 to 50,000	\$3.00 / 1,000
	50,001 to 500,000	\$2.90 / 1,000
	All over 500,000 gallons	\$2.25 / 1,000
Water (Outside City)	First 2,000 or less	\$29.30 base rate
	2,001 to 5,000	\$3.45 / 1,000
	5,001 to 15,000	\$3.35 / 1,000
	15,001 to 25,000	\$3.25 / 1,000
	25,001 to 50,000	\$3.00 / 1,000
	50,001 to 500,000	\$2.90 / 1,000
	All over 500,000 gallons	\$2.25 / 1,000

Table 2. Sewer Rates

Residential Schedule:	Sewer Charge Based on Water Usage (Amount in Gallons)	Rate (Base or per 1,000 gallons)
Sewer	First 5,000 or less	\$15.00 base rate
	5,001 to 10,000	\$3.00 / 1,000
	All over 10,000	\$1.00 / 1,000
Commercial Schedule:	Sewer Charge Based on Water Usage (Amount in Gallons)	Rate (Base or per 1,000 gallons)
Sewer	First 5,000 or less	\$15.00 base rate
	5,001 to 250,000	\$2.25 / 1,000
	All over 250,000 gallons	\$1.00 / 1,000

B. Other relevant data: Please indicate other data or information that is relevant to both the applicant's water management operations and design of a water conservation plan.

N/A

VI. CONSERVATION GOALS

Please use the data provided in this survey to establish conservation goals (additional data may be used).

A. Water conservation goals for municipal utilities are generally established to maintain or reduce consumption, as measured in:

1. gallons per capita per day used;
2. unaccounted-for water uses;
3. peak-day to average-day ratio; and/or
4. an increase in reuse or recycling of water.

B. TNRCC/TWDB conservation staff assess the reasonableness of water conservation goals based on whether the applicant addresses the following steps:

1. identification of a water or wastewater problem;
2. completion of the utility profile;
3. selection of goals based on the technical potential to save water as identified in the utility profile; and
4. performance of a cost-benefit analysis of conservation strategies.

If at least the first three steps have been completed and are summarized in the water conservation plan, then staff can conclude that there is substantiated basis for the goals, and that the water conservation plan is integrated into water management. Therefore, the established conservation goals can be deemed reasonable.

C. Complete the following in gallons per capita per day (gpcd) to quantify the water conservation goals for the utility's service area:

1.	Estimation of the technical potential for reducing per capita water use (see Appendix B).	Conservation Scenario <u>Mostly Likely</u>
a.	Reduction in unaccounted-for uses:	<u>0 to 50.4</u>
b.	Reduction in indoor water use due to water-conserving plumbing fixtures:	<u>20.5 to 21.7</u>
c.	Reduction in seasonal use:	<u>2.7 to 7.7</u>
d.	Reduction in water use due to public education programs:	<u>3.8 to 9.6</u>
	TOTAL TECHNICAL POTENTIAL FOR REDUCING PER CAPITA WATER USE:	<u>27.0 to 89.4</u>

*Subtract these totals from the dry-year per capita use to calculate the long-run planning goal.

2. Planning goal

The planning goal equals the dry year per capita water use minus the total technical potentials calculated in number one above.

Planning goal (in gpcd): 135.6

Goal to be achieved by year: 2017

3. Needed reduction in per capita use to meet planning goal

Current per capita use: 192.4

Planning goal (from #2 above): 135.6

Difference between current use and goal: 56.8

(Represents needed reduction in per capita use to meet goal.)

Appendix A

Definitions of Utility Profile terms

1. **Residential** sales should include residential sales to residential class customers only.
Industrial sales should include manufacturing and other heavy industry.
Commercial sales should include all retail businesses, offices, hospitals, etc.
Wholesale sales should include water sold to another utility for a resale to the public for human consumption.
2. **Unaccounted-for water** is the difference between water diverted or treated (as reported in Section IIA1, p. 4) and water delivered (sold)(as reported in Section IIA2, p. 4).
Unaccounted-for water can result from:
 1. inaccurate or incomplete record keeping;
 2. meter error;
 3. unmetered uses such as firefighting, line flushing, and water for public buildings and water treatment plants;
 4. leaks; and
 5. water theft and unauthorized use.
3. The **peak-day to average-day ratio** is calculated by dividing the maximum daily pumpage (in million gallons per day) by the average daily pumpage. Average daily pumpage is the total pumpage for the year (as reported in Section IIA1, p. 4) divided by 365 and expressed in million gallons per day.
4. **Municipal per capita use** is defined as total municipal water use dividing by the population and the 365 days. Total municipal water use is calculated by subtracting the industrial sales and wholesale from the total water diverted or treated (as reported in Section IIA1, p. 4).

Total municipal water use = Total water diverted or treated - industrial sales - wholesale
Municipal per capita use (gpcd) = Total municipal water use/population/365 days

Note: The AWWA considers the municipal per capita use as the most representative figure to use in long-range water supply and conservation planning.

5. **Seasonal water use** is the difference between base (winter) daily per capita use and summer daily per capita use. To calculate **the base daily per capita use**, average the monthly diversions for December, January, and February, and divide this average by 30. Then divide this figure by the population. To calculate the **summer daily per capita use**, use the months of June, July, and August.

Appendix B

Estimating the Technical Potential for Reducing Per Capita Water Use

The technical potential for reducing per capita water use is the range in potential water savings that can be achieved by implementing specific water conservation measures. The bottom of the range represents the potential savings under a "most likely," or real-world conservation scenario. The top of the range represents the potential savings under an "advanced" conservation scenario. The conservation measures include:

- reducing unaccounted-for water uses;
- reducing indoor water use due to water-conserving plumbing fixtures;
- reducing seasonal water use; and
- reducing water use through public education programs.

Guidelines and examples for calculating the technical potential water savings for each of these conservation measures are given below.

I. Reducing unaccounted-for water uses

The TNRCC considers unaccounted-for water uses of 15% or less as acceptable for communities serving more than 5,000 people. Smaller, older systems that have a larger service area may legitimately experience larger losses. Losses above 15% may be an area of concern, and provide a conservation potential.

The bottom of the range for technical potential savings for unaccounted-for uses is zero. To calculate the top of the range, see the following example:

$$\begin{aligned} \text{Unaccounted-for uses} &= 19.5\% \\ \text{Dry-year per capita water use} &= 250 \text{ gallons per capita per day (gpcd)} \\ \text{Potential for reduction in unaccounted-for use} &= (250 \text{ gpcd} \times 19.5\%) - (250 \text{ gpcd} \times 15\%) \\ &= 48.75 \text{ gpcd} - 37.5 \text{ gpcd} \\ &= 11.25 \text{ gpcd} \\ \text{Technical Potential Savings Range} &= 0 \text{ to } 11.25 \text{ gpcd} \end{aligned}$$

II Reducing Indoor Water Use due to Water-Conserving Plumbing Fixtures

The TNRCC uses **20.5 gpcd** as the most reliable figure upon which to base potential water savings, which represents the "most likely" conservation scenario. This figure is based upon the estimate that by 2050, 90% of pre-1990 homes, and all new homes will have been equipped with water conserving plumbing fixtures.

The figure used for the "advanced" conservation scenario, 21.7 gpcd, is an estimate of the average savings that would result from a home equipped exclusively with water-conserving plumbing fixtures. This figure is considered "advanced" because in a typical city, 100% of the homes are not exclusively equipped with water-conserving fixtures.

III. Reducing Seasonal Water Use

The Texas Water Development Board (TWDB) has calculated seasonal use as a percentage of average annual per capita use for East Texas (20%), West Texas (25%), and a statewide average of 22.5%. Seasonal water use is calculated by multiplying the average annual per capita use in gpcd by the appropriate percentage.

The technical potential for reduction in seasonal use is then calculated by multiplying the seasonal use by 7% for the "most likely" conservation scenario, and by 20% for the "advanced" scenario. Below is an example calculation:

Average annual per capita use = 185 gpcd
Geographical location = West Texas
Seasonal use = $(185 \text{ gpcd} \times 25\%) = 46.25 \text{ gpcd}$
Potential reduction in seasonal use (Most Likely scenario) = $(46.25 \times 7\%) = 3.24 \text{ gpcd}$
Potential reduction in seasonal use (Advanced scenario) = $(46.25 \times 20\%) = 9.25 \text{ gpcd}$
Technical Potential Savings Range = 3.24 to 9.25 gpcd

IV. Reducing Water Use through Public Education Programs

The technical potential for water conservation from public education programs is estimated to be from 2% of the average annual per capita use for the "most likely" conservation scenario to 5% for the "advanced" scenario, according to the "Water Conservation Guidebook," published in 1993 by the American Water Works Association. Below is an example calculation:

Average annual per capita use = 185 gpcd
Potential reduction in water use (Most Likely scenario) = $(185 \times 2\%) = 3.7 \text{ gpcd}$
Potential reduction in water use (Advanced scenario) = $(185 \times 5\%) = 9.25 \text{ gpcd}$
Technical Potential Savings Range = 3.7 to 9.25 gpcd

To calculate the **total technical potential** for reducing municipal per capita water use, simply add the individual technical potential amounts calculated in items I - IV above. In this case **the total technical potential range equals 27.44 gpcd to 51.45 gpcd.**

Summary of Technical Potential Calculations		
Conservation Measure	Calculation Procedure	Example Result
Reducing unaccounted-for uses	(Dry-year demand) x (Unacc.-for percentage if more than 15%, minus 15%)	0 to 11.25 gpcd
Reducing indoor water use due to water- efficient plumbing fixtures	20.5 gpcd ("rule of thumb") to 21.7 gpcd (advanced)	20.5 to 21.7 gpcd
Reducing seasonal water use	Seasonal use (Avg. use x 22.5%) x 7% and 20%	3.24 to 9.25 gpcd
Reducing water use through public education programs	Average use x 2% and 5%	3.7 to 9.25 gpcd
	Total Technical Potential Savings	27.44 to 51.45 gpcd

To calculate the long-run planning goal, subtract these totals from the **dry-year water demand**.

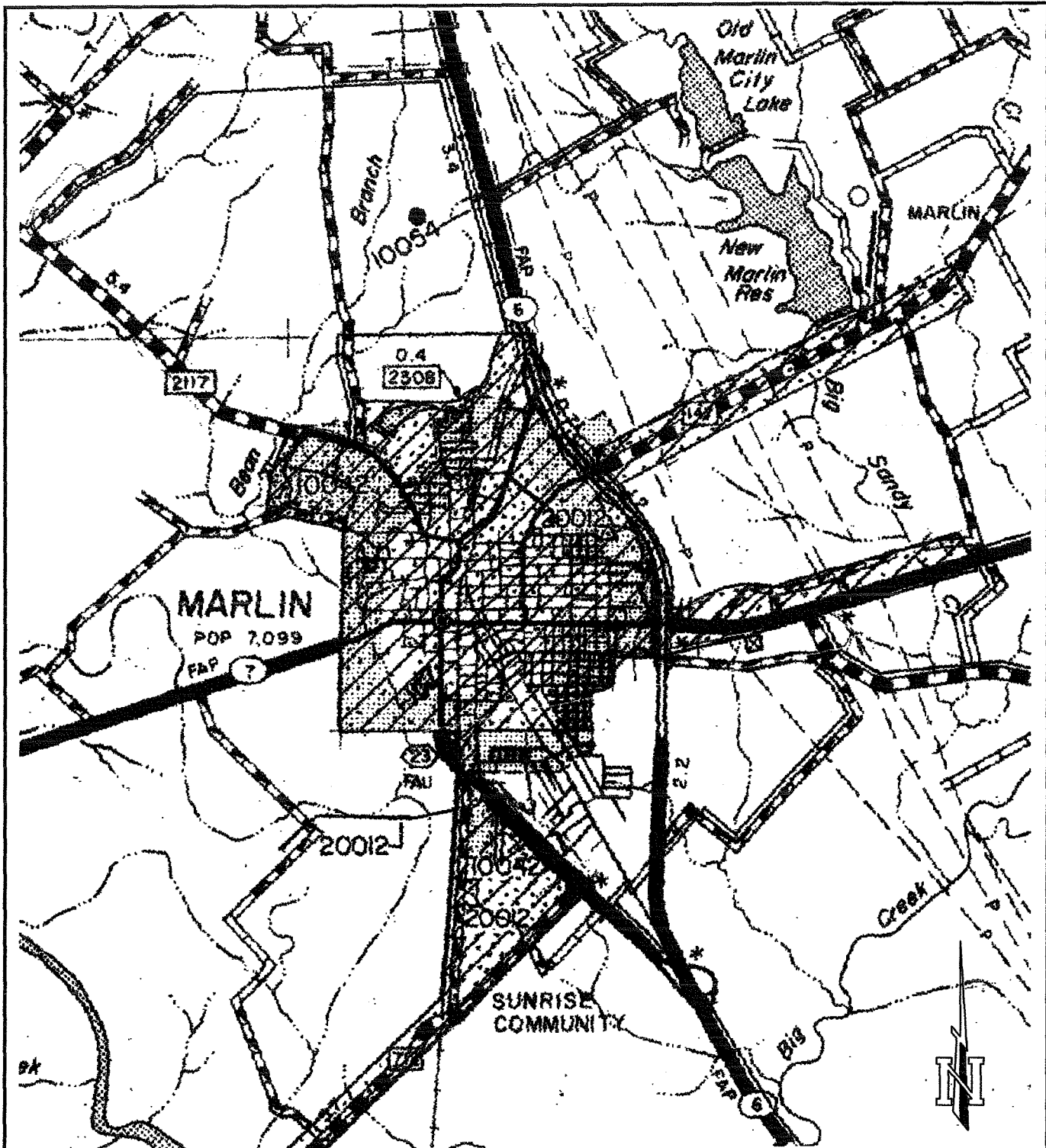
For example:

<p>Long-run planning goal = (Dry year water demand) minus (total technical potential) = 250 gpcd - 27.44 gpcd = 222.56 gpcd ("most likely" scenario) = 250 gpcd - 51.45 gpcd = 198.55 gpcd ("advanced" scenario)</p>
--

<p>Long-run planning goal for municipal water use = 222.56 to 198.55 gpcd</p>
--

ATTACHMENT B

**Certificate of Convenience and Necessity (CCN)
and Service Area Map**



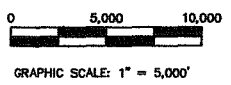
4833 Spicewood Springs Road, Suite 204
 Austin, Texas 78759
 T-512.342.6868
 F-512.342.6877
 www.ksaeng.com



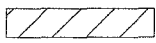
Austin-Longview-Lufkin-McKinney-Sugar Land-Tyler

**CERTIFICATE OF
 CONVENIENCE AND
 NECESSITY**

**CITY OF MARLIN
 FALLS COUNTY, TEXAS**



LEGEND

WATER CNN
 BOUNDARY 

DATE: 3/26/07

ATTACHMENT C

**Year 2007 Amendment to:
Water Conservation and Drought Contingency Plan
Adoption Ordinance**

ORDINANCE NO.07-043

AN ORDINANCE OF THE CITY OF MARLIN, TEXAS, ADOPTING YEAR 2007 AMENDMENT TO: WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN ADOPTED VIA ORDINANCE NO. 02-25 ON THE 8TH DAY OF OCTOBER 2002.

WHEREAS, it is necessary that the Water Conservation and Drought Contingency Plan be amended to incorporate additional Texas Commission on Environmental Quality requirements as provided in Texas Administrative Code – Title 30 - §288 pertaining to Water Conservation and Drought Contingency Plans; and

WHEREAS, the City Council of the City of Marlin believes that it is in the best interest of the City of Marlin to amend its current water conservation and drought contingency plan;

NOW, THEREFORE BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARLIN, TEXAS,


Section 1: That the Year 2007 Amendment to the City of Marlin Water Conservation and Drought Contingency Plan attached hereto and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the City.

Section 2: That all ordinances of the City in conflict with the provisions of this ordinance are, and the same are hereby, repealed and all other ordinances of the City not in conflict with the provisions of this ordinance shall remain in full force and effect.

Section 3: Should any paragraph, sentence, subdivision, clause, phrase, or section of this ordinance be adjudged or held to be unconstitutional, illegal, or invalid, the same shall not affect the validity of this ordinance as a whole or any part or provision thereof, other than the part so declared to be invalid, illegal, or unconstitutional.

Section 4: This ordinance shall take effect immediately from and after its passage and the publication of the caption, as the law in such cases provide.

PASSED, APPROVED, AND ADOPTED, this the 10th day of April, 2007.


Norman Erskine, Mayor

ATTEST:

Rachel Scotty, City Secretary

Sec. 13.03.009 Penalty

(a) Every person, association, organization, or corporation and local manager or agent of every such person, association, organization, or corporation failing or refusing to make the report required by section 13.03.001 of this article, or failing to refusing to allow the examination provided for in section 13.03.002 herein shall, upon conviction in the municipal court of the city, be fined in any sum not to exceed one hundred dollars (\$100.00), and every day's failure or refusal, as mentioned in this section, shall be deemed a separate offense.

(b) Every person, association, organization, or corporation who shall operate any business without the payment of the rentals provided for herein shall be subject to a penalty of one hundred dollars (\$100.00) for each and every day that such person, association, organization, or corporation shall conduct such business by using and occupying the streets, easements, alleys, or other public ways of the city without the payment of the said rentals, which said sum may be recovered by the city in a court of competent jurisdiction by a suit filed therein.

(Ordinance adopted 12/18/41)

ARTICLE 13.04 DROUGHT CONTINGENCY PLAN

Sec. 13.04.001 Definition

Drought contingency plan. A plan, which prescribes short-term measures to cause a temporary but significant reduction in water use during drought, or periods of extended high temperatures.

Sec. 13.04.002 Trigger conditions

Trigger conditions indicate when certain drought or emergency response measures will be implemented. These conditions are stage I customer awareness, stage II voluntary water conservation, stage III mandatory water use restrictions and stage IV critical water use restrictions, and are more fully described as follows:

(1) Stage I – Customer awareness.

Goal. Achieve a voluntary five-percent reduction in total water use when stage I is in force.

This announcement will be made by the mayor and be designed to increase customer awareness of water conservation and encourage the most efficient use of water.

Voluntary water use restrictions. Water customers are requested to voluntarily limit the use of water for nonessential purposes and to practice water conservation.

(2) Stage II – Voluntary water conservation.

Goal. Achieve a voluntary fifteen-percent reduction in total water use when stage II is in force.

The mayor will implement stage II when the selected triggers are reached.

Demand base triggers. When total daily demand equals or exceeds 85% of the daily water production capacity for three (3) consecutive days or 100% on a single day.

Upon initiation and termination of stage II, the utility will publish notice in the city's official newspaper.

Requirements for termination. Stage II of the plan may end when all of the conditions listed as triggering events have ceased to exist for a period of three (3) consecutive days. Upon termination of stage II, stage I becomes operative.

Voluntary water restrictions; restricted days/hours. Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems. Customers are requested to limit outdoor water use to even-numbered dates (2, 4, 6, or 8) for customers with an even-numbered address, odd-numbered dates (1, 3, 5, or 7) for water customers with an odd-numbered address and to irrigate landscape areas between the hours of 8:00 p.m. and 6:00 a.m. on designated watering days. However, irrigation of landscaped areas is permitted at any time if it is by means of a hand-held hose, a faucet-filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(3) Stage III – Mandatory water use restrictions.

Goal. Achieve a twenty-percent reduction in total water use when stage III is in force.

The water utility will implement stage III when any one of the selected triggers are reached.

Demand based triggers. When total daily demand equals or exceeds 90% of the daily water production capacity for three (3) consecutive days or 100% on a single day while under stage II restrictions.

Upon initiation and termination of stage III, the mayor will issue a proclamation and will publish notice in the city's official newspaper.

Requirements for termination. Stage III of the plan may end when all of the conditions listed as triggering events have ceased to exist for a period of (3) consecutive days. Upon termination of stage III, stage II becomes operative.

Utility measures. Visually inspect lines and repair leaks on a regular basis. Flushing is prohibited except for dead-end mains.

Mandatory water use restrictions. The following water use restrictions shall apply to all customers:

- (A) Customers are required to limit outdoor water use to even-numbered dates (2, 4, 6, or 8) for customers with an even-numbered address, odd-numbered dates (1, 3, 5, or 7) for water customers with an odd-numbered address and to irrigate landscaped areas between the hours of 8:00 a.m. and 6:00 p.m. on designated watering days and shall be by means of hand-held hoses, hand-held buckets or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems is prohibited at all times.

- (B) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 8:00 p.m. and 6:00 a.m. Such washing, when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.
 - (C) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools or "Jacuzzi" type pools is prohibited except on designated watering days between the hours of 8:00 p.m. and 6:00 a.m.
 - (D) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
 - (E) Use of water from hydrants or flush valves shall be limited to maintaining public health, safety, and welfare.
 - (F) Unless irrigated with wastewater effluent or from own system, use of water for the irrigation of golf courses, parks, and greenbelt areas is prohibited except by hand-held hose and only on designated watering days between the hours of 8:00 p.m. and 6:00 a.m.
 - (G) The following uses of water are defined as nonessential and are prohibited:
 - (i) Wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surface areas;
 - (ii) Use of water to wash down buildings or structures for purposes other than immediate fire protection;
 - (iii) Use of water for dust control;
 - (iv) Flushing gutters or permitting water to run or accumulate in any gutter or street;
 - (v) Failure to repair a controllable leak within a reasonable period after having been given notice directing the repair of such leak; and
 - (vi) Any waste of water.
- (4) Stage IV – Critical water use restrictions.

Goal. Achieve a thirty-percent reduction in total water use when stage IV is in force.

The mayor will implement stage IV when any one of the selected triggers is reached:

Demand based triggers. When total daily demand equals or exceeds 100% of the daily production for three (3) consecutive days. Furthermore, the city will recognize that an emergency water shortage condition exists when contamination, natural or manmade, of the water source occurs or a major water line breaks, pump or system failures occur, or when prolonged maintenance is required for storage facilities, which cause unprecedented loss of capability to provide water service.

Requirements for termination. Stage IV of the plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of three (3) consecutive days or at the discretion of the water provider. Upon termination of stage IV, stage III becomes operative.

Operation measures. The utility shall visually inspect lines and repair leaks on a daily basis. Flushing is prohibited except for dead-end mains and only by the water purveyor. Emergency interconnects or alternative supply arrangements shall be initiated. All meters shall be read as often as necessary to ensure compliance with this program for the benefit of all the customers.

Mandatory water use restrictions. The following water use restrictions shall apply to all customers:

- (A) All outdoor use of water is prohibited.
- (B) Irrigation of landscaped areas is absolutely prohibited.
- (C) Use of water to wash any motor vehicle, motorbike, boat, airplane or other vehicle is absolutely prohibited.

Sec. 13.04.003 Public notification process

Where public notice is required in this article, the notice will be posted at the city hall and the public library, and the notice will be published in a newspaper of general circulation within the city at least once each week that the newspaper is published for as long as the water use restrictions are in effect.

Sec. 13.04.004 Discontinuance notice

When a given trigger condition ceases to occur for at least (5) consecutive days and the mayor determines that there is no continued threat to the water supply or system, the public shall be notified that any water conservation measures associated with that condition may be discontinued.

Sec. 13.04.005 Penalty

Any person, firm, or corporation who violates any provision of this article shall be guilty of a misdemeanor and, upon conviction, shall be fined in accordance with the general penalty provision found in section 1.01.009 of this code. Each day on which a violation of, or failure to comply with, this article continues shall constitute a separate violation and shall be punishable as such. The city also is entitled to pursue all other criminal and civil remedies to which it is entitled under the authority of other statutes or other ordinances.



DROUGHT CONTINGENCY
AND
EMERGENCY WATER DEMAND MANAGEMENT PLAN

1. INTRODUCTION

The goal of this plan is to cause a reduction in water use in response to drought or emergency conditions so that the water availability can be preserved. Since emergency conditions can occur rapidly, responses must also be enacted quickly. This plan has been prepared in advance considering conditions that will initiate and terminate the rationing program.

A Drought/Emergency Management Committee consisting of two Councilmembers and the System Manager will monitor usage patterns and public education efforts and will make recommendations to the City Council on future conservation efforts, demand management procedures or any changes to this plan. The Committee will develop public awareness notices, bill stuffers, and other methods that will begin and continue as a constant type of reminder that water should be conserved at all times, not just during a drought or emergency. This Committee will also review and evaluate any needed amendments or major changes due to changes in the City service area population, distribution system or supply. This review and evaluation will be done on a regular basis, of five years unless conditions necessitate more frequent amendments.

2. PUBLIC INVOLVEMENT

Opportunity for the public to provide input into the preparation of the Plan was provided by the Board by scheduling and providing public notice of a public meeting to accept input on the Plan. Notice of the meeting was provided to all customers. In the adoption of this plan, the Board considered all comments from customers.

3. COORDINATION WITH REGIONAL WATER PLANNING GROUP

Being located within the Brazos Region G, a copy of this Plan has been provided to that Regional Water Planning Group.

4. TRIGGER CONDITIONS

The Drought Emergency Management Committee is responsible for monitoring water supply and demand conditions on a monthly basis (or more frequently if conditions warrant) and shall determine when conditions warrant initiation or termination of each stage of the plan, that is, when the specified triggers are reached. The Committee will monitor monthly operating reports, water supply or storage tank levels and/or rainfall as needed to determine when trigger conditions are reached. The triggering conditions described below take into consideration: the vulnerability of the water source under drought of record conditions; the production, treatment and distribution capacities of the system, and member usage based upon historical patterns.

- a. Stage I - Mild Condition:** Stage I water allocation measures may be implemented when one or more of the following conditions exist:
- 1) Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days.
 - 2) Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month.
 - 3) There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.
- b. Stage II - Moderate Conditions:** Stage II water allocation measures may be implemented when one of the following conditions exist:
- 1) Water consumption has reached 90 percent of the amount available for three consecutive days.
- c. Stage III - Severe Conditions:** Stage III water allocation measures may be implemented when one of the following five conditions exist:
- 1) Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer.
 - 2) Water consumption of 95 percent or more of the maximum available for three (3) consecutive days.
 - 3) Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period.
 - 4) Natural or man-made contamination of the water supply source(s).
 - 5) The declaration of a state of disaster due to drought conditions in a county or counties served by the City.
 - 6) Reduction of wholesale water supply due to drought conditions.
 - 7) Other unforeseen events which could cause imminent health or safety risks to the public.

5. STAGE LEVELS OF WATER ALOCATIONS

The stage levels of water allocations are to be placed in effect by the triggers in Section D. The System shall institute monitoring and enforce penalties for violations of the Drought Plan for each of the Stages listed below. The water allocation measures are summarized below.

- a. Stage I - Mild Conditions**
- 1) Alternate day, time of day, or duration restrictions for outside water usage allowed. (System will notify Customers which restriction is in effect)
 - 2) The system will reduce flushing operations.
 - 3) Reduction of customers' water use will be encouraged through notices on bills or other method.
- b. Stage II - Moderate Conditions**
- 1) All outside water use is prohibited (except for livestock variances).
 - 2) Make public service announcements as conditions change via local media (TV, radio, newspapers, etc.).

c. Stage III - Severe Conditions

- 1) All outside watering prohibited.
- 2) Water use will be restricted to a percentage of each member's prior month usage. This percentage may be adjusted as needed according to demand on the system. Notice of this amount will be sent to each customer.
- 3) Corporation shall continue enforcement and educational efforts.

NOTE :

- Refer to your water purchase contract for additional restrictions/requirements that may be imposed by stipulations from the wholesale supplier.
- There may be additional restrictions imposed by Governmental Entities.
- Meters will be read as often as necessary to insure compliance with this program for the benefit of all the customers.

6. INITIATION AND TERMINATION PROCEDURES

Once a trigger condition occurs, the City, or its designated responsible representative, shall, based on recommendation from the Chairperson of the Drought/Emergency Management Committee, decide if the appropriate stage of rationing shall be initiated. The initiation may be delayed if there is a reasonable possibility the water system performance will not be compromised by the condition. If water allocation is to be instituted, written notice to the customers shall be given.

Written notice of the proposed water allocation measure shall be mailed or delivered to each affected customer upon the initiation of each stage. In addition, upon adoption of Stage II or Stage III, a notice will be placed in a local newspaper or announced on a local radio or television station. The customer notice shall contain the following information:

- a. The date water allocation shall begin,
- b. The expected duration,
- c. The stage (level) of water allocations to be employed,
- d. Penalty for violations of the water allocation program, and
- e. Affected area or areas.

If the water allocation program extends 30 days then the Chairperson of the Drought/Emergency Management Committee or manager shall present the reasons for the allocations at the next scheduled Council Meeting and shall request the concurrence of the Board to extend the allocation period.

When the trigger condition no longer exists then the responsible official may terminate the water allocations provided that such an action is based on sound judgment. Written notice of the end of allocations shall be given to customers. A water allocation period may not exceed 60 days without extension by action of the Board.

7. PENALTIES FOR VIOLATIONS

- a. **First Violation** – The customer/member will be notified by a written notice of their specific violation.
- b. **Second Violation** - The City may install a flow restricting device in the customer's service line to limit the amount of water that will pass through the meter in a 24 hour period. The cost of this shall be the actual cost to do the work and shall be paid by the customer.

- c. **Subsequent Violations** - The City may terminate service for up to 7 days and charge for the service call to restore service.

These provisions apply to all customers of the City.

8. EXEMPTIONS OR WAIVERS

The Drought/Emergency Management Committee may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health or sanitation for the public or the person requesting such variance and if one or more of the following conditions are met:

- a. Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- b. Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the Drought/Emergency Management Committee within 5 days after the Plan or a particular drought response stage has been invoked or after a condition justifying the variance first occurs. All petitions for variances shall be reviewed by the Committee and shall include the following:

- Name and address of the petitioner(s).
- Purpose of water use.
- Specific provision(s) of the Plan from which the petitioner is requesting relief.
- Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Plan.
- Description of the relief requested.
- Period of time for which the variance is sought.
- Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- Other pertinent information, as requested by the Committee.

Variances granted by the Committee shall be subject to the following conditions, unless specifically waived or modified by the Committee or City Council.

- Variances granted shall include a timetable for compliance.
- Variances granted shall expire when the water allocation is no longer in effect, unless the petitioner has failed to meet specified requirements. No variance allowed for a condition requiring water allocation will continue beyond the termination of water allocation under Section F. Any variance for a subsequent water allocation must be petitioned again. The fact that a variance has been granted in response to a petition will have no relevance to the Committee's decision on any subsequent petition.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

SECTION H: EMERGENCY RATIONING PROGRAM

The following water rationing program is adopted for emergency use only during periods of acute water shortage.

1. Declaration of Emergency. When a system demand exceeds production or storage capability measured over a twenty-four (24) hour period, and refilling the storage facilities is rendered impossible, OR when the Corporation is notified by its wholesale supplier of a outback in water to be delivered to such an extent that normal use patterns will no longer be possible, the Corporation may declare an emergency to exist, and thereafter ration water in the following manner.

2. Notice Requirements. Written notice of the proposed rationing shall be mailed or delivered to each affected Member seventy-two (72) hours before the Corporation actually starts the program, and shall also be placed in a local newspaper. The Member notice shall contain the following information:

- a. The date rationing shall begin;
- b. The date rationing shall end;
- c. The stage (level) of rationing to be employed;
- d. A copy of this rationing authority; and
- e. Affected area to be rationed.

3. Stage Levels of Rationing.

a. STAGE I (Mild Rationing Conditions) -- Alternate day usage of water for outdoor purposes such as lawns, gardens, car washing, etc. The provisions for alternate day use shall be specified by the Corporation in the written notice.

b. STAGE I-A (Limited Water Usage) -- The Corporation may limit water usage to a gallonage determined by the water plant's mechanical capability to provide continuous service in direct proportion to the loss of production/refill capability at a plant where no back-up facilities are available to remedy the shortage, prorated over all Members served by the water plant. Water restrictors may be installed for Members that exceed the limited gallonage determined by the system's mechanical capability. A flow restrictor shall be installed at the Member's expense (not to exceed actual costs or \$50.00). Tampering with the flow restrictor will result in water service termination for seven (7) days. The normal Reconnection Fee (Service Trip Fee) of the Corporation shall apply for restoration of service. The maximum number of gallons per meter per month shall be contained in the notice to each Member.

c. STAGE II (Moderate Rationing Conditions) -- All outdoor water usage is prohibited; however, usage for livestock is exempt.

DATE APPROVED February 8, 1990

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d. STAGE III (Severe Rationing Conditions) -- All outdoor water usage is prohibited; livestock may be exempted by the Corporation. All consumption shall be limited to each Member in one of the following ways;

(1) A fixed percentage of each Member's average use in the prior month, the percentage to be uniformly applied on a system-wide basis, each Member being notified of this percentage amount, OR,

(2) A maximum number of gallons per meter (Member) per week, with notice to each Member of this number.

Total percentages under item 1 or maximum number of gallons under item 2 above shall be calculated not to exceed 80 % of the system's current production/refill capability for the area being rationed.

4. Violation of Emergency Rationing Rules.

a. First Violation - The Corporation may install a flow restrictor in the line to limit the amount of water which will pass through the meter in a twenty-four (24) hour period. The cost to be charged to the Member's account shall be the actual installed cost to the Corporation, not to exceed \$50.00.

b. Subsequent Violations - The Corporation may terminate service at the meter for a period of seven (7) days, or until the end of the calendar month, whichever is LESS. The normal service trip fee of the Corporation shall apply for restoration of service.

5. Exemptions or Variances From Rationing Rules. The Board of Directors may grant any Member an exemption or variance from the uniform rationing program, for good cause. The Corporation shall treat all Members equally concerning exemptions and variances, and shall not employ discrimination in such grants.

6. Rates. All existing rate schedules shall remain in effect during the rationing period, and no charges may be levied against a Member which are not contained in the approved Tariff of the Corporation.

The purpose of this Emergency Rationing Program is to conserve the total amount of water demanded from the Corporation until supply can be restored to normal levels. This rationing program shall not exceed sixty (60) days without extension by the Board of Directors.

SECTION H.
DROUGHT CONTINGENCY
AND
EMERGENCY WATER DEMAND MANAGEMENT PLAN

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the E O L Water Supply Corporation hereby adopts the following regulations and restrictions on the delivery and consumption of water.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

B. SECTION II: PUBLIC INVOLVEMENT

Opportunity for the public to provide input into the preparation of the Plan was provided by the E O L Water Supply Corporation by means of scheduling and providing public notice of a public meeting to accept input on the Plan. Notice of the meeting was provided to all customers. In the adoption of this plan the Board considered all comments from customers.

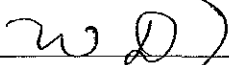
Section III: Public Education

The E O L Water Supply Corporation will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of utility bill messages for Stages 1 and 2 notification, and press releases and/or special mailings for all other stages.

Section IV: Coordination with Regional Water Planning Groups

The service area of the E O L Water Supply Corporation is located within the Brazos G Regional Water Planning Group and McLennan County Water Conservation District. E O L Water Supply Corporation has provided a copy of this Plan to the Brazos G Regional Water Planning Group.

Approved _____



Section V: Authorization

The general manager or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The general manager or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the E O L Water Supply Corporation. The terms “person” and “customer” as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use, which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

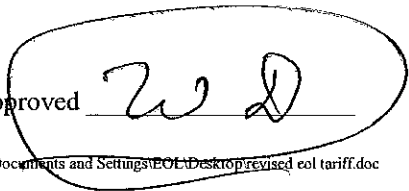
Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by E O L Water Supply Corporation.

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

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Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential, nor required for the protection of public, health, safety, and welfare, including:

- (a) irrigation of landscape areas, including parks, lawns, gardens, athletic fields, and golf courses, except otherwise provided under this Plan;
- (b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
- (c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
- 4) use of water to wash down buildings or structures for purposes other than immediate fire protection;
- 5) flushing gutters or permitting water to run or accumulate in any gutter or street;
- 6) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;
- 7) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
- 8) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
- 9) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

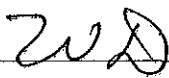
The general manager or his/her designee shall monitor water supply and/or demand conditions on a monthly basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified "triggers" are reached.

The triggering criteria described below are based on known system capacity limits and weather patterns for this area.

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation

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Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII – Definitions, annually beginning June 1 through September 30 if no significant rain for 3 weeks.

Requirements for termination

Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 5 consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when continually falling treated water reservoir levels which do not refill above 90 percent overnight for any of the storage systems.

Requirements for termination

Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 5 consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when continually falling treated water reservoir levels which do not refill above 80 percent overnight for any of the storage systems.

Requirements for termination

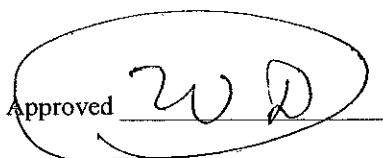
Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 5 consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when continually falling treated water reservoir levels which do not refill above 70 percent overnight for any of the storage systems.

Requirements for termination

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Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when General Manager, or his/her designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**
2. Natural or man-made contamination of the water supply source(s).

Requirements for termination

Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 2 consecutive days or when testing shows the problem has been corrected.

Stage 6 Triggers -- WATER ALLOCATION

Requirements for initiation

Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when continually falling treated water reservoir levels which do not refill above 50 percent overnight in any of the systems.

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 5 consecutive days.

Section IX: Drought Response Stages

The general manager, or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification

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Notification of the Public:

The general manager or his/ here designee shall notify the public by means of:

Messages on billings statements, public service announcements on local television stations, and signs posted in public places.

Additional Notification:

The general manager or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Stage 1 - Mayor and City Council of Jarrell and Jarrell Volunteer Fire Department

Stage 2 – In addition to above, Bell and Williamson County Emergency Management Coordinator(s), County Commissioners, Bell and Williamson County Sheriff Departments, State Disaster District / Department of Public Safety, park and public facility managers, and TCEQ.

Stage 3 – All of the above and any major or critical water users.

Stage 4 & 5 All of the above.

Stage 1 Response -- MILD Water Shortage Conditions

Goal: Achieve a voluntary 5 percent reduction in daily water demand.

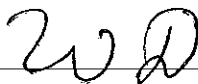
Supply Management Measures:

Reduced or discontinued flushing of water lines.

Voluntary Water Use Restrictions:

- (a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.
- (b) All operations of the E O L Water Supply Corporation shall adhere to water use restrictions prescribed for Stage 2 of the Plan.
- (c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

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Stage 2 Response -- MODERATE Water Shortage Conditions

Goal: Achieve a 10 percent reduction in daily water demand.

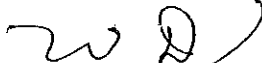
Supply Management Measures:

Discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas.

Water Use Restrictions. Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

- 1) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.
- 2) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.
- 3) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.
- 4) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- 5) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that

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use of water from designated fire hydrants for construction purposes may be allowed under special permit from the E O L Water Supply Corporation.

- 6) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the E O L Water Supply Corporation, the facility shall not be subject to these regulations.
- 7) All restaurants are prohibited from serving water to patrons except upon request of the patron.
- 8) The following uses of water are defined as non-essential and are prohibited:
 - 1) wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
 - 2) use of water to wash down buildings or structures for purposes other than immediate fire protection;
 - 3) use of water for dust control;
 - 4) flushing gutters or permitting water to run or accumulate in any gutter or street; and
 - 5) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

Goal: Achieve a 15 percent reduction in daily water demand

Supply Management Measures:

Discontinued flushing of water mains, and discontinued irrigation of public landscaped areas.

Water Use Restrictions. All requirements of Stage 2 shall remain in effect during Stage 3 except:

- 1) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.
- 2) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the E O L Water Supply Corporation.

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- 3) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

Goal: Achieve a 20 percent reduction in daily water demand.

Supply Management Measures:

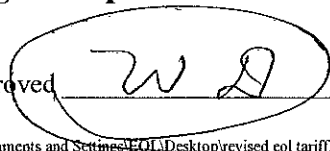
Discontinued flushing of water mains, and discontinued irrigation of public landscaped areas.

Water Use Restrictions. All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

- 1) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.
- 2) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.
- 3) The filling, refilling, or adding of water to swimming pools, wading pools, and jacuzzi-type pools is prohibited.
- 4) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- 5) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

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Goal: Achieve a 25 percent reduction in daily water demand.

Supply Management Measures:

Discontinued flushing of water mains, and discontinued irrigation of public landscaped areas.

Water Use Restrictions. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

- 1) Irrigation of landscaped areas is absolutely prohibited.
- 2) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Stage 6 Response -- WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the General Manager is hereby authorized to allocate water according to the following water allocation plan:

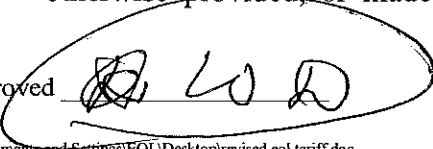
Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

“Household” means the residential premises served by the customer’s meter. “Persons per household” includes only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer’s household is comprised of two (2) persons unless the customer notifies the E O L Water Supply Corporation of a greater number of persons per household on a form prescribed by the General Manager or his/her designee. The General Manager shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a

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customer does not receive such a form, it shall be the customer's responsibility to go to the E O L Water Supply Corporation offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the General Manager. When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the E O L Water Supply Corporation on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the E O L Water Supply Corporation in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the General Manager shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the E O L Water Supply Corporation of a reduction in the number of person in a household shall be fined not less than \$ 100.


Residential water customers shall pay the following surcharges:

- \$ 10 for the first 1,000 gallons over allocation.
- \$ 15 for the second 1,000 gallons over allocation.
- \$ 20 for the third 1,000 gallons over allocation.
- \$ 25 for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (e.g., apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer's meter serves two dwelling units unless the customer notifies the E O L Water Supply Corporation of a greater number on a form prescribed by the General Manager. The General Manager shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the E O L Water Supply Corporation offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the General Manager. If the number of dwelling units served by a master meter is reduced, the customer shall notify the E O L Water Supply Corporation in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the General Manager shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the E O L Water Supply Corporation of a reduction in the number

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of person in a household shall be fined not less than \$ 100. Customers billed from a master meter under this provision shall pay the following monthly surcharges:

- \$ 10 for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.
- \$ 20, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.
- \$ 30, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.
- \$ 40, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

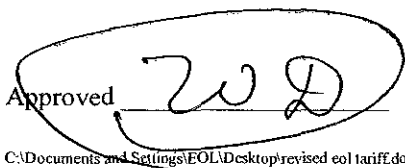
Commercial Customers

A monthly water allocation shall be established by the General Manager, or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately 75 percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Provided, however, a customer, 75 percent of whose monthly usage is less than 6000 gallons, shall be allocated 6000 gallons. The General Manager shall give his/her best effort to see that notice of each non-residential customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the E O L Water Supply Corporation to determine the allocation. Upon request of the customer or at the initiative of the General Manager, the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the President of the E O L Water Supply Corporation. Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is 6000 gallons through 10000 gallons per month:

- \$ 10 per thousand gallons for the first 1,000 gallons over allocation.
- \$ 15 per thousand gallons for the second 1,000 gallons over allocation.
- \$ 20 per thousand gallons for the third 1,000 gallons over allocation.
- \$ 25 per thousand gallons for each additional 1,000 gallons over allocation.

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Customers whose allocation is 10000 gallons per month or more:

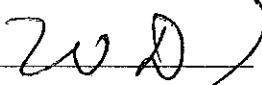
- 1.5 times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
- 2.0 times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
- 2.5 times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
- 3.0 times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

D. Industrial Customers

A monthly water allocation shall be established by the General Manager, or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer's allocation shall be approximately 90 percent of the customer's water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer's allocation shall be further reduced to 85 percent of the customer's water usage baseline. The industrial customer's water use baseline will be computed on the average water use for the 3 month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer's billing history is shorter than 3 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The General Manager shall give his/her best effort to see that notice of each industrial customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the E O L Water Supply Corporation to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the General Manager, the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer's normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the President of the E O L Water Supply Corporation. Industrial customers shall pay the following surcharges:

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Customers whose allocation is 6000 gallons through 10000 gallons per month:

\$ 10 per thousand gallons for the first 1,000 gallons over allocation.

\$ 15 per thousand gallons for the second 1,000 gallons over allocation.

\$ 20 per thousand gallons for the third 1,000 gallons over allocation.

\$ 25 per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is 10000 gallons per month or more:

1.5 times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.

2.0 times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.

2.5 times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.

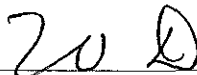
3.0 times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Section X: Enforcement

- (a) No person shall knowingly or intentionally allow the use of water from the E O L Water Supply Corporation for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by General Manager, or his/her designee, in accordance with provisions of this Plan.
- (b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than fifty dollars (\$50) and not more than five hundred dollars (\$500). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the General Manager shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at \$70, and any other costs incurred by the E O L Water Supply Corporation in discontinuing service. In addition, suitable assurance must be given to the General Manager that the same action shall not be repeated while the Plan

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is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

- (c) Any person, including a person classified as a water customer of the E O L Water Supply Corporation, in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

- (d) Any member of the country sheriff's department may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance based on information provided by the E O L Water Supply Corporation. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the county court on the date shown on the citation. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in county court to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in county court, a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant.

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Section XI: Variances

The General Manager or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

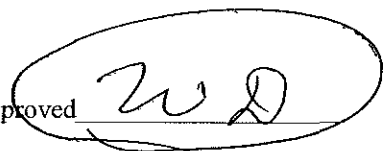
Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the E O L Water Supply Corporation within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the General Manager, or his/her designee, and shall include the following:

- (a) Name and address of the petitioner(s).
- (b) Purpose of water use.
- (c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
- (d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- (e) Description of the relief requested.
- (f) Period of time for which the variance is sought.
- (g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (h) Other pertinent information.

Variances granted by the E O L Water Supply Corporation shall be subject to the following conditions, unless waived or modified by the General Manager or his/her designee:

- (a) Variances granted shall include a timetable for compliance.
- (b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.



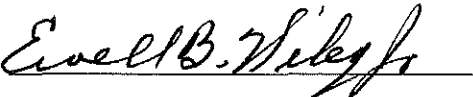
**GHOLSON WATER SUPPLY CORPORATION
RESOLUTION ADOPTING DROUGHT CONTINGENCY PLAN**

WHEREAS, The Gholson Water Supply Corporation, in order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, safety, and minimize the adverse impacts of water supply shortage or other water supply emergency conditions,

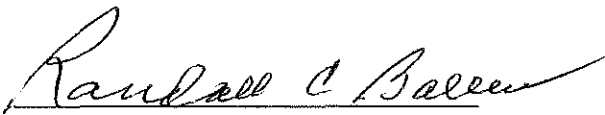
NOW THEREFORE BE IT RESOLVED, that The Gholson Water Supply Corporation does adopt a Drought Contingency Plan.

That it is hereby officially found and determined that the Board of Directors meeting at which this resolution is passed is open to the public as required by law, and that public notice of the time, place and purpose of said meeting was given as required.

PASSED AND APPROVED this the 6th day of June, 2004.


Ewell B Wiley, Jr., President

ATTEST:



Randall C. Ballew, Secretary

**A RESOLUTION OF THE BOARD OF DIRECTORS OF THE
GHOLSON WATER SUPPLY CORPORATION ADOPTING A
DROUGHT CONTINGENCY PLAN.**

WHEREAS, the Board recognizes that the amount of water available to the Gholson Water Supply Corporation and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, Section 12.1172 of the Texas Water Code and applicable rules of the Texas Natural Resource Conservation Commission require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interest of the customers of the Gholson Water Supply Corporation, the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE Gholson Water Supply Corporation:

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit "A" and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the Gholson Water Supply Corporation.

SECTION 2. That the plant operator is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

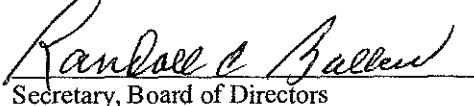
SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE GHOLSON
WATER SUPPLY CORPORATION ON THIS 6th DAY OF June, 2004.



President, Board of Directors

ATTESTED TO:



Secretary, Board of Directors

plant on the system reaches a demand equal to or greater than 80% of the total production (or refill) capacity of such plants, for 3 consecutive days.

Requirements for termination: Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. Public notification of termination of this stage shall be issued by the Board of Directors of the Gholson Water Supply Corporation, or their designee.

(c) Stage 3 – Severe Water Shortage Conditions

Target: Reduce and maintain water demand at or below 85% of system capacity.

Requirements for initiation: Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section VI of this Plan when any one plant on the system reaches a demand equal to or greater than 85% of the total production (or refill) capacity of such plants for 3 consecutive days.

Requirements for termination: Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. Public notification of termination of this stage shall be issued by the Board of Directors of the Gholson Water Supply Corporation, or their designee.

(d) Stage 4 – Critical Water Shortage Conditions

Target: Reduce and maintain water demand at or below 90% of system capacity.

Requirements for initiation: Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section VI of this plan when any one plant on the system reaches a demand equal to or greater than 95% of the total production (or refill) capacity of such plants for 3 consecutive days.

Requirements for termination: Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 4, Stage 3 becomes operative. Public notification of termination of this stage shall be issued by the Board of Directors of the Gholson Water Supply Corporation, or their designee. Notification to TCEQ

(e) Stage 5 – Emergency Water Shortage Conditions

Target: Discontinue all water system operations.

Requirements for initiation: Customers shall be required to comply with the requirements and restrictions of Section VI of this Plan when the Board of Directors of the Gholson Water Supply Corporation, or their designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**
2. Natural or man-made contamination of the water supply source (s).

Requirements for termination: Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist. Public notification of termination of this stage shall be issued by the Board of Directors of the Gholson Water Supply Corporation, or their designee. Notification to TCEQ.

Section VIII: Drought Response Stages

The Board of Directors of the Gholson Water Supply Corporation, or their designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VII of the Plan, shall determine that a mild, moderate, severe, critical, or emergency condition exists and shall implement the provision outlined in Section VII.

Stage 1 – Mild Water Shortage Conditions

Goal: Achieve a voluntary 20 percent reduction in total consumption.

Voluntary Water Use Restrictions:

- (a) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 – Moderate Water Shortage Conditions

Goal: Achieve a 25 percent reduction in total consumption and move to Stage 1.

Supply Management Guidelines: No flushing of water lines.

Water Use Restrictions - Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

- (a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays, Tuesdays, and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6, or 8), and Mondays, Wednesdays, and Saturdays for customers with a street address ending in an odd number (1, 3, 5, 7, or 9). Irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight or designated water days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shut off nozzle for quick rinse. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

(c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight.

(e) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the Gholson Water Supply Corporation, the facility shall not be subject to these regulations in the use of such other water source.

(f) Non-essential water uses as previously defined are prohibited.

Stage 3 - Severe Water Shortage Conditions

Goal: Achieve a 35% reduction in total consumption and move to Stage 2.

Supply Management Guidelines: No flushing of water lines.

Water Use Restrictions – All requirements of Stage 2 shall remain in effect during Stage 3 except:

(a) Irrigation of landscaped areas shall be limited to Stage 2 designated watering days between the hours of 12:00 midnight and 10:00 a.m. between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. This use of hose-end sprinklers is prohibited at all times.

(b) The watering of golf course greens, tees and fairways is prohibited unless the gold course utilizes a water source other than that provided by Gholson Water Supply Corporation.

(c) The use of water for construction purposes from designated fire hydrants or flush valves is to be discontinued.

Stage 4 – Critical Water Shortage Conditions

Goal: Achieve 45% reduction in total consumption and move to Stage 3.

Supply Management Guidelines: No water line flushing

Water Use Restrictions: All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

- (a) Irrigation of landscaped areas shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6, 8) and Saturdays and Wednesdays for customers with a street address ending in an odd number (1, 3, 5, 7, 9) between the hours of 6:00 a.m. and 10 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand held hoses, hand held buckets, or drip irrigation only. The use of hose-end sprinklers and automatic sprinkler systems is prohibited at all times.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10: a.m. and between 6:00 p.m. and 10:00 p.m.
- (c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

Stage 5 - Emergency Water Shortage Conditions

Goal: Achieve a 50 percent reduction in total consumption.

Supply Management Guidelines: No water line flushing.

Water Use Restrictions – All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

- (a) Irrigation of landscaped areas is absolutely prohibited.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Section IX: Violations

1. First violation – The customer will be notified by written notice of their specific violation.
2. Subsequent violations:
 - (a) After written notice, the utility may install a flow restricting device in the line to limit the amount of water which will pass through the meter in a 24-hour period. The utility may charge the customer for the actual cost of installing and removing the flow restricting device, not to exceed \$50.00.
 - (b) After written notice, the utility may discontinue service at the meter for a period of seven (7) days, or until the end of the calendar month, whichever is LESS. The normal reconnect fee of the utility will apply for restoration of service.

Section X: Enforcement

(a) No person shall allow the use of water from Gholson Water Supply Corporation for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by the Board of Directors of the Gholson Water Supply Corporation, or their designee, in accordance with provisions of this Plan.

(b) The Board of Directors of the Gholson Water Supply Corporation may institute temporary rate schedules to enforce the drought response stages as follows:

Stage 2 – 25% increase in the price per 1,000 gallons used above the minimum monthly bill.

Stage 3 – 50% increase in the price per 1,000 gallons used above the minimum monthly bill.

Stage 4 – 75% increase in the price per 1,000 gallons used above the minimum monthly bill.

Stage 5 – Any usage above the pro rata allocation shall be grounds for termination of service.

Section XI: Variations

The Board of Directors of the Gholson Water Supply Corporation, or their designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, safety or fire protection of the public or the person requesting such variance and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the Secretary of Gholson Water Supply Corporation within 5 days after the Plan or particular drought response stage has been invoked. J All petitions for variances shall be reviewed by the Board of Directors of the Gholson Water Supply Corporation, or their designee, and shall include the following:

- (a) Name and address of the petitioner(s).
- (b) Purpose of water use.
- (c) Specific provisions(s) of the Plan from which the petitioner is requesting relief.
- (d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Plan.
- (e) Description of the relief requested.
- (f) Period of time for which the variance is sought.
- (g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (h) Other pertinent information.

Variances granted by Gholson Water Supply Corporation shall be subject to the following conditions, unless waived or modified by the Board of Directors or their designee:

- (a) Variances granted shall include a timetable for compliance.
- (b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.
- (c) Variances granted may be revoked by the Board of Directors of Gholson Water Supply Corporation, or their designee, at any time and without cause.

No variances shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section VII: Severability

It is hereby declared to be the intention of Gholson Water Supply Corporation that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by Gholson Water Supply Corporation without the

incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.



**Drought Contingency Plan
for
LEROY-TOURS-GERALD
WATER SUPPLY CORPORATION**

Leroy - Tours - Gerald Water Supply Corporation (L-T-G-WSC)
(Name of Utility)

P.O. Box 22 Leroy, TX 76654
(Address, City, Zip Code)

10025
(CCN#)

1550027
(PWS #s)

May 26, 2009
(Date)

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the L-T-G WSC hereby adopts the following regulations and restrictions on the delivery and consumption of water through an ordinance/or resolution.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the L-T-G WSC by means of scheduling and providing public notice of a public meeting to accept input on the plan.

The meeting will take place at: 312 COMMERCE ST, LEROY, TX 76654

Date: JUNE 11, 2009 Time: 7:00 p.m. Location: CORPORATION'S OFFICE

Notice will be posted at the Leroy and Elm Mott Post Offices and on the Corporation's office door. Notice will also be posted at the McLennan County Court House and at M&S Grocery in Leroy, TX.

Section III: Public Education

The L-T-G WSC will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of public meeting, press releases, utility bill inserts, and/or public postings.

Section IV: Coordination with Regional Water Planning Groups

The service area of the L-T-G WSC is located within the Brazos G and L-T-G WSC has provided a copy of this Plan to the Brazos G.

(Section 4 will be done when the Plan is fully completed.)

Section V: Authorization

The Board President, or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The Board President, or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the L-T-G WSC. The terms Aperson@ and Acustomer@ as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by L-T-G WSC.

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

- (a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
- (b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
- (c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
- (d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
- (e) flushing gutters or permitting water to run or accumulate in any gutter or street;
- (f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
- (g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
- (h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
- (i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The Board President or his/her designee shall monitor water supply and/or demand conditions on a daily water demand basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified Atargets@ are reached.

Stage 1 Target -- MILD Water Shortage Conditions

Requirements for initiation

Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII B Definitions:

Annually, beginning on May 1 through September 30, however, Stage I restrictions may extend later into the year if weather conditions warrant.

Requirements for termination

Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of seven (7) consecutive days.

Stage 2 Targets -- MODERATE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when:

- a. Pump hours per day: over 10 hours
- b. Continually falling treated water reservoir levels which do not refill overnight.
- c. Production or distribution limitations.

Requirements for termination

Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of seven (7) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Targets B SEVERE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when:

- a. Pump hours per day: over 16 hours.
- b. Any storage tank that fails to fill to the 15 foot level overnight.
- c. Production or distribution limitations.

Requirements for termination

Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of seven (7) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Targets -- CRITICAL Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when:

- a. Pump hours per day: over 20 hours.
- b. Production or distribution limitations or equipment failures.
- c. Any storage tank that falls below the 10 foot level overnight or any plant that has less than 40psi of pressure for over 15 minutes.

Requirements for termination

Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of seven (7) consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Targets -- EMERGENCY Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when Board President, or his/her designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**
2. Natural or man-made contamination of the water supply source(s).

Requirements for termination

Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of seven (7) consecutive days.

Stage 6 Targets -- WATER ALLOCATION

Requirements for initiation

Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when:

- a. Any storage tank falls below the cut-on electrodes.
- b. Production or distribution limitations or equipment failures.
- c. Power outage expected for long durations.

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of seven (7) consecutive days.

Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary 15 percent reduction in daily water demand.

Best Management Practices for Supply Management:

Reduced flushing of water mains, activation and use of an alternative supply source(s).

Voluntary Water Use Restrictions for Reducing Demand :

- (a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.
- (b) All operations of the L-T-G- WSC shall adhere to water use restrictions prescribed for Stage 2 of the Plan.
- (c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a 20 percent reduction in daily water demand.

If voluntary did not reduce usage by 15%, then goal will be 35%. If some reduction was achieved then the goal will be 20%.

Best Management Practices for Supply Management:

Additional measures, if any, to be implemented directly by L-T-G WSC to manage limited water supplies and/or reduce water demand. Reduced flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s). Provide customers with a list of water conservation measures and additional notices and news releases.

Water Use Restrictions for Demand Reduction:

Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

- (a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.
- (c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the L-T-G WSC.

- (f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the L-T-G WSC, the facility shall not be subject to these regulations.
- (g) All restaurants are prohibited from serving water to patrons except upon request of the patron.
- (h) The following uses of water are defined as non-essential and are prohibited:
 - 1. Wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
 - 2. Use of water to wash down buildings or structures for purposes other than immediate fire protection;
 - 3. Use of water for dust control;
 - 4. Flushing gutters or permitting water to run or accumulate in any gutter or street; and
 - 5. Failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

Target: Achieve a 25 percent reduction in daily water demand.

Best Management Practices for Supply Management:

Additional measure to be implemented directly by L-T-G WSC to manage limited water supplies and/or reduce water demand. Reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s).

Water Use Restrictions for Demand Reduction:

All requirements of Stage 2 shall remain in effect during Stage 3 except:

- (a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.
- (b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the L-T-G WSC.
- (c) The use of water for construction purposes from designated fire hydrants under

special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

Target: Achieve a 25 percent reduction in daily water demand.

Best Management Practices for Supply Management:

Additional measures to be implemented directly by L-T-G WSC to manage limited water supplies and/or reduce water demand. Reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s). Any wasteful use of water, Member will be notified and will be penalized \$50.00 on the next water bill.

Water Use Restrictions for Reducing Demand:. All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

- (a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.
- (c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

Target: Achieve a 25 percent reduction in daily water demand.

Best Management Practices for Supply Management:

Additional measures to be implemented directly by L-T-G WSC to manage limited water supplies and/or reduce water demand: Discontinued flushing of water mains, discontinued irrigation of public landscaped areas; use of an alternative supply source(s). Water being supplied to each Member may be limited to a fixed percentage of each such Member's use in the prior month, the percentage to be applied on a system-wide basis, with each Member being notified of this percentage amount.

Water Use Restrictions for Reducing Demand. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

- (a) Irrigation of landscaped areas is absolutely prohibited.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Stage 6 Response -- WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the _____ (designated official) is hereby authorized to allocate water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

AHousehold@ means the residential premises served by the customer=s meter. APersons per household@ include only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer=s household is comprised of two (2) persons unless the customer notifies the _____ (name of your water supplier) of a greater number of persons per household on a form prescribed by the _____ designated official). The _____ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a

form, it shall be the customer=s responsibility to go to the _____ (name of your water supplier) offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the _____ (designated official). When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the _____ (name of water supplier) on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the _____ (name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the _____ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the _____ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than \$_____.

Residential water customers shall pay the following surcharges:

- \$_____ for the first 1,000 gallons over allocation.
- \$_____ for the second 1,000 gallons over allocation.
- \$_____ for the third 1,000 gallons over allocation.
- \$_____ for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (example: apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer=s meter serves two dwelling units unless the customer notifies the _____ (name of your water supplier) of a greater number on a form prescribed by the _____ (designated official). The _____ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer=s responsibility to go to the _____ (name of your water supplier) offices to complete

and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the _____ (designated official). If the number of dwelling units served by a master meter is reduced, the customer shall notify the _____ (name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the _____ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the _____ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than \$_____. Customers billed from a master meter under this provision shall pay the following monthly surcharges:

- \$_____ for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.
- \$_____, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.
- \$_____, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.
- \$_____, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Commercial Customers

A monthly water allocation shall be established by the _____ (designated official), or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer=s allocation shall be approximately ___ (e.g. 75%) percent of the customer=s usage for corresponding month=s billing period for the previous 12 months. If the customer=s billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Provided, however, a customer, ___ percent of whose monthly usage is less than _____ gallons, shall be allocated _____ gallons. The _____ (designated official) shall give his/her best effort to see that notice of each non-residential customer=s allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer=s responsibility to contact the _____ (name of your water supplier) to determine the allocation. Upon request of the customer or at the initiative of the _____ (designated official), the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer=s normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the _____ (designated official or alternatively, a special water allocation review committee). Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through _____ gallons per month:

- \$_____ per thousand gallons for the first 1,000 gallons over allocation.
- \$_____ per thousand gallons for the second 1,000 gallons over allocation.
- \$_____ per thousand gallons for the third 1,000 gallons over allocation.
- \$_____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is _____ gallons per month or more:

- _____ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
- _____ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
- _____ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
- _____ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, A block rate@ means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer=s allocation.

Industrial Customers

A monthly water allocation shall be established by the _____ (designated official), or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer=s allocation shall be approximately ____ (example: 90%) percent of the customer=s water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer=s allocation shall be further reduced to ____ (example: 85%) percent of the customer=s water usage baseline. The industrial customer=s water use baseline will be computed on the average water use for the _____ month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer=s billing history is shorter than ____ months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The _____ (designated official) shall give his/her best effort to see that notice of each industrial customer=s allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer=s responsibility to contact the _____ (name of your water supplier) to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the _____ (designated official), the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer=s normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer

has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the _____ (designated official or alternatively, a special water allocation review committee). Industrial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through _____ gallons per month:

- \$_____ per thousand gallons for the first 1,000 gallons over allocation.
- \$_____ per thousand gallons for the second 1,000 gallons over allocation.
- \$_____ per thousand gallons for the third 1,000 gallons over allocation.
- \$_____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is _____ gallons per month or more:

- _____ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
- _____ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
- _____ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
- _____ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, A block rate@ means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer=s allocation.

Section X: Enforcement

- (a) No person shall knowingly or intentionally allow the use of water from the _____ (name of your water supplier) for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by _____ (designated official), or his/her designee, in accordance with provisions of this Plan.
- (b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than _____ dollars (\$____) and not more than _____ dollars (\$____). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the _____ (designated official) shall, upon due notice to the customer, be authorized to

discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at \$_____, and any other costs incurred by the _____ (name of your water supplier) in discontinuing service. In addition, suitable assurance must be given to the _____ (designated official) that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

- (c) Any person, including a person classified as a water customer of the _____ (name of your water supplier), in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person=s property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents= control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

- (d) Any employee of the _____ (name of your water supplier), police officer, or other _____ employee designated by the _____ (designated official), may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the _____ (example: municipal court) on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator=s immediate family or is a resident of the violator=s residence. The alleged violator shall appear in _____ (example: municipal court) to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in _____ (example: municipal court), a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in _____ (example: municipal court) before all other cases.

Section XI: Variances

The _____ (designated official), or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _____ (name of your water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the _____ (designated official), or his/her designee, and shall include the following:

- (a) Name and address of the petitioner(s).
- (b) Purpose of water use.
- (c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
- (d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- (e) Description of the relief requested.
- (f) Period of time for which the variance is sought.
- (g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (h) Other pertinent information.

If you have any questions on how to fill out this form or about the Drought Contingency program, please contact us at 512/239-_____.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

BE IT RESOLVED BY THE McLENNAN COUNTY WATER CONTROL AND
IMPROVEMENT DISTRICT NO. TWO:

That the Drought Contingency Plan for the District be and the same is hereby adopted.

BE IT FURTHER RESOLVED that the President be and he is hereby authorized to
execute the Plan for and on behalf of the District and that a copy of the Drought Contingency
Plan be sent to the proper designated authority.

Passed and Approved on August 29, 2000.

McLennan County Water Control and
Improvement District No. Two

By John H. Maxwell
President

Attest:

Ronald Carter
Secretary

**DROUGHT CONTINGENCY PLAN
FOR THE
McLENNAN COUNTY WATER CONTROL & IMPROVEMENT DISTRICT NO. TWO**

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the McLennan County Water Control & Improvement District No. Two ("Water District") hereby adopts the following regulations and restrictions on the delivery and consumption of water.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the Water District by means of a scheduled public hearing to accept input on the proposed plan.

Section III: Public Education

The Water District will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of press releases, utility bill inserts and water conservation materials provided at the Water District office.

Section IV: Coordination with Regional Water Planning Groups

The service area of the Water District is located within the Brazos Region and Water District has provided a copy of this Plan to the Brazos River Authority.

Section V: Authorization

The President of the Board of Directors of Water District or his designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The President or his designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the Water District. The terms "person" and "customer" as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by the Water District.

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

- (a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
- (b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
- (c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
- (d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
- (e) flushing gutters or permitting water to run or accumulate in any gutter or street;
- (f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;
- (g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
- (h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
- (i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Triggering Criteria for Initiation and Termination of Drought Response Stages

The President, or his designee, shall monitor water supply and/or demand conditions on a daily basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Public notification of the initiation or termination of drought response stages shall be by means of newspaper and sign posted in public places and by direct mailing.

The triggering criteria described below are based on daily well readings, pumping and static levels, elevated and storage tank levels.

Stage 1 - Moderate Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section VII of this Plan when any one of the three conditions occur for a period of 24 hours.

- a. When the water supply available to the Water District is equal to or less than 125% (acre feet, percentage of storage, etc.).
- b. When the static water level in the Water District well(s) is equal to or less than 560 feet above/below mean sea level.
- c. When the static water level in the Water District ground storage tanks are 50% or less.

Requirements for termination - Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 1 consecutive day.

Stage 2 - Severe Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 2 of this Plan when any of the two conditions occur for a period of 24 hours.

- a. When the water supply available to the Water District is equal to or less than 110% (acre feet, percentage of storage, etc.).
- b. When the static water level in the Water District well(s) is equal to or less than 560 feet above/below mean sea level.
- c. When the static water level in the Water District ground storage tanks are 50% or less.

Requirements for termination - Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 - Critical Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when all three of the conditions occur for a period of 24 hours.

- a. When the water supply available to the Water District is equal to or less than 100% (acre feet, percentage of storage, etc.).
- b. When the static water level in the Water District well(s) is equal to or less than 560 feet above/below mean sea level.
- c. When the static water level in the Water District ground storage tanks are 50% or less.

Requirements for termination - Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 - Emergency Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions for Stage 4 of this Plan when the President, or his designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**
2. Natural or man-made contamination of the water supply source(s).

Requirements for termination - Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days.

Water Rationing

Requirements for initiation - Customers shall be required to comply with the water allocation plan prescribed in Section X of this Plan and comply with the requirements and restrictions for Stage 4 of this Plan when all three conditions occur for a period of 24 hours.

- a. When the water supply available to the Water District is equal to or less than 100% (acre feet, percentage of storage, etc.).
- b. When the static water level in the Water District well(s) is equal to or less than 560 feet above/below mean sea level.
- c. When the static water level in the Water District ground storage tanks are 50% or less.

Requirements for termination - Water rationing may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days.

Section IX: Drought Response Stages

The President or his designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of the Plan, shall determine that a mild, moderate, severe, critical, or emergency condition exists and shall implement the following actions upon publication of notice in a newspaper of general circulation:

Stage 1 - Moderate Water Shortage Conditions

Goal: Achieve a 5 percent reduction in daily water demand.

Supply Management Measures:

Reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source.

Water Use Restrictions. Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

- (a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.
- (c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the Water District.
- (f) All restaurants are prohibited from serving water to its patrons except when requested.
- (g) The following uses of water are defined as non-essential and are prohibited:
 - 1.) wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
 - 2.) use of water to wash down buildings or structures for purposes other than immediate fire protection;
 - 3.) use of water for dust control;
 - 4.) flushing gutters or permitting water to run or accumulate in any gutter or street; and
 - 5.) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 2 - Severe Water Shortage Conditions

Goal: Achieve a 20 percent reduction in total water demand.

Supply Management Measures:

Reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source.

Water Use Restrictions. All requirements of Stage 2 shall remain in effect during Stage 3 except:

- (a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.
- (b) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 3 - Critical Water Shortage Conditions

Goal: Achieve a 30 percent reduction in daily water demand.

Supply Management Measures:

Reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source.

Water Use Restrictions. All requirements of Stage 1 and 2 shall remain in effect during Stage 3 except:

- (a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.
- (c) The filling, refilling, or adding of water to swimming pools, wading pools, and jacuzzi-type pools is prohibited.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) No applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be allowed or approved.

Stage 4 - Emergency Water Shortage Conditions

Goal: Achieve a 40 percent reduction in daily water demand.

Supply Management Measures:

Reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source.

Water Use Restrictions. All requirements of Stage 1, 2, and 3 shall remain in effect during Stage 4 except:

- (a) Irrigation of landscaped areas is absolutely prohibited.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Section X: Water Rationing

In the event that water shortage conditions threaten public health, safety, and welfare, the President is hereby authorized to ration water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

“Household” means the residential premises served by the customer’s meter. “Persons per household” includes only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer’s household is comprised of two (2) persons unless the customer notifies the Water District of a greater number of persons per household on a form prescribed by the President. The President shall give his best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a form, it shall be the customer’s responsibility to go to the Water District offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the President. When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the Water District on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the Water District in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the President shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the Water District of a reduction in the number of persons in a household may be charged with a misdemeanor in accordance with Section XI hereof. Residential water customers shall pay a 10 percent surcharge for water used over and above the above allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (e.g., apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer's meter serves two dwelling units unless the customer notifies the Water District of a greater number on a form prescribed by the President. The President shall give his best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the Water District offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the President. If the number of dwelling units served by a master meter is reduced, the customer shall notify the Water District in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the President shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the Water District of a reduction in the number of person in a household may be charged with a misdemeanor in accordance with Section XI. Customers billed from a master meter under this provision shall pay a 10 percent surcharge for water used over and above the above allocations.

Surcharges shall be cumulative.

Commercial Customers

A monthly water usage allocation shall be established by the President, or his designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately 75 percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Upon request of the customer or at the initiative of the President, the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the Board of Directors. Nonresidential commercial customers shall pay a 10

percent surcharge for water used above the allocated amount.

Industrial Customers

A monthly water usage allocation shall be established by the President or his designee for each industrial customer, which uses water for processing purposes. The industrial customer's allocation shall be approximately 90% percent of the customer's water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer's allocation shall be further reduced to 85% percent of the customer's water usage baseline. The industrial customer's water usage baseline will be computed on the average water usage for the 12 month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The President shall give his best effort to see that notice of each industrial customers allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the Water District to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the President, the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer's normal water usage because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce usage is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the Board of Directors. Industrial customers shall pay a 10 percent surcharge on water used over and above the allocated amount.

The surcharges shall be cumulative.

Section XI: Enforcement

- (a) No person shall knowingly or intentionally allow the use of water from the Water District for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by the President, or his designee, in accordance with provisions of this Plan.

- (b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than twenty-five dollars (\$25.00) and not more than one hundred dollars (\$100.00). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the President shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at \$100.00, and any other costs incurred by the Water District in discontinuing service. In addition, suitable assurance must be given to the President that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.
- (c) Any person, including a person classified as a water customer of the Water District, in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.
- (d) Any employee of the Water District designated by the President, may issue a citation to a person he reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the Justice Court on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in Justice Court to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in Justice Court, a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant.

Section XII: Variances

The President, or his designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the Water District within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the President or his designee, and shall include the following:

- (a) Name and address of the petitioner(s).
- (b) Purpose of water use.
- (c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
- (d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- (e) Description of the relief requested.
- (f) Period of time for which the variance is sought.
- (g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (h) Other pertinent information.

Variances granted by the Water District shall be subject to the following conditions, unless waived or modified by the President or his designee:

- (a) Variances granted shall include a timetable for compliance.
- (b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XIII: Severability


It is hereby declared to be the intention of the Water District that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Water District without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Adopted on August 29, 2000.

McLennan County Water Control and
Improvement District No. Two

By _____
President

Attest:



Secretary

RECEIVED

MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.

SEP 05 2000

DROUGHT CONTINGENCY PLAN

CCN# 11878

SURFACE WATER USES SECTION
TNRCC

SECTION 1: Declaration of Policy, Purpose and Intent

In cases of extreme drought, periods of abnormally high usage, system contamination, or extended reduction in ability to supply water due to equipment failure, temporary restrictions may be instituted to limit nonessential water usage. The purpose of the Drought contingency Plan is to encourage customer conservation in order to maintain supply, storage, or pressure or to comply with the requirements of a court, government agency or other authority.

SECTION 2: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by Moore's Water System of Beaver Lake, Inc. (hereinafter named Water System) by means of a notice of intent to formulate a Drought Contingency Plan and notice of such in the monthly billing and times for Public comment either in writing or in person at the Water System office during the 2 weeks following the notice being mailed.

SECTION 3: Public Education

The Water System will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of utility bill inserts.

SECTION 4: Coordination with Regional Water Planning Groups

The service area of Moore's Water System of Beaver Lake, Inc. is located in the Group G, Brazos Region and a copy of this Plan has been provided to the Brazos River Authority, P.O. Box 7555, Waco, TX 76714.

SECTION 5: Declaration

DECLARATION OF WATER RESTRICTION: When there is an acute water supply shortage to such an extent that normal use patterns can no longer be served, the utility may implement a water restriction program in the following manner.

SECTION 6: Notice Requirements

Written notice will be provided to each customer prior to implementation or termination of each stage of the water restriction program. Mailed notice must be given to each customer 72 hours prior to the start of the water restriction. If notice is hand delivered, the utility cannot enforce the provisions of the plan for 24 hours after notice is provided. The written notice to customers will contain the following information:

**MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.
DROUGHT CONTINGENCY PLAN**

- a) the date restrictions will begin,
- b) the circumstances that triggered the restrictions,
- c) the stages of response and explanation of the restrictions to be implemented, and,
- d) an explanation of the consequences for violations.

The utility must notify the TNRCC by telephone at (512) 239-6020, or electronic mail at watermon@tnrcc.state.tx.us prior to implementing the program and must notify in writing the Public Drinking Water Section at MC - 155, P.O. Box 13087, Austin, TX 78711-3087 within five (5) working days of implementation including a copy of the utility's restriction notice. The utility must file a status report of its restriction program with the TNRCC every 30 days that restriction continues.

SECTION 7: Violations

1. First violation - The customer will be notified by written notice of their specific violation.
2. Second violation - After written notice the utility may install a flow restricting device in the line to limit the amount of water which will pass through the meter in a 24 hour period. The utility may charge the customer for the actual cost of installing and removing the flow restricting device, not to exceed \$50.00.
3. Subsequent violations - The utility may discontinue service at the meter for a period of seven (7) days, or until the end of the calendar month, whichever is LESS. The normal reconnect fee of the utility will apply for restoration of service.

SECTION 8: Exemptions or Variances

The utility may grant any customer an exemption or variance form the drought contingency plan for good cause **upon written request**. A customer who is refused an exemption or variance may appeal such action of the utility by written appeal to the Texas Natural Resource Conservation Commission. The utility will treat all customers equally concerning exemptions or variances and shall not discriminate in granting exemptions or variances. No exemption or variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

SECTION 9: Criteria for Initiation and Termination of Drought Response Stages

Unless there is an immediate and extreme reduction in water production, or other absolute necessity to declare an emergency or severe condition, the utility will initially declare Stage I restrictions. If, after a reasonable period of time, demand is not reduced enough to alleviate outages, reduce the risk of outages, or comply with restrictions required by a court, government agency of other authority, Stage II may be implemented with Stage III to follow if necessary.

**MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.
DROUGHT CONTINGENCY PLAN**

STAGE I - VOLUNTARY WATER USE RESTRICTIONS:

Goal: Achieve a voluntary Ten (10) percent reduction in daily Water Demand as a Percentage of Pump Capacity.

Requirements for initiation: Customers shall be informed of a need for awareness of water conservation water uses when Daily Water Demand as a Percentage of Pump Capacity reaches Eighty (80) percent.

Supply Management Measures:

The utility will mail a public announcement to its customers if Daily Water Demand reaches 80 percent of total pump capacity. The calculation of this percentage would include 12 hours of pump time per day for the well pump and /or 12 hours of pump time for as many of the pressure pumps as are available that day. A copy of the current public announcement on water conservation awareness shall be kept on file available for inspection by TNRCC.

Voluntary Water Use Restrictions:

Water Customers are requested to voluntarily limit the use of water for nonessential purposes and to practice water conservation.

STAGE II - MILD WATER USE RESTRICTIONS:

Goal: Achieve a voluntary Fifteen (15) percent reduction in daily Water Demand as a Percentage of Pump Capacity.

Requirements for initiation: Customers shall be required to comply with the requirements and restrictions on certain nonessential water uses when Daily Water Demand as a Percentage of Pump Capacity reaches Eighty Five (85) percent for a period of Three (3) consecutive days.

Requirements for termination: Stage II of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of Three (3) consecutive days. Upon termination of Stage II, Stage I becomes operative.

Supply Management Measures: Visually inspect lines and repair leaks on a daily basis. Take any other actions which may be reasonable to reduce water usage by Management which does not effect the health or safety of any customers.

Voluntary Water Use Restrictions:

1. Restricted Hours: Outside watering is allowed daily, but only during periods specifically in the customer notice; between 10:00 PM and 8:00 AM for example; **OR**

**MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.
DROUGHT CONTINGENCY PLAN**

2. **Restricted Days/Hours:** Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending with an even number (0,2,4,6 or 8), and Saturdays and Wednesdays for customers with a street address that ends with an odd number (1,3,5,7 or 9), and to irrigate landscapes only between the hours of Midnight to 8:00 AM and 8:00 PM to Midnight on designated water days.

STAGE III - MODERATE WATER USE RESTRICTIONS:

Goal: Achieve a voluntary Twenty (20) percent reduction in daily Water Demand as a Percentage of Pump Capacity.

Requirements for initiation: Customers shall be required to comply with the requirements and restrictions on certain nonessential water uses when Daily Water Demand as a Percentage of Pump Capacity reaches Ninety (90) percent for a period of Three (3) consecutive days.

Requirements for termination: Stage II of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of Three (3) consecutive days. Upon termination of Stage II, Stage I becomes operative.

Supply Management Measures: Visually inspect lines and repair leaks on a daily basis. Take any other actions which may be reasonable to reduce water usage by Management which does not effect the health of safety of any customers. Water main Flushing is prohibited except for dead end mains.

Water Use Restrictions:

1. **Restricted Days/Hours:** Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Mondays for customers with a street address ending with the numbers 1,2 or 3 and Wednesdays for customers with a street address that ends with the numbers 4,5 or 6, and Fridays for customers with a street address that ends with the numbers 7,8,9 or 0. Irrigation of landscapes only between the hours of Midnight to 8:00 AM and 8:00 PM to Midnight on designated water days. However irrigation of landscaped areas is permitted at any time if it is by means of a hand held hose, a faucet filled Bucket or Watering Can of 5 Gal. or less, or a drip irrigation system.
2. Use of water to wash any motor vehicle, motorbike, boat, trailer airplane or other vehicle is prohibited except during the designated Restricted Days/ Hours as listed above. Such washing, when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shut off nozzle for quick rinses. Further, such washing may be exempted from these regulations if the health, safety or welfare of the public is contingent upon said washings.
3. Use of water to fill, refill or add to any indoor or outdoor swimming pools, wading pools, or "jacuzzi" type pool is prohibited except on designated water days/hours.

MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.
WATER AND RESOURCE CONSERVATION COMMISSION

MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.
DROUGHT CONTINGENCY PLAN

4. Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a re-circulation system.
5. Use of water from hydrants or flush valves shall be limited to maintaining public health, safety and welfare.
6. The following uses of water are defined as nonessential and are prohibited:
 - a. wash down of any sidewalks, walkways, driveways, parking lots, tennis or basketball courts, or other hard-surfaced areas;
 - b. use of water to wash down buildings or structures for purposes other than immediate fire protection;
 - c. use of water for dust control;
 - d. flushing gutters or permitting water to run or accumulate in any gutter, street or bar ditch and;
 - e. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

STAGE IV - CRITICAL WATER USE RESTRICTIONS:

GOAL: Achieve a per customer limit in water usage equivalent to or below the winter months average per customer.

Requirements for initiation:

Customers shall be required to comply with the requirements and restrictions for Stage 4 when the utility determines that a water supply emergency exists based on:

1. Major water line breaks or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or
2. Natural or man-made contamination of the water supply source(s).

Requirements for termination:

Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 3 consecutive days. Upon termination of Stage 4, whatever the previous Drought Stage was becomes operative again. (i.e., if Stage 4 was immediately called for a loss of water due to equipment failure only then a return to no Drought condition status may be in order.)

Supply Management Measures:

The utility shall visually inspect lines and repair leaks on a daily basis. Flushing is prohibited except for dead end mains and only between the hours of 9:00 p.m. and 3:00 a.m.. Emergency interconnects or alternative supply arrangements shall be initiated. All meters shall be read as often as necessary to insure compliance with this program for the benefit of all the customers.

PUBLISHED BY THE RESOURCE CONSERVATION COMMISSION

**MOORE'S WATER SYSTEM OF BEAVER LAKE, INC.
DROUGHT CONTINGENCY PLAN**

Water Use Restrictions: All outdoor use of water is prohibited.

1. Irrigation of landscaped areas is absolutely prohibited.
2. Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

**DROUGHT
CONTINGENCY PLAN**

FOR

M-S WATER SUPPLY CORPORATION

Date Adopted by Board: 4-24-2000

DROUGHT CONTINGENCY PLAN FOR M-S WATER SUPPLY CORPORATION

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, M-S Water Supply Corporation hereby adopts the following regulations and restrictions on the delivery and consumption of water.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply conditions are hereby limited according to the provisions outlined herein.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by M-S Water Supply Corporation by means of open public meeting of the M-S Water Supply Corporation Board of Directors.

Section III: Public Education

M-S Water Supply Corporation will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated with the drought response measures to be implemented in each stage. This information may be provided by means of newsletter, or other similar means, to the water customers of M-S Water Supply Corporation.

Section IV: Coordination with Regional Water Planning Groups

The service area of M-S Water Supply Corporation is located within the Brazos Region and M-S Water Supply Corporation has provided a copy of this Plan to the Brazos River Authority, P.O. Box 755, Waco, Texas 76714.

Section V: Authorization

The Board of Directors of the M-S Water Supply Corporation, or their designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The Board of Directors of the M-S Water Supply Corporation, or their designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by M-S Water Supply Corporation. The terms "person" and "customer" as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities. M-S Water Supply Corporation shall be exempt from application of this plan when necessary to protect health, safety, and welfare, as determined by the Board of Directors of the M-S Water Supply Corporation, or their designee.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by M-S Water Supply Corporation.

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

- (a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
- (b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
- (c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
- (d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
- (e) flushing gutters or permitting water to run or accumulate in any gutter or street;
- (f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
- (g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
- (h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
- (i) use of water from hydrants or flush valves for construction purposes or any other purposes other than fire fighting.

Odd numbered addresses: street addresses ending in 1, 3, 5, 7, or 9.

Section VIII: Triggering Criteria for Initiation and Termination of Drought Response Stages

The Board of Directors of the M-S Water Supply Corporation, or their designee, shall monitor water supply and/or demand conditions on a daily basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Public notification of the initiation or termination of drought response stages may be by means of notice published in local newspaper and/or public service announcements via television or radio.

The triggering criteria described below are based on analysis of the system emphasizing the importance of water supply to each plant.

(a) Stage 1 - Mild Water Shortage Conditions

Requirements for initiation - Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII - Definitions, when any one plant on the system reaches a demand equal to or greater than 75% of the total production (or refill) capacity for 3 consecutive days.

Requirements for termination - Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Public notification of termination shall not be necessary.

(b) Stage 2 - Moderate Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restriction on certain non-essential water uses provided in Section VII of this Plan when any one plant on the system reaches a demand equal to or greater than 100% of the total production (or refill) capacity of such plants, for 3 consecutive days.

Requirements for termination - Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. Public notification of termination of this stage shall be issued by the Board of Directors of the M-S Water Supply Corporation, or their designee.

(c) Stage 3 - Severe Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section VII of this Plan when any one plant on the system reaches a demand equal to or greater than 115% of the total production (or refill) capacity of such plants for 3 consecutive days.

Requirements for termination - Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. Public notification of termination of this stage shall be issued by the Board of Directors of the M-S Water Supply Corporation, or their designee.

(d) Stage 4 - Critical Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section VII of this Plan when any one plant on the system reaches a demand equal to or greater then 118% of the total production (or refill) capacity of such plants for 3 consecutive days.

Requirements for termination - Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon

termination of Stage 4, Stage 3 becomes operative. Public notification of termination of this stage shall be issued by the Board of Directors of the M-S Water Supply Corporation, or their designee.

(e) Stage 5 - Emergency Water Shortage Conditions

Requirements for initiation - Customers shall be required to comply with the requirements and restrictions of Section VII of this Plan when the Board of Directors of the M-S Water Supply Corporation, or their designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or
2. Natural or man-made contamination of the water supply source (s).

Requirements for termination - Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist. Public notification of termination of this stage shall be issued by the Board of Directors of the M-S Water Supply Corporation, or their designee.

Section IX: Drought Response Stages

The Board of Directors of the M-S Water Supply Corporation, or their designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of the Plan, shall determine that a mild, moderate, severe, critical, or emergency condition exists and shall implement the provisions outlined in Section VIII.

Stage 1 - Mild Water Shortage Conditions

Goal: Achieve a voluntary 20 percent reduction in total consumption.

Voluntary Water Use Restrictions:

- (a) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 - Moderate Water Shortage Conditions

Goal: Achieve a 25 percent reduction in total consumption and move to Stage 1.

Supply Management Guidelines: No flushing of water lines.

Water Use Restrictions - Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

- (a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays, Tuesdays, and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Mondays, Wednesdays, and Saturdays for customers with a street address ending in an odd number (1, 3, 5, 7 9). Irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rinses. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.
- (c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight.
- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- (e) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the M-S Water Supply Corporation, the facility shall not be subject to these regulations in the use of such other water source.
- (f) Non-essential water uses as previously defined are prohibited.

Stage 3 - Severe Water Shortage Conditions

Goal: Achieve a 15 percent reduction in total consumption and move to Stage 2.

Supply Management Guidelines: No flushing of water lines.

Water Use Restrictions - All requirements of Stage 2 shall remain in effect during Stage 3 except:

- (a) Irrigation of landscaped areas shall be limited to Stage 2 designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.
- (b) The watering of golf course greens, tees and fairways is prohibited unless the golf course utilizes a water source other than that provided by M-S Water Supply Corporation.
- (c) The use of water for construction purposes from designated fire hydrants or flush valves is to be discontinued.

Stage 4 - Critical Water Shortage Conditions

Goal: Achieve a 3 percent reduction in total consumption and move to Stage 3.

Supply Management Guidelines: No water line flushing.

Water Use Restrictions: All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

- (a) Irrigation of landscaped areas shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6, 8) and Saturdays and Wednesdays for customers with a street address ending in an odd number (1, 3, 5, 7, 9) between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand held hoses, hand held buckets, or drip irrigation only. The use of hose-end sprinklers and automatic sprinkler systems is prohibited at all times.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10:00 p.m.
- (c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited

- (d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

Stage 5 - Emergency Water Shortage Conditions

Goal: Achieve a 50 percent reduction in total consumption.

Supply Management Guidelines: No water line flushing.

Water Use Restrictions - All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

- (a) Irrigation of landscaped areas is absolutely prohibited.
- (b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Section X: Enforcement

- (a) No person shall allow the use of water from M-S Water Supply Corporation for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by the Board of Directors of the M-S Water Supply Corporation, or their designee, in accordance with provisions of this Plan.
- (b) The Board of Directors of the M-S Water Supply Corporation may institute temporary rate schedules to enforce the drought response stages. The members of the M-S Water Supply Corporation shall be notified of the new rate schedule.

Section XI: Variances

The Board of Directors of the M-S Water Supply Corporation, or their designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, safety or fire protection of the public or the person requesting such variance and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the Secretary of M-S Water Supply Corporation within 5 days after the Plan or particular drought response stage has been invoked. All petitions for variances shall be reviewed by the Board of Directors of the M-S Water Supply Corporation, or their designee, and shall include the following:

- (a) Name and address of the petitioner(s).
- (b) Purpose of water use.
- (c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
- (d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- (e) Description of the relief requested.
- (f) Period of time for which the variance is sought.
- (g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (h) Other pertinent information.

Variances granted by M-S Water Supply Corporation shall be subject to the following conditions, unless waived or modified by the Board of Directors or their designee:

- (a) Variances granted shall include a timetable for compliance.
- (b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.
- (c) Variances granted may be revoked by the Board of Directors of the M-S Water Supply Corporation, or their designee, at any time and without cause.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XII: Severability

It is hereby declared to be the intention of M-S Water Supply Corporation that the sections, paragraphs, sentences, clauses, and phrases of this plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been adopted by M-S Water Supply Corporation without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

SECTION H.
DROUGHT CONTINGENCY
AND
EMERGENCY WATER DEMAND MANAGEMENT PLAN

1. INTRODUCTION

The goal of this plan is to cause a reduction in water use in response to drought or emergency conditions so that the water availability can be preserved. Since emergency conditions can occur rapidly, responses must also be enacted quickly. This plan has been prepared in advance considering conditions that will initiate and terminate the rationing program.

A Drought/Emergency Management Committee consisting of all Board Members and the System Manager will monitor usage patterns and public education efforts and will make recommendations to the Board on future conservation efforts, demand management procedures or any changes to this plan. The Committee will develop public awareness notices, bill stuffers, and other methods that will begin and continue as a constant type of reminder that water should be conserved at all times, not just during a drought or emergency. This Committee will also review and evaluate any needed amendments or major changes due to changes in the WSC service area population, distribution system or supply. This review and evaluation will be done on a regular basis of five years unless conditions necessitate more frequent amendments.

The plan will be implemented according to the three stages of rationing as imposed by the Board. Section D describes the conditions that will trigger these stages.

2. PUBLIC INVOLVEMENT

Opportunity for the public to provide input into the preparation of the Plan was provided by the Board by scheduling and providing public notice of a public meeting to accept input on the Plan. Notice of the meeting was provided to all customers. In the adoption of this plan, the Board considered all comments from customers.

3. COORDINATION WITH REGIONAL WATER PLANNING GROUP

Being located within the Brazos Region G, a copy of this Plan has been provided to that Regional Water Planning Group.

4. TRIGGER CONDITIONS

The Drought Emergency Management Committee is responsible for monitoring water supply and demand conditions on a monthly basis (or more frequently if conditions warrant) and shall determine when conditions warrant initiation or termination of each stage of the plan, that is, when the specified triggers are reached. The Committee will monitor monthly operating reports, water supply or storage tank levels and/or rainfall as needed to determine when trigger conditions are reached. The triggering conditions described below take into consideration: the vulnerability of the water source under drought of record conditions; the production, treatment and distribution capacities of the system, and member usage based upon historical patterns.

a. Stage I - Mild Condition: Stage I water allocation measures may be implemented when one or more of the following conditions exist:

- 1) Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days.
- 2) Water supply is reduced to a level that is only 20 percent greater than the

Approved March 2002

Pravie Hill WSC

average consumption for the previous month.

- 3) There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.

b. Stage II - Moderate Conditions: Stage II water allocation measures may be implemented when one of the following conditions exist:

- 1) Water consumption has reached 90 percent of the amount available for three consecutive days.
- 2) The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days.

c. Stage III - Severe Conditions: Stage III water allocation measures may be implemented when one of the following five conditions exist:

- 1) Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer.
- 2) Water consumption of 95 percent or more of the maximum available for three (3) consecutive days.
- 3) Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period.
- 4) Natural or man-made contamination of the water supply source(s).
- 5) The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation.
- 6) Reduction of wholesale water supply due to drought conditions.
- 7) Other unforeseen events which could cause imminent health or safety risks to the public.

5. STAGE LEVELS OF WATER ALOCATIONS

The stage levels of water allocations are to be placed in effect by the triggers in Section D. The System shall institute monitoring and enforce penalties for violations of the Drought Plan for each of the Stages listed below. The water allocation measures are summarized below.

a. Stage I - Mild Conditions

- 1) Alternate day, time of day, or duration restrictions for outside water usage allowed. (System will notify Customers which restriction is in effect)
- 2) The system will reduce flushing operations.
- 3) Reduction of customers' water use will be encouraged through notices on bills or other method.

b. Stage II - Moderate Conditions

- 1) All outside water use is prohibited (except for livestock variances).
- 2) Make public service announcements as conditions change via local media (TV, radio, newspapers, etc.).

c. Stage III - Severe Conditions

- 1) All outside watering prohibited.
- 2) Water use will be restricted to a percentage of each member's prior month usage. This percentage may be adjusted as needed according to demand on the system. Notice of this amount will be sent to each customer.
- 3) Corporation shall continue enforcement and educational efforts.

NOTE :

- Refer to your water purchase contract for additional restrictions/requirements that may be imposed by stipulations from the wholesale supplier.
- There may be additional restrictions imposed by Governmental Entities.
- Meters will be read as often as necessary to insure compliance with this program for the benefit of all the customers.
-

6. INITIATION AND TERMINATION PROCEDURES

Once a trigger condition occurs, the Corporation, or its designated responsible representative, shall, based on recommendation from the Chairperson of the Drought/Emergency Management Committee, decide if the appropriate stage of rationing shall be initiated. The initiation may be delayed if there is a reasonable possibility the water system performance will not be compromised by the condition. If water allocation is to be instituted, written notice to the customers shall be given.

Written notice of the proposed water allocation measure shall be mailed or delivered to each affected customer upon the initiation of each stage. In addition, upon adoption of Stage II or Stage III, a notice will be placed in a local newspaper or announced on a local radio or television station. The customer notice shall contain the following information:

- a. The date water allocation shall begin,
- b. The expected duration,
- c. The stage (level) of water allocations to be employed,
- d. Penalty for violations of the water allocation program, and
- e. Affected area or areas.

A sample Customer Notice of water allocation conditions is included in Miscellaneous Transaction Forms of this tariff.

If the water allocation program extends 30 days then the Chairperson of the Drought/Emergency Management Committee or manager shall present the reasons for the allocations at the next scheduled Board Meeting and shall request the concurrence of the Board to extend the allocation period.

When the trigger condition no longer exists then the responsible official may terminate the water allocations provided that such an action is based on sound judgment. Written notice of the end of allocations shall be given to customers. A water allocation period may not exceed 60 days without extension by action of the Board.

7. PENALTIES FOR VIOLATIONS

- a. **First Violation** – The customer/member will be notified by a written notice of their specific violation.
- b. **Second Violation** - The Corporation may install a flow restricting device in the customer's service line to limit the amount of water that will pass through the meter in a 24 hour period. The cost of this shall be the actual cost to do the work and shall be paid by the customer.
- c. **Subsequent Violations** - The Corporation may terminate service for up to 7 days and charge for the service call to restore service.

These provisions apply to all customers of the Corporation.

8. EXEMPTIONS OR WAIVERS

The Drought/Emergency Management Committee may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an

emergency condition adversely affecting the health or sanitation for the public or the person requesting such variance and if one or more of the following conditions are met:

- a. Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- b. Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the Drought/Emergency Management Committee within 5 days after the Plan or a particular drought response stage has been invoked or after a condition justifying the variance first occurs. All petitions for variances shall be reviewed by the Committee and shall include the following:

- Name and address of the petitioner(s).
- Purpose of water use.
- Specific provision(s) of the Plan from which the petitioner is requesting relief.
- Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Plan.
- Description of the relief requested.
- Period of time for which the variance is sought.
- Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- Other pertinent information, as requested by the Committee.

Variances granted by the Committee shall be subject to the following conditions, unless specifically waived or modified by the Committee or Board of Directors:

- Variances granted shall include a timetable for compliance.
- Variances granted shall expire when the water allocation is no longer in effect, unless the petitioner has failed to meet specified requirements. No variance allowed for a condition requiring water allocation will continue beyond the termination of water allocation under Section F. Any variance for a subsequent water allocation must be petitioned again. The fact that a variance has been granted in response to a petition will have no relevance to the Committee's decision on any subsequent petition.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

9. IMPLEMENTATION

The Board establishes a Drought/Emergency Management Committee by Resolution, the chairperson of which will be the responsible representative to make Drought and Emergency Water Management actions. This Committee will review the procedures in this plan annually or more frequently. Modifications may be required to accommodate system growth, changes in water use demand, available water supply and/or other circumstances.

This Plan was adopted by the Board at a properly noticed meeting held on _____.

**A RESOLUTION OF THE BOARD OF DIRECTORS
ADOPTING A DROUGHT CONTINGENCY PLAN FOR
THE R-M-S WATER SUPPLY CORPORATION**

WHEREAS, the Board recognizes that the amount of water available to the R-M-S Water Supply Corporation and to its wholesale water customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the R-M-S Water Supply Corporation recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 12.1272 of the Texas Water Code and applicable rules of the Texas Natural Resource Conservation Commission require all public water supply systems in Texas to prepare a drought contingency plan;

WHEREAS, Section 11.039 of the Texas Water Code authorizes water supplies to distribute available water supplies on a pro rata basis during times of water supply shortages; and

WHEREAS, as authorized under law, and in the best interests of the customers of the R-M-S Water Supply Corporation, the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

**NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF
THE R-M-S WATER SUPPLY CORPORATION:**

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit "A" and hereby adopted as the official policy of the R-M-S Water Supply Corporation.

SECTION 2. That the President is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

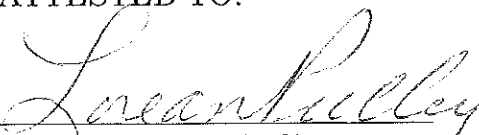
SECTION 3. That this resolution shall take effect immediately upon passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE R-M-S WATER
SUPPLY CORPORATION, ON THIS 14th day of December, 1999.



President, Board of Directors

ATTESTED TO:



Secretary, Board of Directors

**DROUGHT CONTINGENCY PLAN
FOR THE
R-M-S WATER SUPPLY CORPORATION
DECEMBER 14, 1999**

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the R-M-S Water Supply Corporation adopts the following Drought Contingency Plan.

Section II: Public Involvement

Opportunity for the public and wholesale water customers to provide input into the preparation of the Plan was provided by the R-M-S Water Supply Corporation by means of a Public Hearing.

Section III: Wholesale Water Customer Education

The R-M-S Water Supply Corporation will periodically provide wholesale water customers with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of a copy of the Plan to the wholesale customer.

Section IV: Coordination with Regional Water Planning Groups

The water service area of the R-M-S Water Supply Corporation is located within the Brazos Region and the R-M-S Water Supply Corporation has provided a copy of the Plan to the Brazos River Authority, P.O. Box 755, Waco, Tx, 76714.

Section V: Authorization

The Board of Directors of the R-M-S Water Supply Corporation, or their designee, is hereby authorized and directed to implement the applicable provisions of the Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The Board of Directors of the R-M-S Water Supply Corporation, or their designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of the Plan shall apply to all customers utilizing water provided by the R-M-S Water Supply Corporation's water. The terms "person" and "customers" as used in

the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Triggering Criteria for Initiation and Termination of Drought Response Stages

The Board of Directors of the R-M-S Water Supply Corporation, or their designee, shall monitor water supply and/or demand conditions on a daily basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customers notification of the initiation or termination of drought response stages will be made by mail or telephone. The news media will also be informed.

The triggering criteria described below are based on analysis of the system emphasizing the importance of water supply to each wholesale customer.

(a) Stage 1 - Mild Water Shortage Conditions

Requirements for initiation - The R-M-S Water Supply Corporation will recognize that a mild water shortage condition exists when total daily water demand equals or exceeds 80% of the total production (or refill) capacity for 3 consecutive days.

Requirements for termination - Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify its wholesale customers and the media of the termination of Stage 1 in the same manner as the notification of initiation of Stage 1 of the Plan.

(b) Stage 2 - Moderate Water Shortage Conditions

Requirements for initiation - The R-M-S Water Supply Corporation will recognize that a moderate water shortage condition exists when daily water demand equals or exceeds 90% of the total production (or refill) capacity for 3 consecutive days.

Requirements for termination - Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 1 of the Plan.

(c) Stage 3 - Severe Water Shortage Conditions

Requirements for initiation - The R-M-S Water Supply Corporation will recognize that a severe water shortage condition exists when daily water demand equals or exceeds 100% of the total production (or refill) capacity for 3 consecutive days.

Requirements for termination - Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify its wholesale customers and the media of the termination of Stage 3 in the same manner as the notification of initiation of Stage 2 of the Plan.

(d) Stage 4 - Emergency Water Shortage Conditions

Requirements for initiation - The R-M-S Water Supply Corporation will recognize that a severe water shortage condition exists when based on:

Major water line break, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or

Natural or man-made contamination of the water supply source(s).

Requirements for termination - Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of 7 consecutive days. The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify its wholesale customers and the media of the termination of Stage 4 of the Plan.

Section VIII: Drought Response Stages

The Board of Directors of the R-M-S Water Supply Corporation, or their designee, shall monitor water supply and/or demand condition and, in accordance with the triggering criteria set forth in Section VI, shall determine that mild, moderate, or severe water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

Stage 1 - Mild Water Shortage Conditions

1. Goal: Achieve a voluntary 20% reduction in total consumption.

2. Supply Management Measure:

The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify wholesale customers that they are requested to practice voluntary water conservation and to minimize or discontinue water use for non-essential purposes.

3. Demand Management Measures:

(a) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale

customers initiate voluntary measures to reduce water use by implementing Stage 1 of the customer's drought contingency plan.

- (b) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 2 - Moderate Water Shortage Conditions

1. Goal: Achieve a 25% reduction in total consumption.
2. Supply Management Measure:

The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify wholesale customers that they are to reduce their water demands by no flushing of water lines.

3. Demand Management Measures:

- (a) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will contact wholesale water customers to discuss water supply and/or demand conditions and the possibility of pro rata curtailment of water diversions and/or deliveries.
- (b) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will request wholesale water customers to initiate mandatory measures to reduce non-essential water use and to implement Stage 2 of the customer's drought contingency plan.
- (c) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will initiate preparations for the implementation of pro rata curtailment of water diversions and/or deliveries by preparing a monthly water usage allocation baseline for each wholesale customer according to the procedures specified in Section VI of the Plan.
- (d) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 3 - Severe Water Shortage Conditions

1. Goal: Achieve a 15% reduction in total consumption.

2. Supply Management Measure:

The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will notify emergency back-up interconnection with another water system that a problem exists. All requirements of Stage 2 shall remain in effect during Stage 3.

3. Demand Management Measures:

(a) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use to implement Stage 2 of the customer's drought contingency plan.

(b) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer according to the procedures specified in Section VI of the Plan.

(c) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices

Stage 4 - Emergency Water Shortage Conditions

Whenever emergency water shortage conditions exist as defined in Section VII of the Plan, the Board of Directors of R-M-S Water Supply Corporation and their designee shall:

1. Assess the severity of the problem and identify the actions needed and time required to solve the problem.
2. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and request that they notify their customers to reduce water use until service is restored.
3. Undertake necessary actions, including repairs and/or clean-up as needed.

Section IX: Pro Rata Water Allocation

In the event that the triggering criteria specified in Section VII of the Plan for Stage 3 - Severe Water Shortage Conditions have been met, the Board of Directors of the R-M-S Water Supply Corporation, or their designee, is hereby authorized to initiate allocation of water supplies on a pro rata basis with Texas Water Code Section 11.039 and according to the following water allocation policies and procedures:

- (a) A wholesale customer's monthly allocation shall be a percentage of the customer's water usage baseline. The percentage will be set by resolution of the Board of Directors of the R-M-S Water Supply Corporation, or their designee, based on the Board of Directors of the R-M-S Water Supply Corporation, or their designee, assessment of the severity of the water shortage condition and the need to curtail water diversions and/or deliveries and may be adjusted periodically by resolution of the Board of Directors of the R-M-S Water Supply Corporation, or their designee, as conditions warrant. Once pro rata allocation is in effect, water diversions by or deliveries to each wholesale customer shall be limited to the allocation established for each month.
- (b) A monthly water usage allocation shall be established by the Board of Directors of the R-M-S Water Supply Corporation, or their designee, for each wholesale customer. The wholesale customer's water usage baseline will be computed on the average water usage by month for the 1994-1998 period as shown in the example given on the next page.

City of Riesel

	1994	1995	1996	1997	1998	SUM	AVE	Allocation Percentage	Monthly Allocation
Jan.	1,903	2,104	2,189	2,306	1,926	10,428	2,086	75%	1,564
Feb.	2,423	2,505	2,633	2,455	1,910	11,926	2,385	75%	1,789
March	1,992	2,110	2,598	1,927	1,695	10,322	2,064	75%	1,548
April	2,366	2,213	2,657	2,184	2,077	11,497	2,299	75%	1,725
May	2,382	2,354	2,647	2,306	1,340	11,029	2,206	75%	1,654
June	2,351	2,616	3,266	2,442	2,309	12,984	2,597	75%	1,948
July	3,022	2,866	3,299	1,007	3,441	13,635	2,727	75%	2,045
Aug.	4,451	2,879	3,425	1,915	4,218	16,888	3,378	75%	2,533
Sept.	3,762	3,599	2,873	4,017	3,398	17,649	3,530	75%	2,647
Oct.	3,090	3,013	2,535	3,486	2,843	14,967	2,993	75%	2,245
Nov.	2,671	2,840	2,402	2,799	1,863	12,575	2,515	75%	1,886
Dec.	2,147	2,739	1,750	2,064	1,622	10,322	2,064	75%	1,548
Total	32,560	31,838	32,274	28,908	28,642		30,844		

M-S Water Supply

	1994	1995	1996	1997	1998	SUM	AVE	Allocation Percentage	Monthly Allocation
Jan.	666	490	812	1,207	643	3,818	764	75%	573
Feb.	545	646	821	723	692	3,427	685	75%	514
March	502	612	628	550	552	2,844	569	75%	427
April	509	524	579	644	502	2,758	552	75%	414
May	572	671	548	620	400	2,811	562	75%	422
June	550	738	875	762	666	3,591	718	75%	539
July	700	936	883	301	1,236	4,056	811	75%	608
Aug.	1,236	1,175	960	474	1,665	5,510	1,102	75%	827
Sept.	1,292	1,276	1,088	1,415	1,556	6,627	1,325	75%	994
Oct.	890	894	614	1,388	1,104	4,890	978	75%	734
Nov.	645	1,578	655	1,046	1,145	5,069	1,014	75%	760
Dec.	829	755	558	895	626	3,663	733	75%	549
Total	8,936	10,295	9,021	10,025	10,787		9,813		

** UNITS IN THOUSAND GALLONS

- (c) The Board of Directors of the R-M-S Water Supply Corporation, or their designee, shall provide notice, by certified mail, to each wholesale customer informing them of their monthly water usage allocations and shall notify the news media and the executive director of the Texas Natural Resource Conservation Commission upon initiation of pro rata water allocation.
- (d) Upon request of the customer or at the initiative of the Board of Directors of the R-M-S Water Supply Corporation, or their designee, the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the wholesale customer's normal water usage; (2) the customer agrees to transfer part of its allocation to another wholesale customer; or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the Board of Directors of the R-M-S Water Supply Corporation, or their designee.

Section X: Enforcement

During any period when pro rata allocation of available water supplies is in effect, wholesale customers shall pay the following surcharges on excess water diversions and/or deliveries:

- (a) 20% times the normal water charge per thousand gallons for water diversions and/or deliveries in excess of the monthly allocation up through 5% above the monthly allocation.
- (b) 25% times the normal water charge per thousand gallons for water diversions and/or deliveries in excess of the monthly allocation from 5% through 15% above the monthly allocation.
- (c) 30% times the normal water charge per thousand gallons for water diversions and/or deliveries more than 15% above the monthly allocation.
- (d) The above surcharge shall be cumulative

Section XI: Variances

The Board of Directors of the R-M-S Water Supply Corporation, or designee, may, in writing, grant a temporary variance to the pro rata water allocation policies provided by this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affected the public health, welfare, or safety and if one or more of the following conditions are met:

- (a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

- (b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition variance with the Board of Directors of the R-M-S Water Supply Corporation, or their designee, within 5 days after pro rata allocation has been invoked. All petitions for variances shall be reviewed by the Board of Directors of the R-M-S Water Supply Corporation, or their designee, and shall include the following.

- (a) Name and address of the petitioner(s).
- (b) Detailed statement with supporting data and information as to how to pro rata allocation of water under the policies and procedures established in the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- (c) Description of the relief requested.
- (d) Period of time for which the variance is sought.
- (e) Alternative measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- (f) Other pertinent information.

Variances granted by the Board of Directors of the R-M-S Water Supply Corporation, or their designee, shall be subject to the following conditions, unless waived or modified by the Board of Directors of the R-M-S Water Supply Corporation, or their designee:

- (a) Variances granted shall include a timetable for compliance.
- (b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of the R-M-S Water Supply Corporation, or their designee, that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgement or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board of Directors of the R-M-S Water Supply Corporation, or their designee, without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraphs, or section.

3.1.5 the water conservation methods implemented during the previous 10 years and those methods planned for implementation in the next 5 years;

Ross Water Supply Corporation has been very aggressive in water conservation measures such as:

1. **Mandatory implementation of Levels 1 and 2 of their Drought Contingency Plan has been issued during drought years in which Level 1 restricts outdoor watering to even and day days based on customers physical address and Level 2 restricts all outdoor watering for any purpose other than watering livestock or use in business.**
2. **Implementation of a program to educate and promote water conservation to customers by distributing flyers to customers and mailing water conservation information with the annual Consumer Confidential Report (see attached).**
3. **Implementation of System Wide Meter Change out – Ross W.S.C. Board of Directors recently approved installation of new meters throughout the system in an effort to replace old, outdated meters. This will eliminate the potential of malfunctioning old meters not registering water flow which will result in water loss and revenue. At this time, Ross WSC has completed approximately 25% of this endeavor.**

Ross Water Supply Corporation methods for the next five years will to continue to implement the measures described above, educate their customers about water conservation in their community, implement more precise water auditing, and educate the Board of Directors and staff regarding accurate record keeping and monitoring.



Conservation Tips

Ross Water Supply

Indoor/Outdoor

Visit these sites for helpful conservation tips

- <http://www.tceq.texas.gov/response/drought/conservation.html>
- http://www.epa.gov/region1/eco/drinkwater/water_conservation_residents.html

Indoor:

- Toilets are the biggest source of water leaks inside the home. To check your toilets place 12 drops of food coloring in the tank and do not flush for 1 hour. If dye has leaked into the bowl, you have a leak.
- Install faucet aerators and low flow shower heads.
- Take showers instead of baths.
- Run full loads, when using your washer and dishwasher.
- Repair leaky faucets as soon as possible.
- When purchasing new appliances, choose water saving models.

Outdoor:

- Water your lawn and plants in the early morning or late evening. Less water is lost due to evaporation.
- Use soaker hoses instead of sprinklers.
- Plant native or drought tolerant plants, trees, and shrubs. Native and drought tolerant plants require less water.
- Mulch around shrubs and flowers to hold moisture in.
- Sweep driveways, decks, and porches, instead of using the garden hose.
- Adding compost or organic matter improves soil conditions and water retention.



Update Your Emergency Phone Number

We would like our customers to provide an up to date emergency phone number. Our office likes to have a phone number on file where we can reach you if we find a leak or need access to your property. Please provide you contact number and account number in the space below and return this portion to the office. We thank you for your assistance.

Emergency Phone Number: _____

Account Number: _____

In addition, if you would like to receive the CCR and emergency notifications by email, please provide us with your email address below. (We do not resell or supply your email address to anyone. This is strictly for Ross WSC correspondence.)

Email Address: _____

SECTION H. DROUGHT CONTINGENCY AND EMERGENCY WATER DEMAND MANAGEMENT PLAN

1. INTRODUCTION

The goal of this plan is to cause a reduction in water use in response to drought or emergency conditions so that the water availability can be preserved. Since emergency conditions can occur rapidly, responses must also be enacted quickly. This plan has been prepared in advance considering conditions that will initiate and terminate the rationing program.

A Drought/Emergency Management Committee consisting of two Board Members and the System Manager will monitor usage patterns and public education efforts and will make recommendations to the Board on future conservation efforts, demand management procedures or any changes to this plan. The Committee will develop public awareness notices, bill stuffers, and other methods that will begin and continue as a constant type of reminder that water should be conserved at all times, not just during a drought or emergency. This Committee will also review and evaluate any needed amendments or major changes due to changes in the WSC service area population, distribution system or supply. This review and evaluation will be done on a regular basis of five years unless conditions necessitate more frequent amendments.

The plan will be implemented according to the three stages of rationing as imposed by the Board. Section D describes the conditions that will trigger these stages.

2. PUBLIC INVOLVEMENT

Opportunity for the public to provide input into the preparation of the Plan was provided by the Board by scheduling and providing public notice of a public meeting to accept input on the Plan. Notice of the meeting was provided to all customers. In the adoption of this plan, the Board considered all comments from customers.

3. COORDINATION WITH REGIONAL WATER PLANNING GROUP

Being located within the Southern Trinity Groundwater Conservation District (name of regional water planning area or areas), a copy of this Plan has been provided to that Regional Water Planning Group.

4. TRIGGER CONDITIONS

The Drought Emergency Management Committee is responsible for monitoring water supply and demand conditions on a monthly basis (or more frequently if conditions warrant) and shall determine when conditions warrant initiation or termination of each stage of the plan, that is, when the specified triggers are reached. The Committee will monitor monthly operating reports, water supply or storage tank levels and/or rainfall as needed to determine when trigger conditions are reached. The triggering conditions described below

take into consideration: the vulnerability of the water source under drought of record conditions; the production, treatment and distribution capacities of the system, and member usage based upon historical patterns.

- a. **Stage I - Mild Condition:** Stage I water allocation measures may be implemented when one or more of the following conditions exist:
 - 1) Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days.
 - 2) Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month.
 - 3) There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.

- b. **Stage II - Moderate Conditions:** Stage II water allocation measures may be implemented when one of the following conditions exist:
 - 1) Water consumption has reached 90 percent of the amount available for three consecutive days.
 - 2) The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days.

- c. **Stage III - Severe Conditions:** Stage III water allocation measures may be implemented when one of the following five conditions exist:
 - 1) Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer.
 - 2) Water consumption of 95 percent or more of the maximum available for three (3) consecutive days.
 - 3) Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period.
 - 4) Natural or man-made contamination of the water supply source(s).
 - 5) The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation.
 - 6) Reduction of wholesale water supply due to drought conditions.
 - 7) Other unforeseen events which could cause imminent health or safety risks to the public.

5. STAGE LEVELS OF WATER ALOCATIONS

The stage levels of water allocations are to be placed in effect by the triggers in Section D. The System shall institute monitoring and enforce penalties for violations of the Drought Plan for each of the Stages listed below. The water allocation measures are summarized below.

- a. **Stage I - Mild Conditions**
 - 1) Alternate day, time of day, or duration restrictions for outside water usage allowed. (System will notify Customers which restriction is in effect)
 - 2) The system will reduce flushing operations.
 - 3) Reduction of customers' water use will be encouraged through notices on

bills or other method.

b. Stage II - Moderate Conditions

- 1) All outside water use is prohibited (except for a livestock or other exemption or variance granted under this section).
- 2) Make public service announcements as conditions change via local media (TV, radio, newspapers, etc.).

c. Stage III - Severe Conditions

- 1) All outside watering prohibited.
- 2) Water use will be restricted to a percentage of each member's prior month usage. This percentage may be adjusted as needed according to demand on the system. Notice of this amount will be sent to each customer.
- 3) Corporation shall continue enforcement and educational efforts.

NOTE:

- Refer to your water purchase contract for additional restrictions/requirements that may be imposed by stipulations from the wholesale supplier.
- There may be additional restrictions imposed by Governmental Entities.
- Meters will be read as often as necessary to insure compliance with this program for the benefit of all the customers.

6. INITIATION AND TERMINATION PROCEDURES

Once a trigger condition occurs, the Corporation, or its designated responsible representative, shall, based on recommendation from the Chairperson of the Drought/Emergency Management Committee, decide if the appropriate stage of rationing shall be initiated. The initiation may be delayed if there is a reasonable possibility the water system performance will not be compromised by the condition. If water allocation is to be instituted, written notice to the customers shall be given.

Written notice of the proposed water allocation measure shall be mailed or delivered to each affected customer upon the initiation of each stage. In addition, upon adoption of Stage II or Stage III, a notice will be placed in a local newspaper or announced on a local radio or television station. The customer notice shall contain the following information:

- a. The date water allocation shall begin,
- b. The expected duration,
- c. The stage (level) of water allocations to be employed,
- d. Penalty for violations of the water allocation program, and
- e. Affected area or areas.

If the water allocation program extends 30 days then the Chairperson of the Drought/Emergency Management Committee or manager shall present the reasons for the allocations at the next scheduled Board Meeting and shall request the concurrence of the Board to extend the allocation period.

When the trigger condition no longer exists then the responsible official may terminate the water allocations provided that such an action is based on sound judgment. Written notice

of the end of allocations shall be given to customers. A water allocation period may not exceed 60 days without extension by action of the Board.

7. PENALTIES FOR VIOLATIONS

- a. **First Violation** – The customer/member will be notified by a written notice of their specific violation and their need to comply with the tariff rules. The notice will show the amount of penalty * to be assessed for continued violations.
- b. **Second Violation** - The Corporation will assess a penalty * of \$ 35.00.
- c. **Subsequent Violations** - The Corporation will assess an additional penalty of \$70.00 for violations continuing after the Second Violation. The Corporation may also install a flow restricting device in the customer's meter service to limit the amount of water that will pass through the meter in a 24 hour period. The costs of this procedure will be for the actual work and equipment and shall be paid by the customer.
- d. **Termination** – The Corporation will terminate service for up to 7 days for continuing violations under this section. Service will remain off until any delinquent penalty * or other assessment is fully paid including a charge for the service call to restore service.

These provisions apply to all customers of the Corporation.

NOTE: PENALTY * – A WSC is allowed to charge a reasonable penalty to customers that fail to comply with the Rationing Procedures in accordance with TAC 291.41 (j) if:

- (1) the penalty is clearly stated in the tariff;
- (2) the penalty is reasonable and does not exceed six (6) times the minimum monthly bill stated in the water supply corporation's current tariff; and
- (3) the water supply corporation has deposited the penalty in a separate account dedicated to enhancing water supply for the benefit of all the water supply corporation's customers.

8. EXEMPTIONS OR WAIVERS

The Drought/Emergency Management Committee may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health or sanitation for the public or the person requesting such variance and if one or more of the following conditions are met:

- a. Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- b. Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the Drought/Emergency Management Committee within 5 days after the Plan or a particular drought response stage has been invoked or after a condition justifying the variance first occurs. All petitions for variances shall be reviewed by the Committee and shall include the following:

- Name and address of the petitioner(s).

- Purpose of water use.
- Specific provision(s) of the Plan from which the petitioner is requesting relief.
- Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Plan.
- Description of the relief requested.
- Period of time for which the variance is sought.
- Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- Other pertinent information, as requested by the Committee.

Variations granted by the Committee shall be subject to the following conditions, unless specifically waived or modified by the Committee or Board of Directors:

- Variations granted shall include a timetable for compliance.
- Variations granted shall expire when the water allocation is no longer in effect, unless the petitioner has failed to meet specified requirements. No variance allowed for a condition requiring water allocation will continue beyond the termination of water allocation under Section F. Any variance for a subsequent water allocation must be petitioned again. The fact that a variance has been granted in response to a petition will have no relevance to the Committee's decision on any subsequent petition.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

9. IMPLEMENTATION

The Board establishes a Drought/Emergency Management Committee by Resolution, the chairperson of which will be the responsible representative to make Drought and Emergency Water Management actions. This Committee will review the procedures in this plan annually or more frequently. Modifications may be required to accommodate system growth, changes in water use demand, available water supply and/or other circumstances.

This Plan was adopted by the Board at a properly noticed meeting held on 01/09/2012.

APPENDIX B

**POPULATION PROJECTIONS FOR
PARTICIPATING CITIES AND WSCs**

**FHLM Regional Water Facility Planning Study
Population Projections for Study Area**

Entity	Annual Growth Projected by Entity	POPULATION						
		2010	2015	2020	2025	2030	2035	2040
Falls County								
TWDB Projections (2011 Region G Water Plan)	0.59%	19600	20242	20884	21540	22196	22773	23350
-- County Other (Brazos Basin)	-2.65%	3246	2939	2631	2316	2001	1725	1449
Texas State Data Center Projections (0.5 Migration)	0.20%	17866	18267	18667	18838	19008	18981	18953
Texas State Data Center Projections (1.0 Migration)	0.41%	17866	18551	19236	19679	20121	20167	20213
U.S. Census Bureau Projections (linear)	-0.69%	17866	17304	16742	16180	15618	15056	14494
Hill County								
TWDB Projections (2011 Region G Water Plan)	0.47%	33416	34182	34947	35813	36679	37543	38407
-- County Other (Brazos Basin)	1.04%	2074	2190	2305	2436	2566	2697	2827
Texas State Data Center Projections (0.5 Migration)	0.58%	35089	36453	37816	39041	40266	41026	41786
Texas State Data Center Projections (1.0 Migration)	0.83%	35089	37219	39349	41146	42943	43955	44967
U.S. Census Bureau Projections (linear)	-0.24%	35089	34683	34277	33871	33465	33059	32653
Limestone County								
TWDB Projections (2011 Region G Water Plan)	0.43%	23322	24133	24944	25386	25828	26167	26505
-- County Other (Brazos Basin)	-0.54%	7384	7209	7034	6851	6667	6476	6284
Texas State Data Center Projections (0.5 Migration)	0.58%	23386	24262	25137	25888	26638	27215	27792
Texas State Data Center Projections (1.0 Migration)	0.81%	23386	24736	26085	27202	28319	29038	29756
U.S. Census Bureau Projections (linear)	-0.08%	23386	23294	23202	23110	23018	22926	22834
McLennan County								
TWDB Projections (2011 Region G Water Plan)	0.66%	231882	241140	250398	258200	266002	274090	282177
-- County Other (Brazos Basin)	0.15%	26101	26320	26538	26723	26908	27101	27293
Texas State Data Center Projections (0.5 Migration)	0.70%	234906	243704	252501	262533	272564	281136	289707
Texas State Data Center Projections (1.0 Migration)	0.86%	234906	245214	255521	268265	281009	292420	303830
U.S. Census Bureau Projections (linear)	0.79%	234906	245305	255703	266102	276500	286899	297297
City of Mart								
TWDB Projections	0.7%	2475	2577	2679	2765	2851	2940	3029
City's Projections for existing city limits	0.7%	2426	2512	2601	2694	2789	2888	2991
Proposed Developments within ETJ & outside city limits		0	0	0	0	0	0	0
Sum for City of Mart Area	0.7%	2426	2512	2601	2694	2789	2888	2991
City of Marlin								
TWDB Projections	0.4%	6862	7009	7155	7305	7455	7587	7718
City's Projections for existing city limits	0.4%	5967	6087	6210	6335	6463	6593	6726
Proposed Developments within ETJ & outside city limits		0	0	0	0	0	0	0
Sum for City of Marlin Area	0.4%	5967	6087	6210	6335	6463	6593	6726

Entity	Annual Growth Projected by Entity	POPULATION						
		2010	2015	2020	2025	2030	2035	2040
City of Mount Calm								
City's Projections for existing city limits	0.3%	320	325	330	335	340	345	350
Proposed Developments within ETJ		0	0	0	0	0	0	0
Sum for City of Mount Calm Area	0.3%	320	325	330	335	340	345	350
Axtell WSC								
WSC Projections for existing service area	0.7%	1513	1574	1634	1695	1755	1816	1876
Proposed Developments		0	0	0	0	0	0	0
Sum for Axtell WSC Area	0.7%	1513	1574	1634	1695	1755	1816	1876
Birome WSC								
WSC Projections for existing service area	0.6%	1506	1556	1606	1656	1706	1756	1806
Proposed Developments		0	0	0	0	0	0	0
Sum for Birome WSC Area	0.6%	1506	1556	1606	1656	1706	1756	1806
Chalk Bluff WSC								
TWDB Projections	1.6%	3487	3884	4280	4614	4948	5295	5641
WSC Projections for existing service area	1.6%	3432	3585	3960	4335	4710	5085	5460
Proposed Developments		0	75	0	0	0	0	0
Sum for Chalk Bluff WSC Area	1.6%	3432	3660	3960	4335	4710	5085	5460
EOL WSC								
WSC Projections for existing service area	0.9%	1625	1699	1777	1858	1944	2033	2126
Proposed Developments		0	0	0	0	0	0	0
Sum for EOL WSC Area	0.9%	1625	1699	1777	1858	1944	2033	2126
Gholson WSC								
WSC Projections for existing service area	0.4%	2985	3033	3093	3153	3213	3273	3333
Proposed Developments		0	0	0	0	0	0	0
Sum for Gholson WSC Area	0.4%	2985	3033	3093	3153	3213	3273	3333
H&H WSC								
WSC Projections for existing service area	1.0%	1431	1504	1581	1661	1746	1835	1929
Proposed Developments		0	0	0	0	0	0	0
Sum for H&H WSC Area	1.0%	1431	1504	1581	1661	1746	1835	1929
LTG WSC								
WSC Projections for existing service area	0.9%	1396	1466	1533	1601	1668	1735	1802
Proposed Developments		0	0	0	0	0	0	0
Sum for LTG WSC Area	0.9%	1396	1466	1533	1601	1668	1735	1802
M.S. WSC								
WSC Projections for existing service area	0.1%	681	684	687	691	694	697	701
Proposed Developments		0	0	0	0	0	0	0

Entity	Annual Growth Projected by Entity	POPULATION						
		2010	2015	2020	2025	2030	2035	2040
Sum for M.S. WSC Area	0.1%	681	684	687	691	694	697	701
McLennan County WCID No. 2								
WCID Projections for existing service area	0.1%	1751	1760	1769	1778	1787	1795	1804
Proposed Developments		0	0	0	0	0	0	0
Sum for McLennan County WCID No. 2 Area	0.1%	1751	1760	1769	1778	1787	1795	1804
Prairie Hill WSC								
WSC Projections for existing service area	0.5%	1794	1840	1886	1934	1982	2032	2084
Proposed Developments		0	0	0	0	0	0	0
Sum for Prairie Hill WSC Area	0.5%	1794	1840	1886	1934	1982	2032	2084
Pure WSC								
WSC Projections for existing service area	0.1%	707	707	711	715	718	722	725
Proposed Developments		0	0	0	0	0	0	0
Sum for Pure WSC Area	0.1%	707	707	711	715	718	722	725
RMS WSC (City of Riesel)								
Projections for existing service area	1.6%	960	1039	1124	1217	1317	1425	1542
Proposed Developments		0	0	0	0	0	0	0
Sum for RMS WSC Area	1.6%	960	1039	1124	1217	1317	1425	1542
Ross WSC								
WSC Projections for existing service area	1.0%	2144	2250	2361	2478	2601	2729	2864
Proposed Developments		0	0	0	0	0	0	0
Sum for Ross WSC Area	1.0%	2144	2250	2361	2478	2601	2729	2864
Moore Water System								
Projections for existing service area	0.1%	246	247	248	250	251	252	253
Proposed Developments		0	0	0	0	0	0	0
Sum for Moore Water System Service Area	0.1%	246	247	248	250	251	252	253
TOTAL POPULATION - PROJECT PARTICIPANTS	0.7%	30885	31944	33113	34384	35683	37012	38373

APPENDIX C

**WATER DEMAND PROJECTIONS FOR
PARTICIPATING CITIES AND WSCs**

**FHLM Regional Water Facility Planning Study
Water Demand Projections for Study Area**

Entity	Water Demands (MGD)						
	2010	2015	2020	2025	2030	2035	2040
City of Mart							
Average day water demand (based on gpcd)	0.33	0.35	0.36	0.37	0.38	0.40	0.41
Average day water demand (reported by city)	0.37	0.38	0.39	0.40	0.42	0.43	0.45
Maximum day water demand (city data & avg/max day ratio)	0.83	0.86	0.89	0.92	0.96	0.99	1.03
City of Marlin							
Average day water demand (based on gpcd)	1.63	1.50	1.35	1.20	1.04	1.06	1.08
Average day water demand (reported by city)	1.36	1.38	1.41	1.44	1.47	1.50	1.53
Maximum day water demand (city data & avg/max day ratio)	2.50	2.29	2.07	1.84	1.60	1.63	1.65
City of Mount Calm							
Average day water demand (reported by city)	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Maximum day water demand (city data & avg/max day ratio)	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Axtell WSC							
Average day water demand (based on gpcd)	0.17	0.18	0.18	0.19	0.20	0.20	0.21
Average day water demand (reported by WSC)	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Maximum day water demand (WSC data & avg/max day ratio)	0.37	0.39	0.40	0.42	0.43	0.45	0.46
Birome WSC							
Average day water demand (based on gpcd)	0.13	0.14	0.14	0.15	0.15	0.15	0.16
Average day water demand (reported by WSC)	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Maximum day water demand (WSC data & avg/max day ratio)	0.33	0.34	0.35	0.36	0.37	0.38	0.39
Chalk Bluff WSC							
Average day water demand (based on gpcd)	0.35	0.37	0.40	0.44	0.48	0.52	0.56
Average day water demand (reported by WSC)	0.27	0.29	0.31	0.33	0.36	0.39	0.42
Maximum day water demand (WSC data & avg/max day ratio)	0.63	0.68	0.74	0.80	0.86	0.93	1.01
EOL WSC							
Average day water demand (based on gpcd)	0.14	0.15	0.15	0.16	0.17	0.18	0.18
Average day water demand (reported by WSC)	0.17	0.18	0.19	0.20	0.21	0.22	0.23
Maximum day water demand (WSC data & avg/max day ratio)	0.39	0.41	0.43	0.45	0.47	0.49	0.51
Gholson WSC							
Average day water demand (based on gpcd)	0.35	0.35	0.36	0.37	0.38	0.38	0.39
Average day water demand (reported by WSC)	0.28	0.28	0.29	0.29	0.30	0.30	0.31
Maximum day water demand (WSC data & avg/max day ratio)	0.56	0.57	0.58	0.59	0.60	0.61	0.62
H&H WSC							
Average day water demand (based on gpcd)	0.14	0.14	0.15	0.16	0.17	0.17	0.18

Entity	Water Demands (MGD)						
	2010	2015	2020	2025	2030	2035	2040
Average day water demand (reported by WSC)	0.15	0.16	0.16	0.17	0.18	0.19	0.20
Maximum day water demand (WSC data & avg/max day ratio)	0.39	0.41	0.44	0.46	0.48	0.51	0.53
LTG WSC							
Average day water demand (based on gpcd)	0.12	0.13	0.13	0.14	0.15	0.15	0.16
Average day water demand (reported by WSC)	0.10	0.10	0.11	0.11	0.12	0.12	0.13
Maximum day water demand (WSC data & avg/max day ratio)	0.19	0.20	0.21	0.22	0.23	0.24	0.25
M.S. WSC							
Average day water demand (based on gpcd)	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Average day water demand (reported by WSC)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Maximum day water demand (WSC data & avg/max day ratio)	0.07	0.07	0.07	0.07	0.07	0.07	0.07
McLennan County WCID No. 2							
Average day water demand (based on gpcd)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Average day water demand (reported by WCID)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Maximum day water demand (WCID data & avg/max day ratio)	0.35	0.35	0.35	0.36	0.36	0.36	0.36
Prairie Hill WSC							
Average day water demand (based on gpcd)	0.10	0.10	0.11	0.11	0.11	0.12	0.12
Average day water demand (reported by WSC)	0.14	0.15	0.15	0.15	0.16	0.16	0.17
Maximum day water demand (WSC data & avg/max day ratio)	0.41	0.42	0.43	0.44	0.46	0.47	0.48
Pure WSC							
Average day water demand (based on gpcd)	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Average day water demand (reported by WSC)	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Maximum day water demand (WSC data & avg/max day ratio)	0.09	0.09	0.09	0.09	0.09	0.09	0.09
RMS WSC (City of Riesel)							
Average day water demand (reported by WSC)	0.11	0.12	0.12	0.14	0.15	0.16	0.17
Maximum day water demand (city data & avg/max day ratio)	0.21	0.23	0.25	0.27	0.29	0.32	0.34
Ross WSC							
Average day water demand (reported by WSC)	0.20	0.21	0.22	0.24	0.25	0.26	0.27
Maximum day water demand (WSC data & avg/max day ratio)	0.41	0.43	0.45	0.47	0.49	0.52	0.54
Moore Water System							
Average day water demand (reported by system)	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Maximum day water demand (system data & avg/max day ratio)	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Total Average Day Water Demand (based on entity data)	3.72	3.84	3.96	4.09	4.23	4.37	4.52
Total Maximum Day Water Demand (avg/max day ratio)	7.88	7.89	7.89	7.90	7.90	8.19	8.49

APPENDIX D

DETAILED COST CALCULATIONS AND FINANCIAL EVALUATIONS

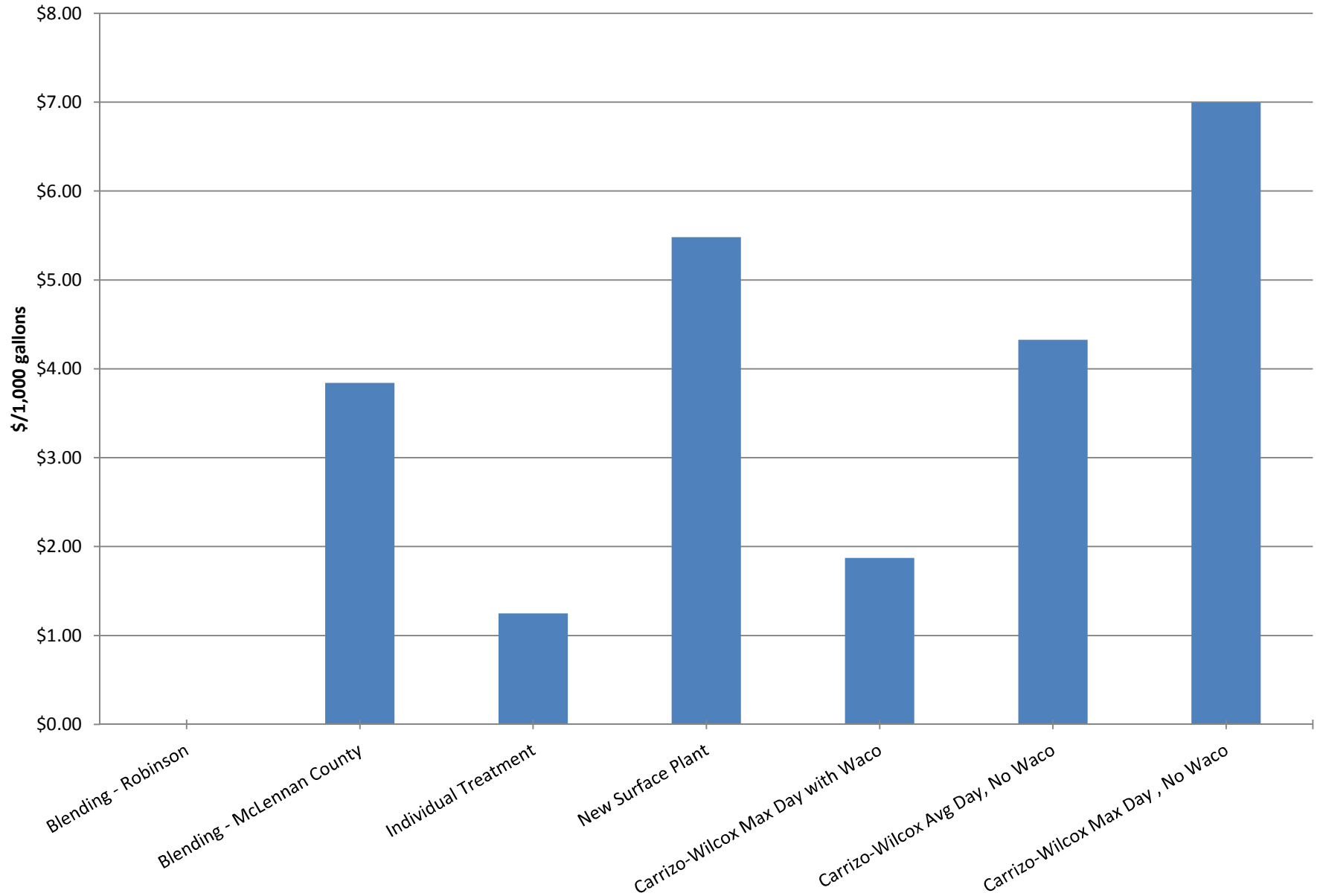
COST PER 1,000 GALLON SUMMARY TABLE (ALL COSTS)

Entity	Blending - Robinson	Blending - McLennan County	Individual Treatment	New Surface Plant	Carrizo-Wilcox Max Day with Waco	Carrizo-Wilcox Avg Day, No Waco	Carrizo-Wilcox Max Day , No Waco
Axtell WSC	\$0.00	\$3.84	\$1.25	\$5.48	\$1.87	\$4.33	\$7.00
Birome WSC	\$0.00	\$3.84	\$2.00	\$5.48	\$1.87	\$4.33	\$7.00
Prairie Hill WSC	\$5.04	\$0.00	\$2.19	\$5.48	\$1.87	\$4.33	\$7.00
EOL WSC	\$5.04	\$0.00	\$1.44	\$5.48	\$1.87	\$4.33	\$7.00
Moore Water System	\$5.04	\$0.00	\$2.29	\$5.48	\$1.87	\$4.33	\$7.00
Pure WSC	\$0.00	\$3.84	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
LTG WSC	\$0.00	\$3.84	\$2.34	\$5.48	\$1.87	\$4.33	\$7.00
City of Mount Calm	\$0.00	\$3.84	\$4.01	\$5.48	\$1.87	\$4.33	\$7.00
M.S. WSC	\$5.04	\$0.00	\$3.21	\$5.48	\$1.87	\$4.33	\$7.00
RMS WSC	\$5.04	\$0.00	\$0.89	\$5.48	\$1.87	\$4.33	\$7.00
H&H WSC	\$5.04	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
McLennan County WCID #2	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
Ross WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
Gholson WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
Chalk Bluff WSC	\$0.00	\$0.00	\$0.00	\$5.48	\$1.87	\$4.33	\$7.00
City of Mart	\$0.00	\$0.00	\$0.00	\$5.48	\$0.00	\$0.00	\$0.00
City of Marlin	\$0.00	\$0.00	\$0.00	\$5.48	\$0.00	\$0.00	\$0.00

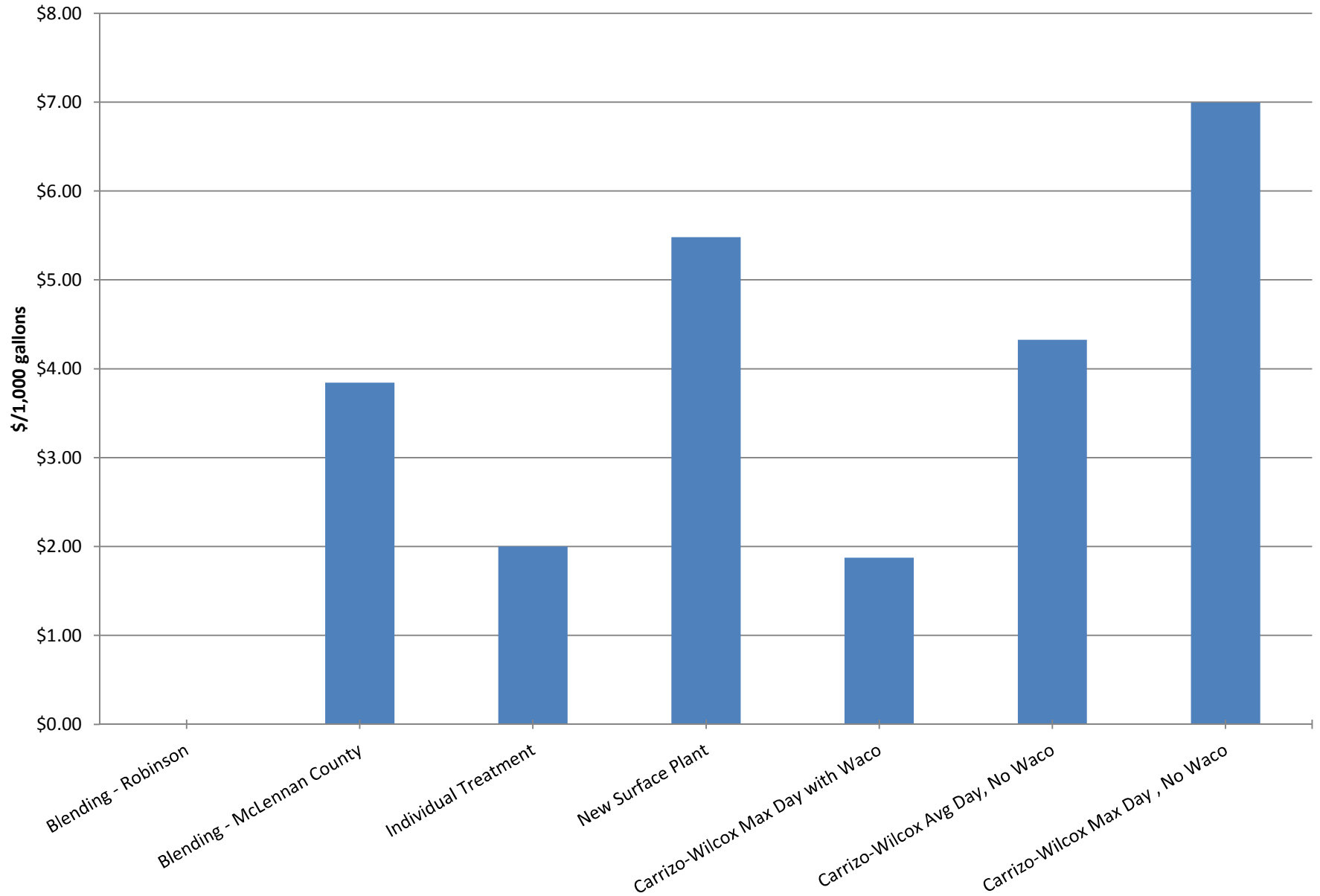
PRESENT-WORTH VALUES FOR ALL ALTERNATIVES

	Capital Improvements	O&M Costs	Total
Blending - Robinson	\$16,160,000	\$12,618,476	\$28,778,476
Blending - McLennan County	\$8,040,000	\$466,971	\$8,506,971
Individual Treatment			
Axtell WSC	\$654,000	\$567,092	\$1,221,092
Birome WSC	\$654,000	\$340,255	\$994,255
Prairie Hill WSC	\$784,500	\$1,188,711	\$1,973,211
EOL WSC	\$1,084,500	\$359,885	\$1,444,385
LTG WSC	\$1,076,500	\$244,286	\$1,320,786
M.S. WSC	\$463,700	\$56,709	\$520,409
City of Mount Calm	\$463,700	\$56,709	\$520,409
Moore WS	\$463,700	\$56,709	\$520,409
RMS WSC	\$536,000	\$102,513	\$638,513
New Plant	\$86,642,000	\$31,519,697	\$118,161,697
Carrizo-Wilcox Max Day with Waco	\$84,628,000	\$16,245,984	\$100,873,984
Carrizo-Wilcox Avg Day, No Waco	\$42,762,000	\$4,932,308	\$47,694,308
Carrizo-Wilcox Max Day , No Waco	\$69,256,000	\$7,804,931	\$77,060,931

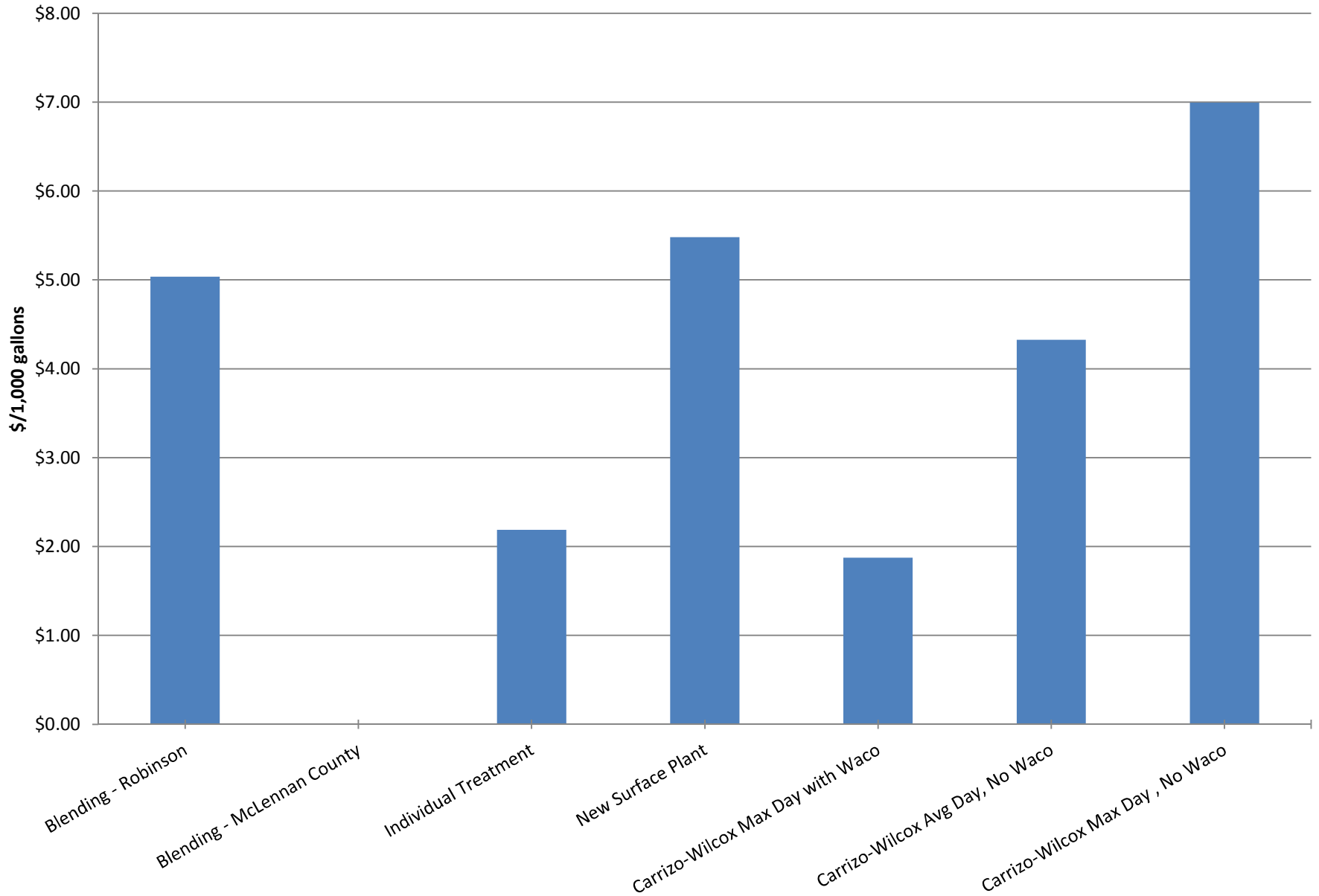
Axtell Alternative Costs



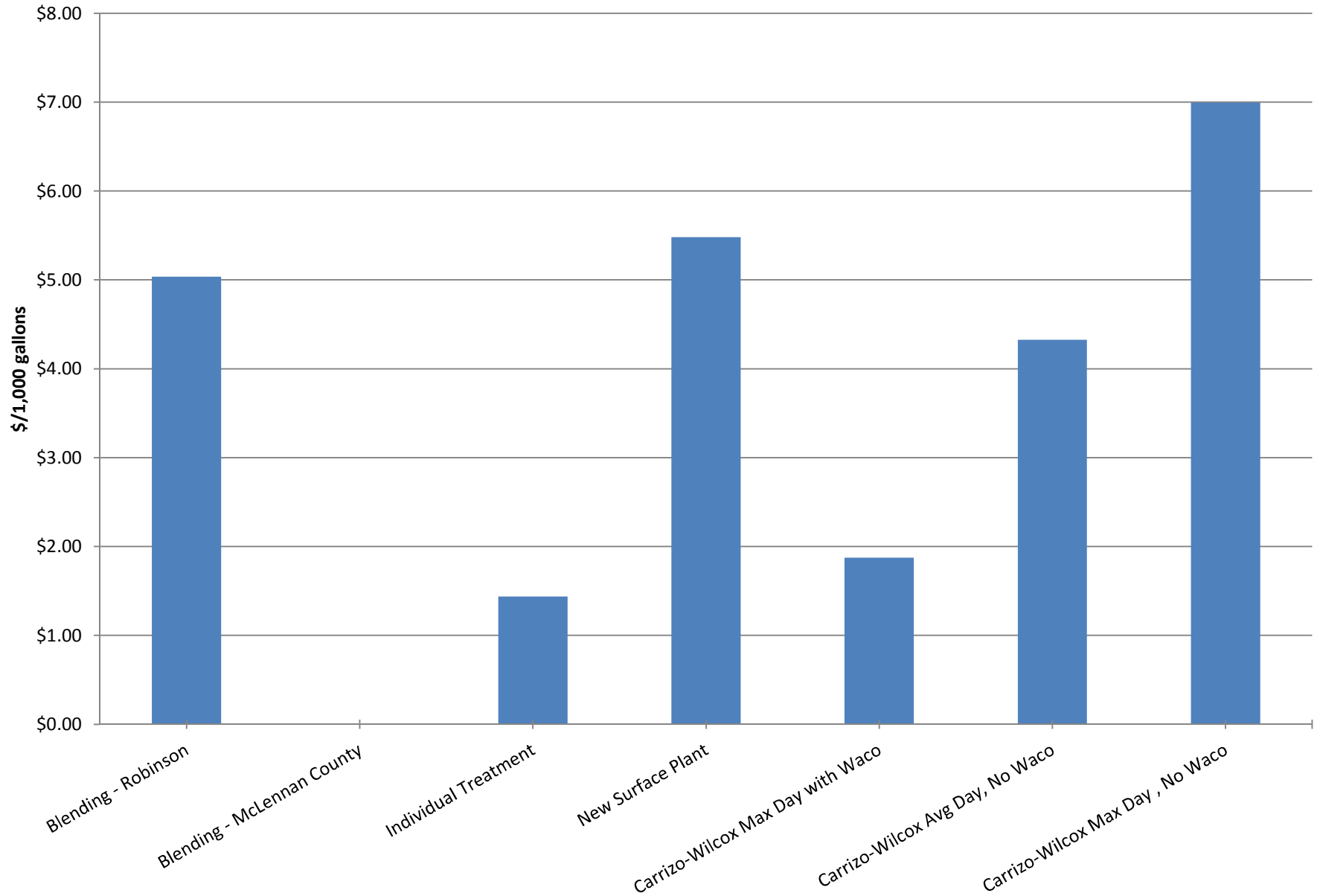
Birome Alternative Costs



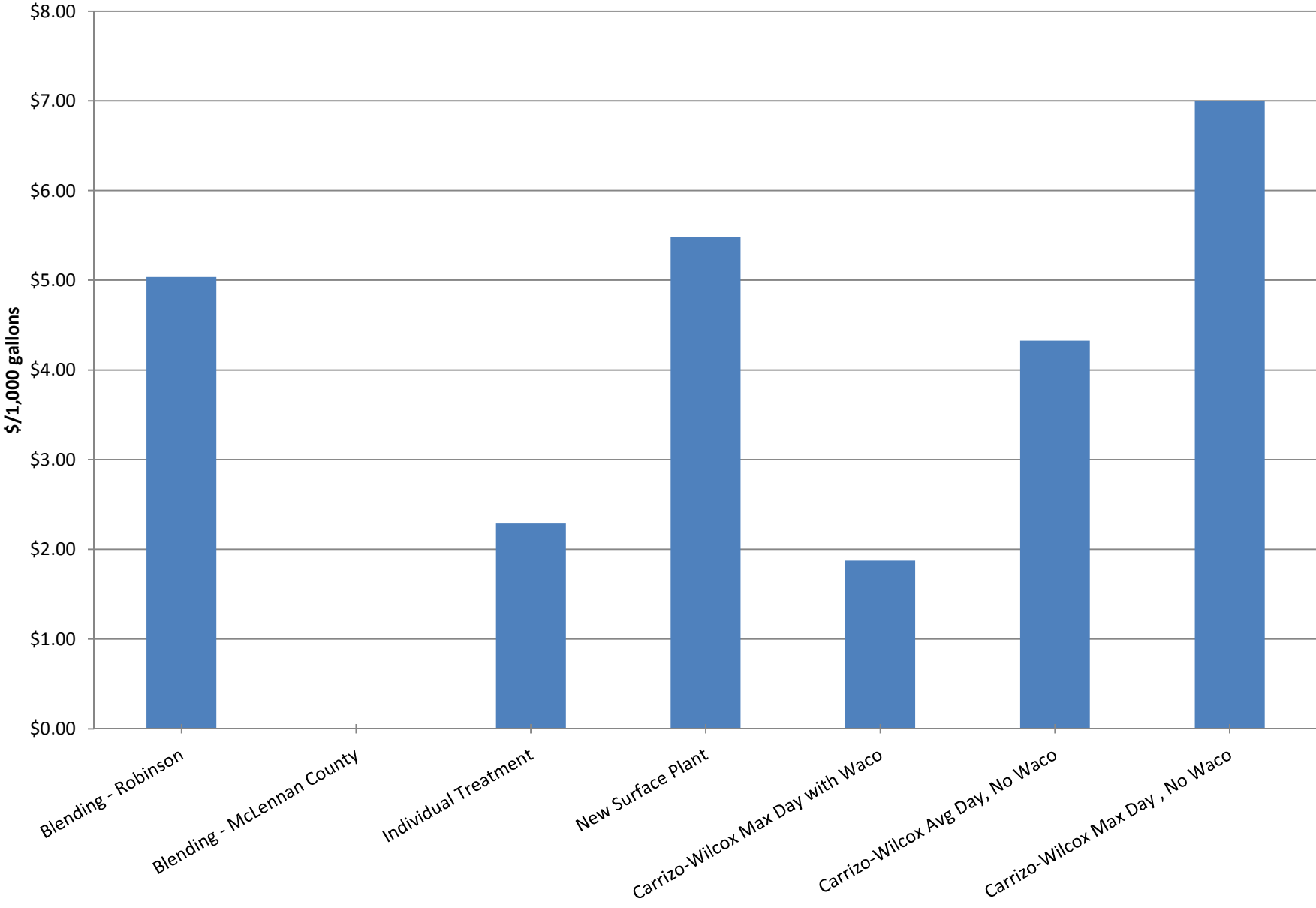
Prairie Hill Alternative Costs



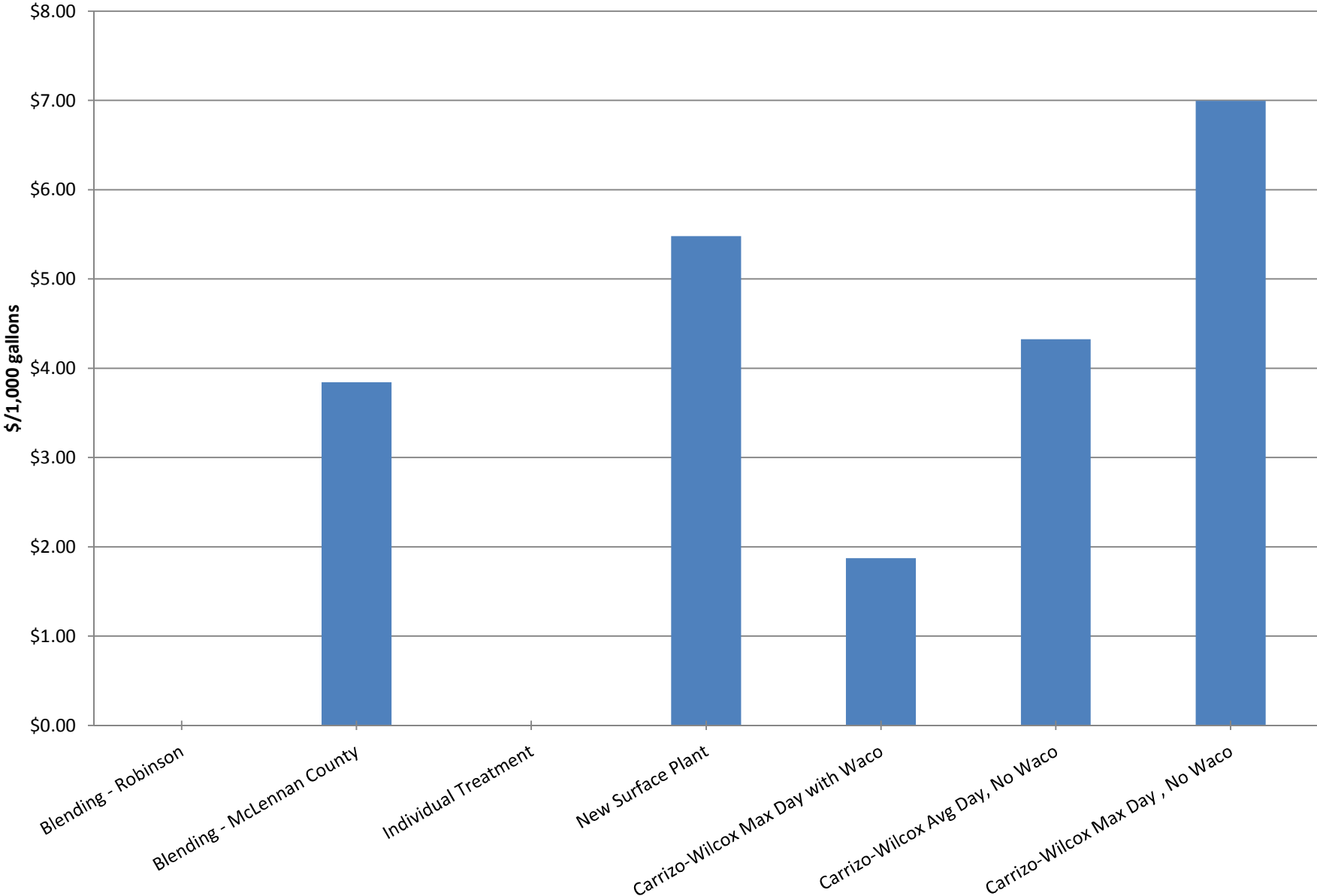
EOL Alternative Costs



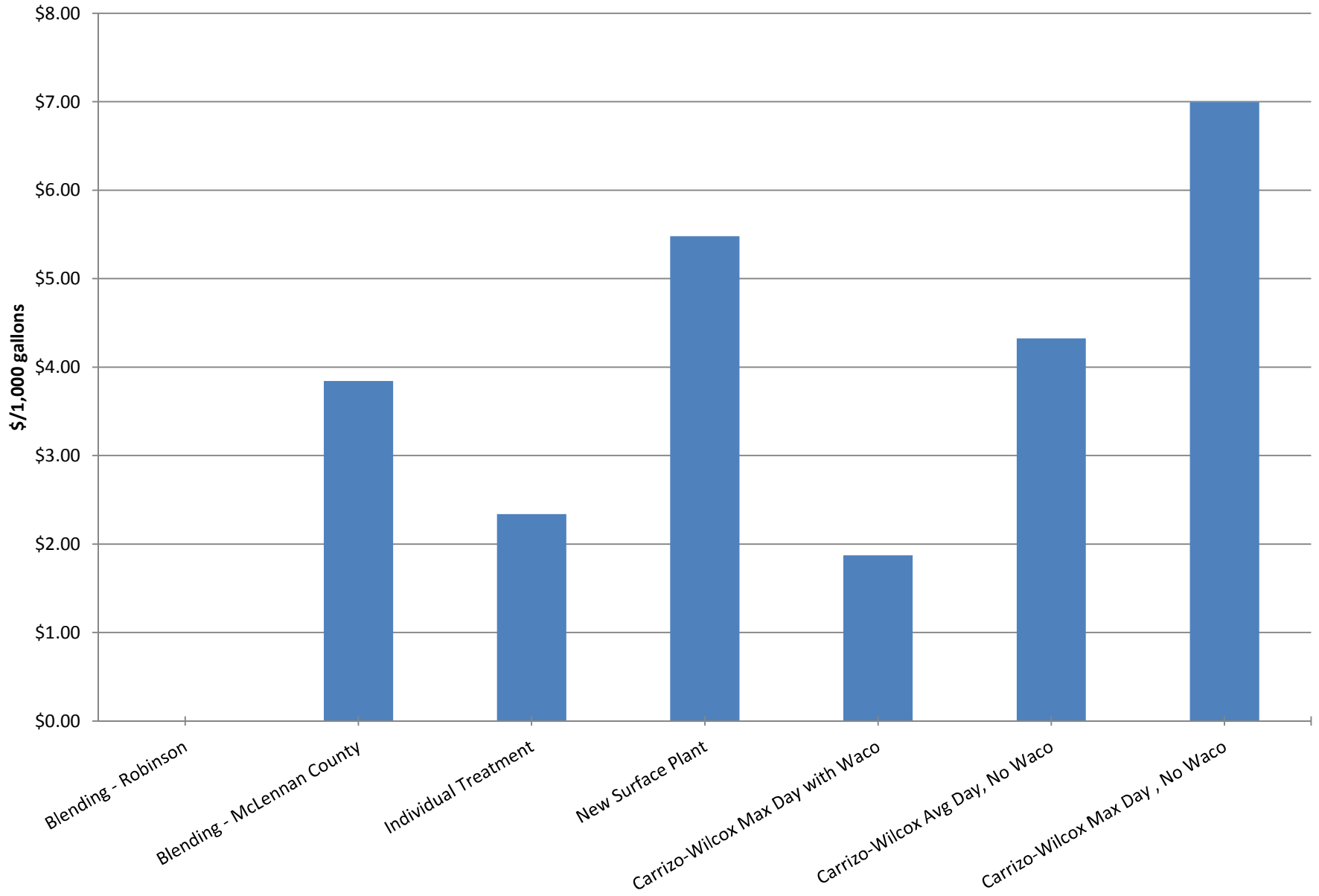
Moore Alternative Costs



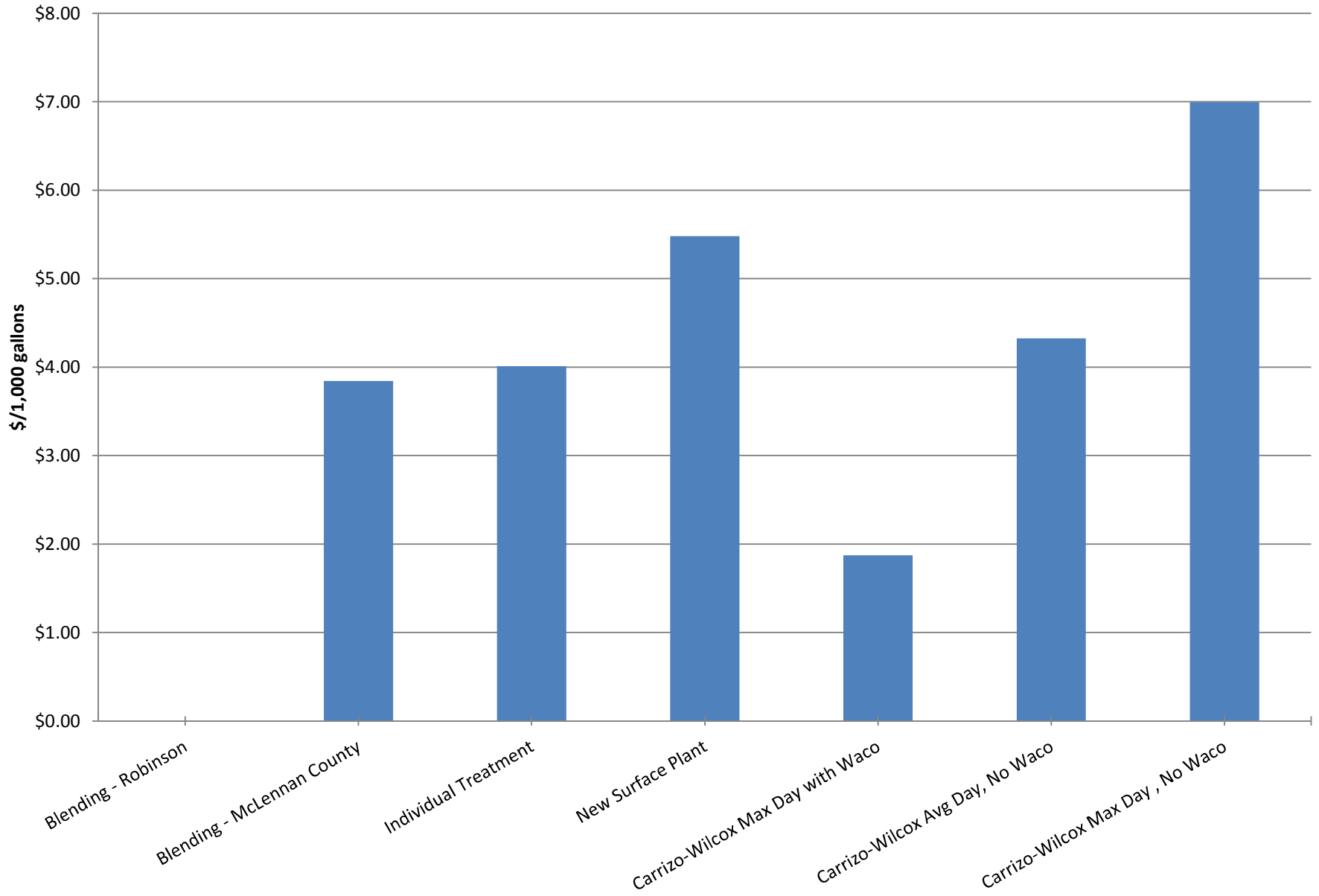
Pure Alternative Costs



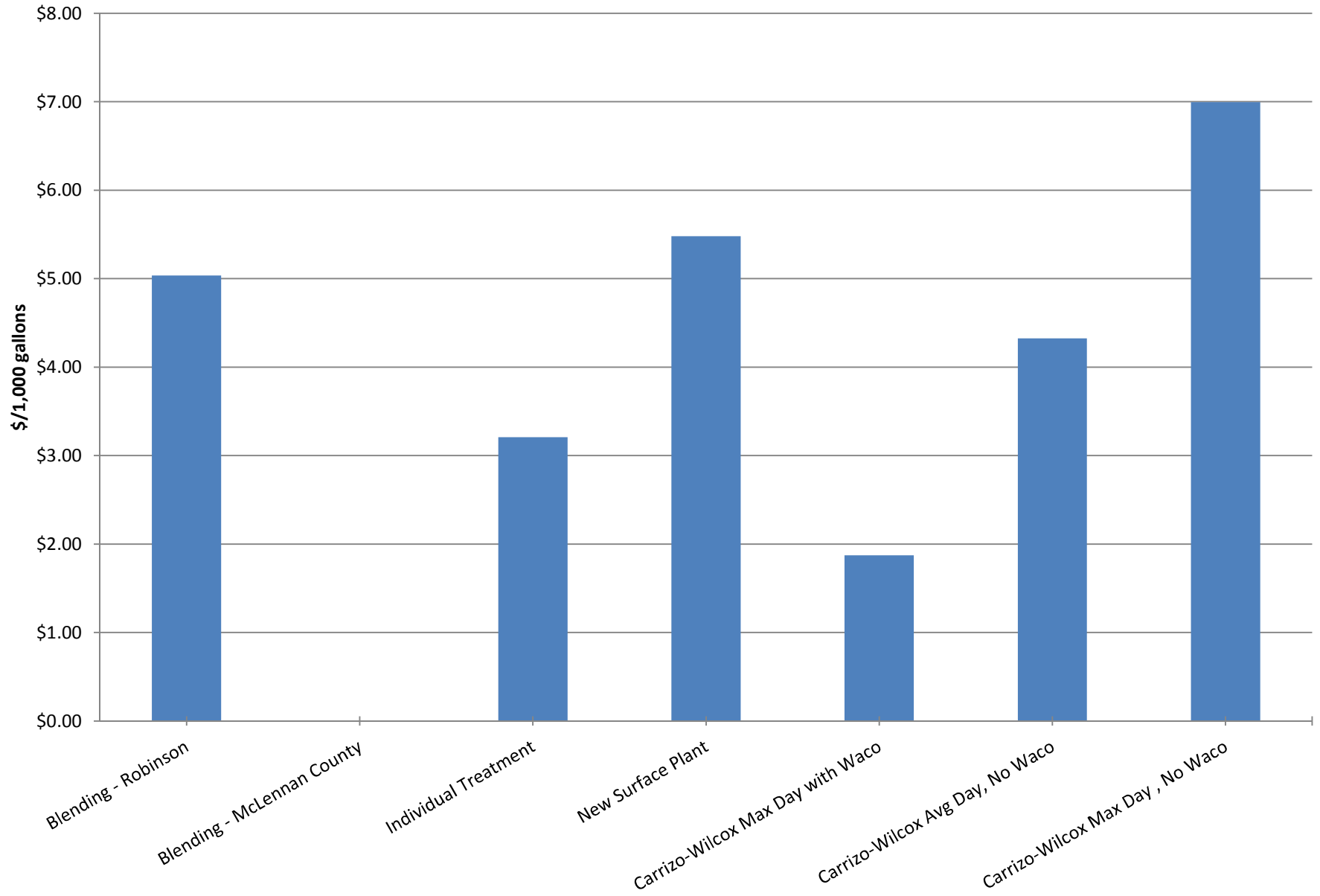
LTG Alternative Costs



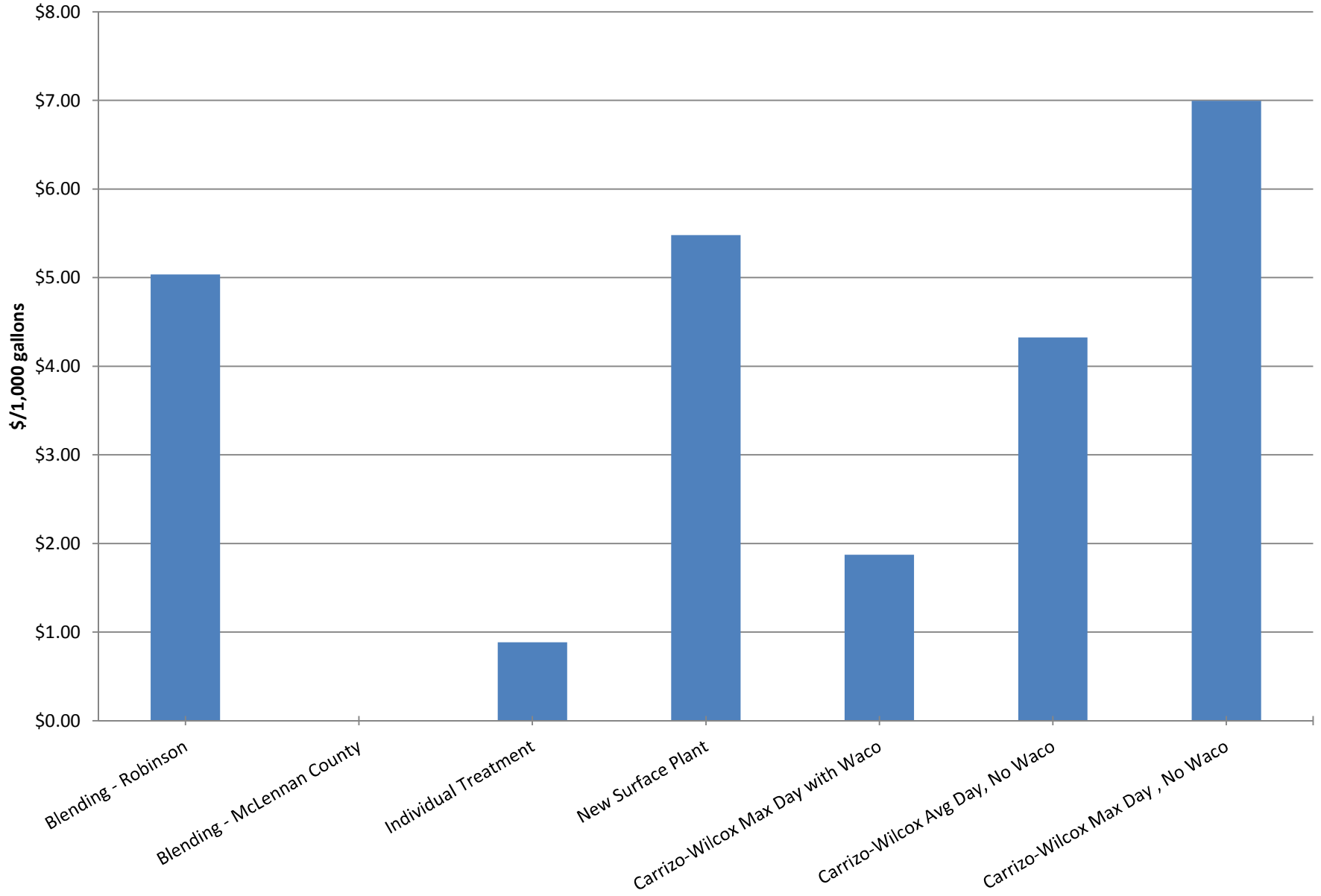
Mount Calm Alternative Costs



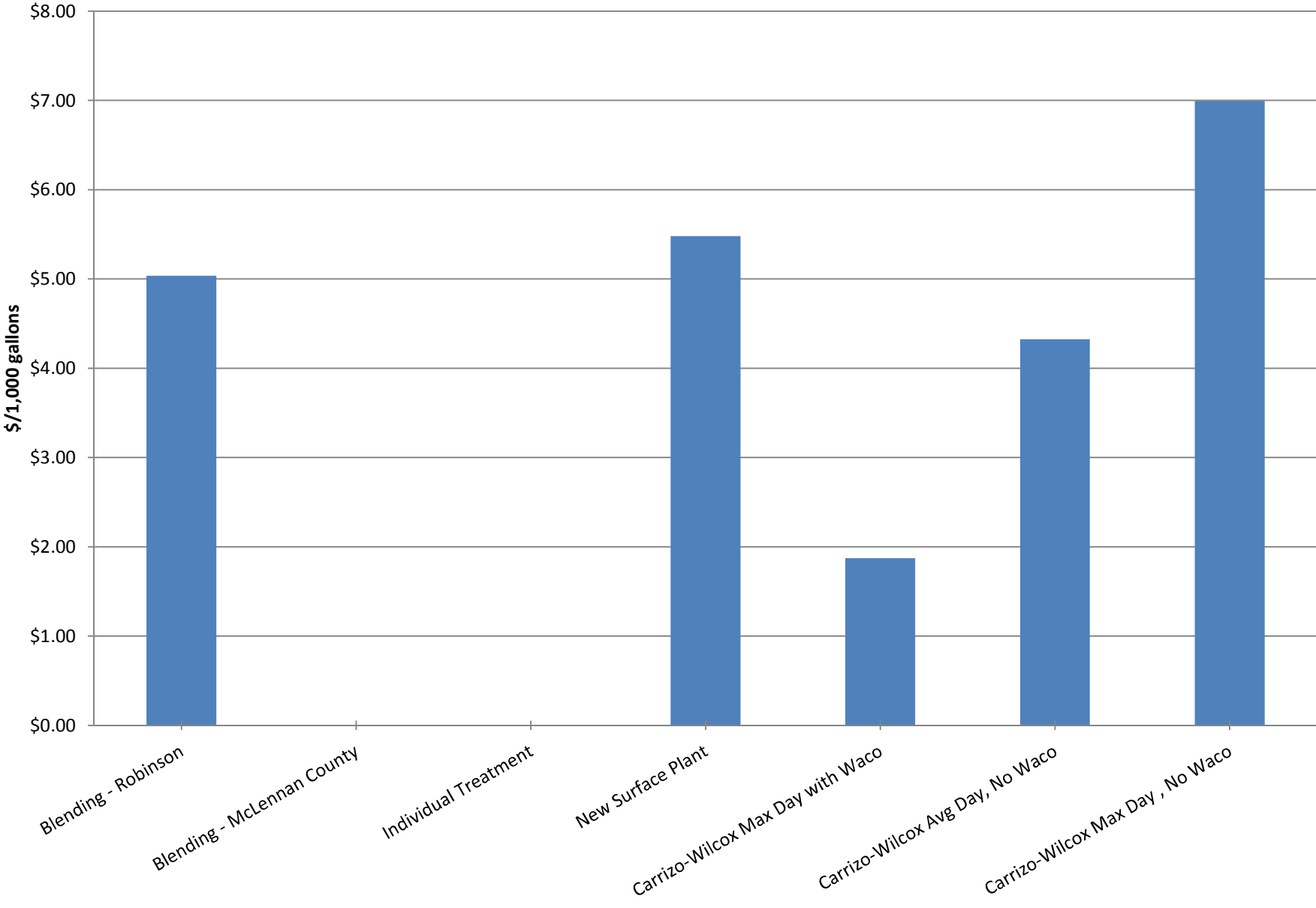
MS Alternative Costs



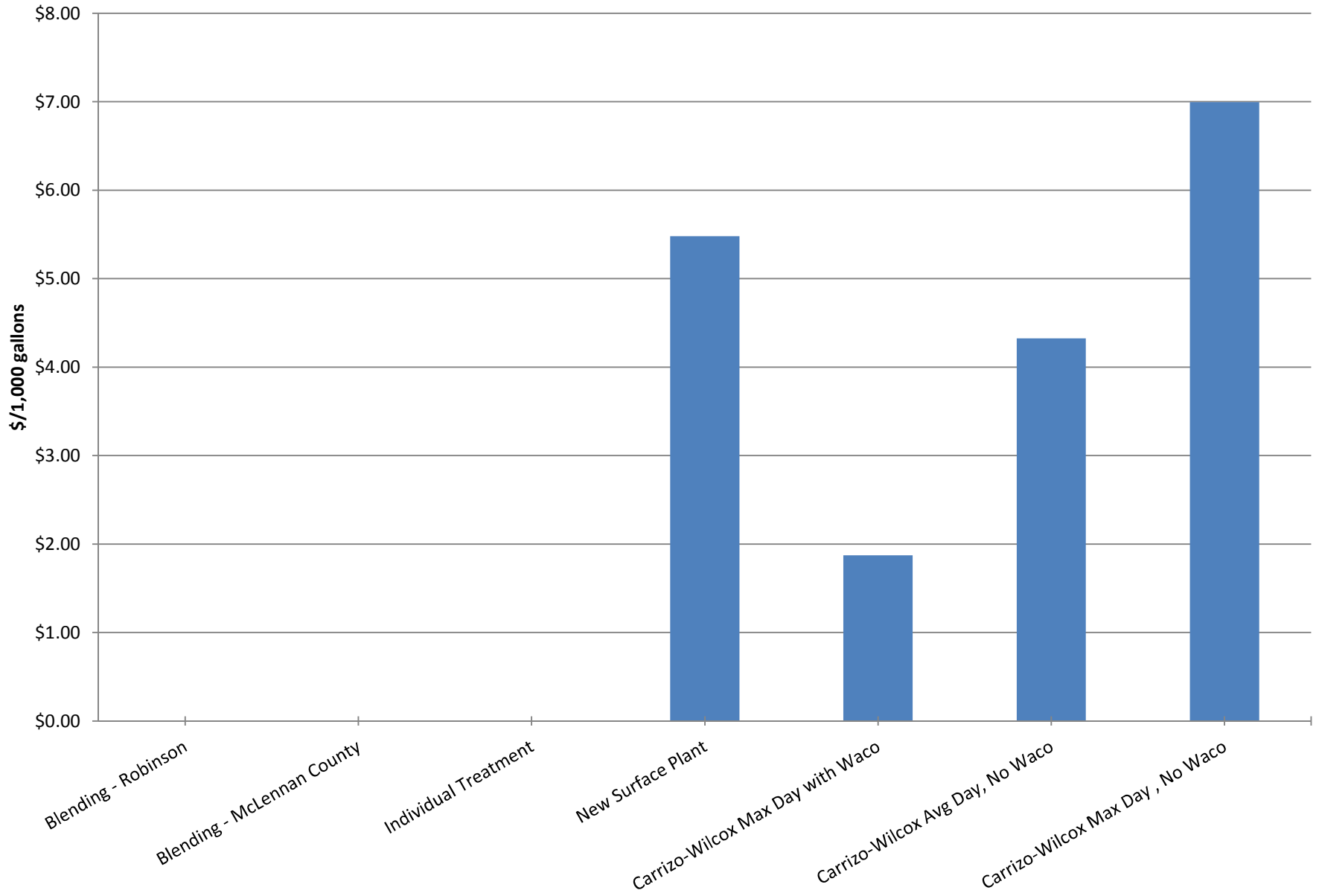
RMS Alternative Costs



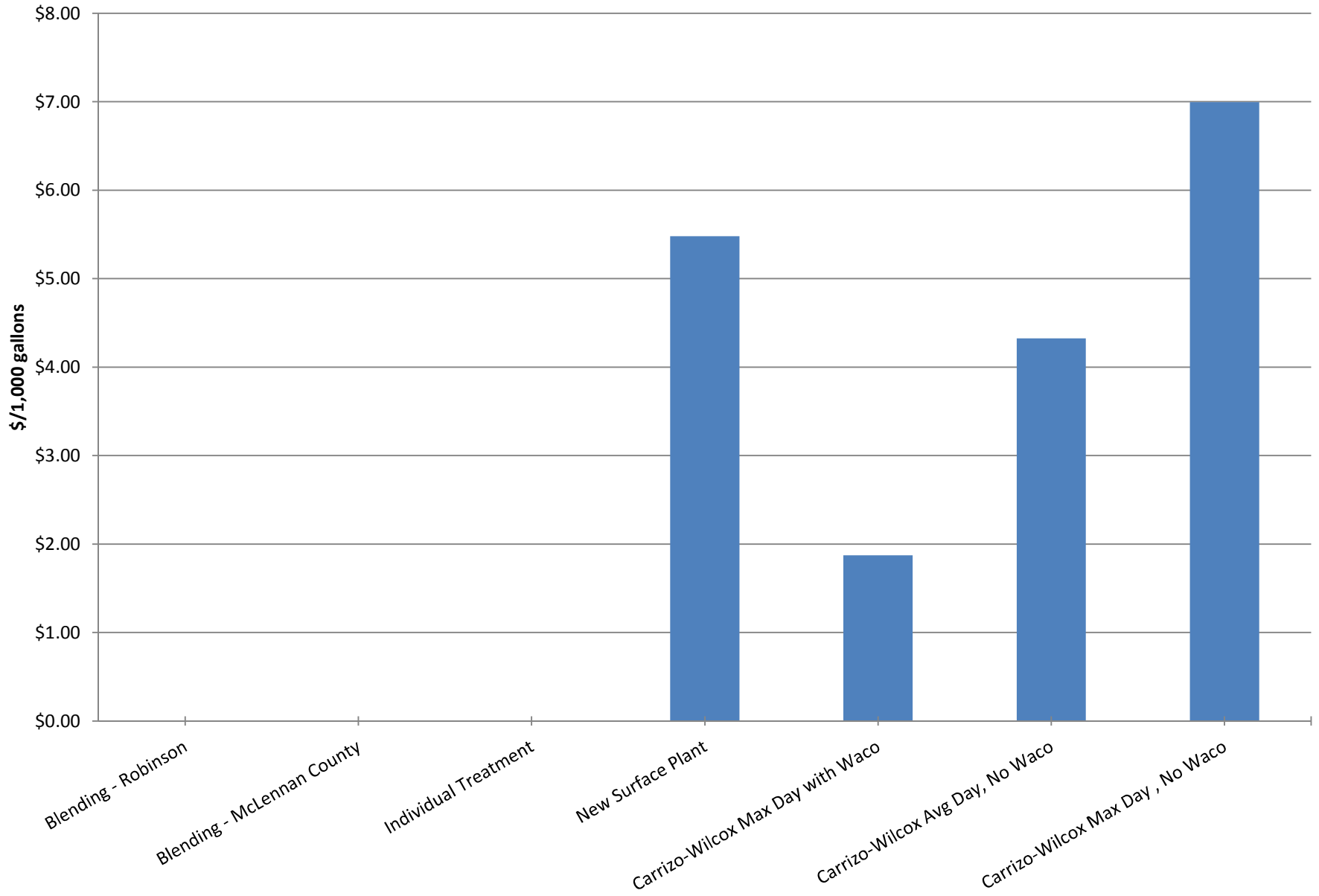
H&H Alternative Costs



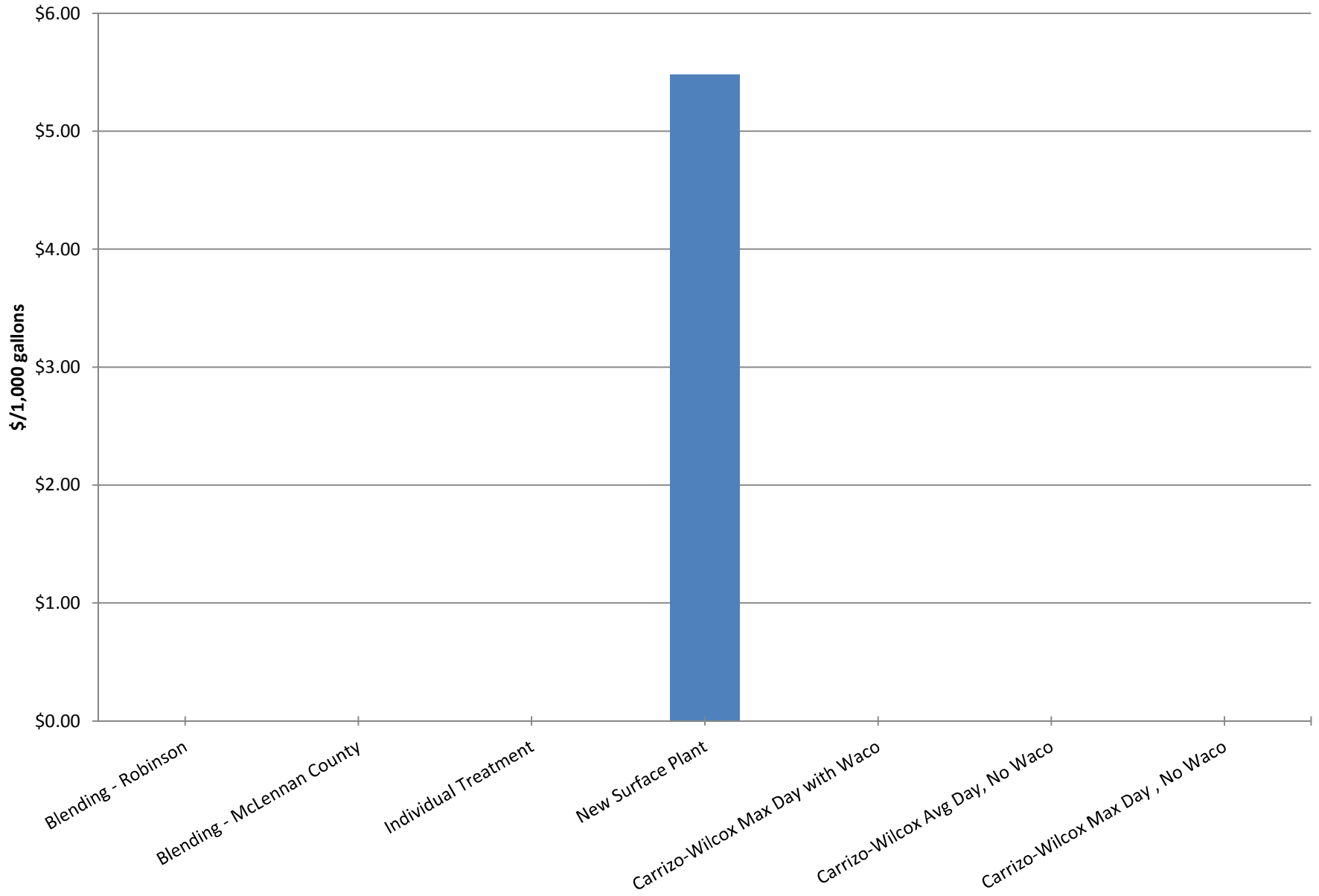
McLennan Alternative Costs



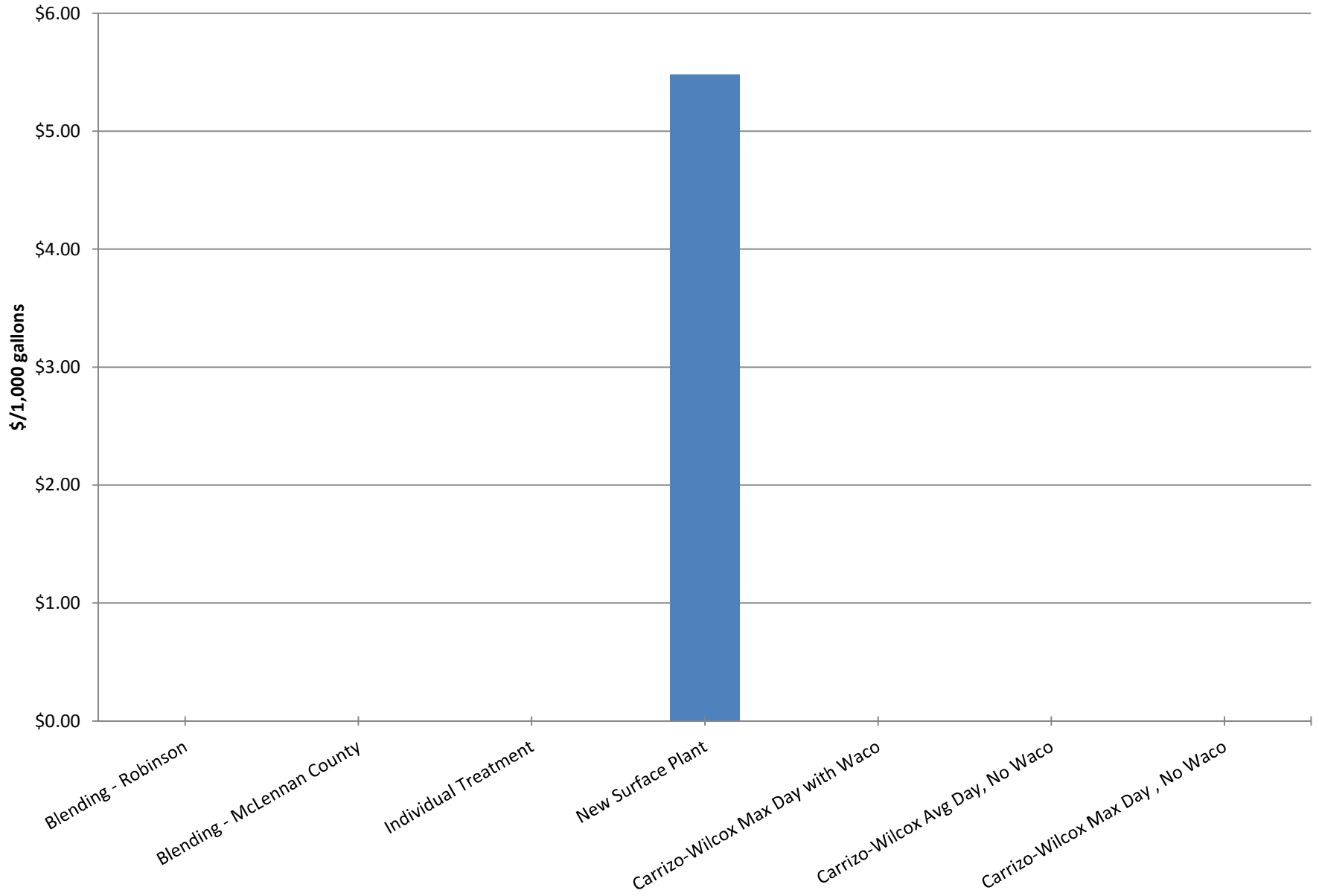
Ross Alternative Costs



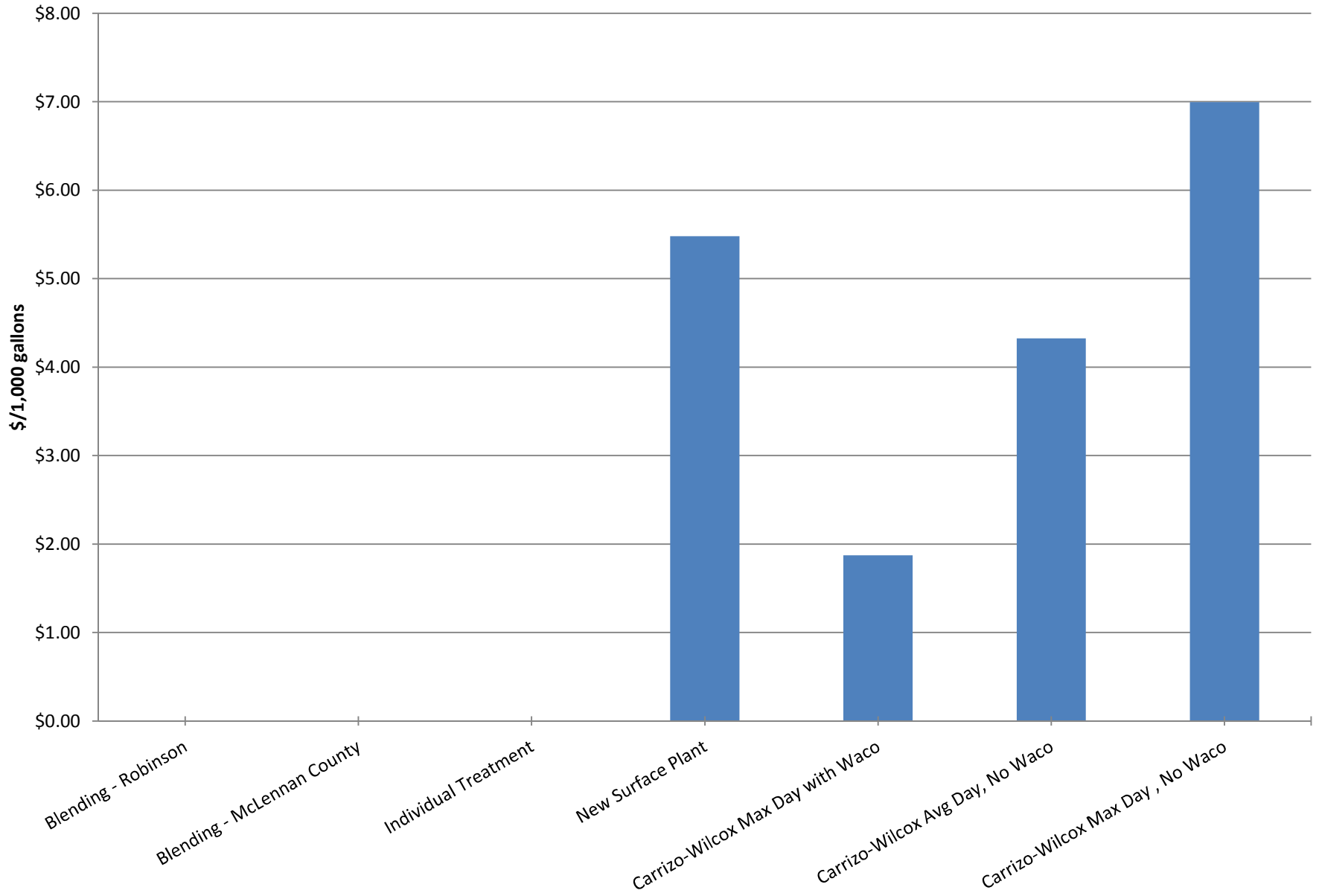
City of Mart Alternative Costs



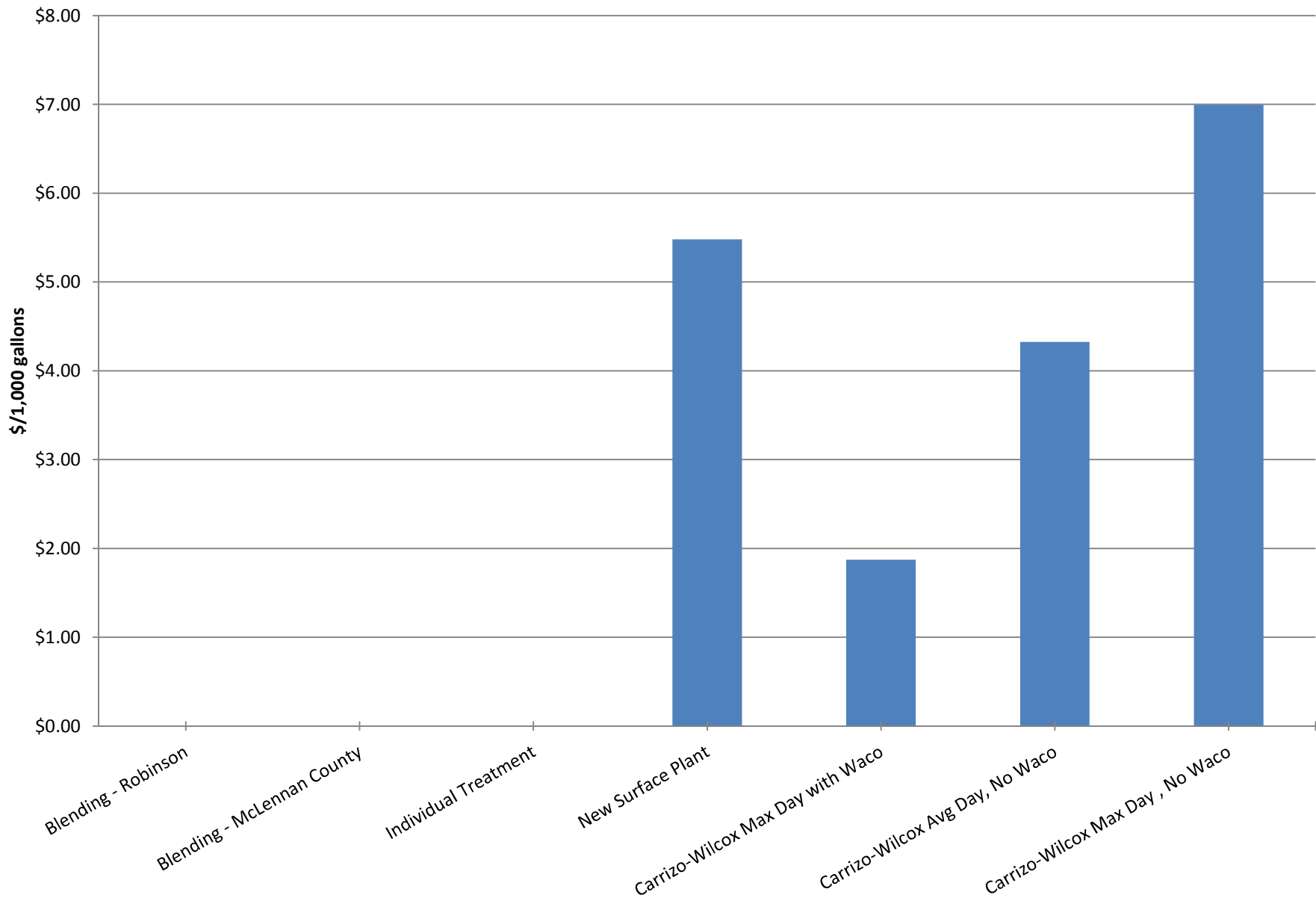
City of Marlin Alternative Costs



Gholson Alternative Costs



Chalk Bluff Alternative Costs



Capital Cost Factors

Mobilization and Demobilization	5.00%
Contingency	20.00%
Professional Services	15.00%
Easement/Acquisition	\$4,000 per acre
Easement/Acquisition - fee simple	\$8,000 per acre
Pipeline Costs	
2"	\$12 per lf
4"	\$15 per lf
6"	\$18 per lf
8"	\$28 per lf
10"	\$31 per lf
12"	\$35 per lf
14"	\$46 per lf
16"	\$57 per lf
18"	\$68 per lf
20"	\$80 per lf
24"	\$102 per lf
30"	\$136 per lf
36"	\$169 per lf
GST	\$1.00 per gal

Financial Factors

Interest Rate	4.00%
Payment Period	20 years
Beginning Year	2015
Inflation rate	0.025
O&M Cost per Gallon for Groundwater Plant =	\$1.49 \$/1000 gal
O&M Cost per Gallon for Surface Water Plant =	\$1.00 \$/1000 gal
Cost of BPS/HSPS operations =	\$0.05 \$/1000 gal
Cost of Well operations =	\$0.10 \$/1000 gal
Power costs =	\$0.06 \$/kwhr

Blending of Arsenic Violation Water Alternative - Southern Option

<u>Item No.</u>	<u>Item Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Robinson Water Treatment Plant Expansion	1,000,000	GPD	\$4.00	\$4,000,000
2	Transmission Pipeline, 4"	46,660	LF	\$15	\$699,900
3	Transmission Pipeline, 6"	18,307	LF	\$18	\$329,530
4	Transmission Pipeline, 8"	32,728	LF	\$28	\$916,390
5	Transmission Pipeline, 10"	42,074	LF	\$31	\$1,304,300
6	Booster Pump Station #1, 20 hp	1	LS	\$795,000	\$795,000
7	Booster Pump Station #2, 15 hp	1	LS	\$780,000	\$780,000
	Booster Pump Station #3, 10 hp	1	LS	\$762,000	\$762,000
9	Ground Storage Tank at Robinson WTP	1,000,000	GAL	\$1	\$1,000,000
10	Booster pump station from Robinson WTP, 40 hp	1	LS	\$755,000	\$755,000
Construction Subtotal					\$11,342,200
	Mobilization and Demobilization (5%)				\$567,110
	Contingency (20%)				\$2,268,500
	Professional Services (15%)				\$1,701,400
Construction Total					\$15,879,300
Easements					
	Easement/Acquisition (pipeline)	65	AC	\$4,000	\$260,000
	Easement/Acquisition (WTP, pump stations and GSTs)	2.5	AC	\$8,000	\$20,000
Easement Subtotal					\$280,000
Project Total					\$16,160,000

Blending of Arsenic Violation Water Alternative - Southern Option - O&M Costs

RO Plant O&M cost = \$1.49 per 1,000 gallon
 Beginning year = 2015
 Inflation rate = 0.0250
 Interest rate = 0.0400
 Cost of HSPS/BPS operations = \$0.05 \$/1000 gpd

Annual O&M Costs

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
WTP (Avg day demand, MGD)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Annual O&M at WTP	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134
High Service Pump Station Costs	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250
Booster Pump Station #1	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650
Booster Pump Station #2	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213
Booster Pump Station #3	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285
Total O&M Costs	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531
Inflated Total O&M Costs	\$578,531	\$592,995	\$607,820	\$623,015	\$638,590	\$654,555	\$670,919	\$687,692	\$704,884	\$722,506	\$740,569	\$759,083	\$778,060

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
2015 Present Worth of Annual O&M Costs	\$578,531	\$570,187	\$561,963	\$553,858	\$545,870	\$537,997	\$530,237	\$522,589	\$515,052	\$507,623	\$500,302	\$493,086	\$485,974

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
WTP (Avg day demand, MGD)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Annual O&M at WTP	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134	\$545,134
High Service Pump Station Costs	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250	\$18,250
Booster Pump Station #1	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650	\$3,650
Booster Pump Station #2	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213
Booster Pump Station #3	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285	\$3,285
Total O&M Costs	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531	\$578,531
Inflated Total O&M Costs	\$797,512	\$817,450	\$837,886	\$858,833	\$880,304	\$902,312	\$924,869	\$947,991	\$971,691	\$995,983	\$1,020,883	\$1,046,405	\$1,072,565

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2015 Present Worth of Annual O&M Costs	\$478,965	\$472,057	\$465,248	\$458,538	\$451,925	\$445,406	\$438,982	\$432,651	\$426,411	\$420,260	\$414,199	\$408,225	\$402,337

Blending of Arsenic Violation Water Alternative - Southern Option - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Capital Costs	2010	2015	2020	2025	2030	2035	2040
Phase Capital Costs	\$0	\$16,160,000	\$0	\$0	\$0	\$0	\$0

Financing Cost

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Debt Service	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000
O&M Costs (Inflated)	\$578,531	\$592,995	\$607,820	\$623,015	\$638,590	\$654,555	\$670,919	\$687,692	\$704,884	\$722,506	\$740,569	\$759,083	\$778,060
Total Cost	\$1,768,531	\$1,782,995	\$1,797,820	\$1,813,015	\$1,828,590	\$1,844,555	\$1,860,919	\$1,877,692	\$1,894,884	\$1,912,506	\$1,930,569	\$1,949,083	\$1,968,060
Avg Water Sold (mgd)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cost per 1,000 gal	\$4.85	\$4.88	\$4.93	\$4.97	\$5.01	\$5.05	\$5.10	\$5.14	\$5.19	\$5.24	\$5.29	\$5.34	\$5.39

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Debt Service	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$1,190,000	\$0	\$0	\$0	\$0	\$0	\$0
O&M Costs (Inflated)	\$797,512	\$817,450	\$837,886	\$858,833	\$880,304	\$902,312	\$924,869	\$947,991	\$971,691	\$995,983	\$1,020,883	\$1,046,405	\$1,072,565
Total Cost	\$1,987,512	\$2,007,450	\$2,027,886	\$2,048,833	\$2,070,304	\$2,092,312	\$2,114,869	\$947,991	\$971,691	\$995,983	\$1,020,883	\$1,046,405	\$1,072,565
Avg Water Sold (mgd)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cost per 1,000 gal	\$5.45	\$5.50	\$5.56	\$5.61	\$5.67	\$5.73	\$5.79	\$2.60	\$2.66	\$2.73	\$2.80	\$2.87	\$2.94

Total Annual Average Demand: 9,490 million gallons
 10-Year Avg for Cost per 1,000 gal: \$5.04

Blending of Arsenic Violation Water Alternative - Southern Option - Economic Evaluation

2015 Present Worth of Capital Costs	\$16,160,000
2015 Present Worth of O&M Costs	\$12,619,000
Total 2015 Present Worth Cost	\$28,779,000
Total Average Day Water Demand from 2015-2040 (acre-ft)	29,126
Total Present Worth Cost/acre-ft	\$988

Blending of Arsenic Violation Water Alternative - Northern Option

Description

LTG WSC, Pure WSC, Axtell WSC, Birome WSC and City of Mount Calm receive water from a new well drilled in McLennan County for blending.

Blending will occur in existing tank, so no additional tanks needed. High Service Pump station to get water from McLennan County to LTG WSC, Pure WSC, Axtell WSC, Birome WSC and City of Mount Calm is needed.

New pipelines and booster pump stations from McLennan County well to LTG WSC, Pure WSC, Axtell WSC, Birome WSC and City of Mount Calm are needed.

Total Arsenic Concentration taken from Exceedance Graph at point where concentration is below this level 80% of the time.

Targeted Arsenic Concentration is below MCL.

Flow required based on 2040 Avg Day Demand.

WATER DEMANDS REQUIRED

Entity	Required Water Demand (mgd)						
	2010	2015	2020	2025	2030	2035	2040
LTG	0.10	0.10	0.11	0.11	0.12	0.12	0.13
Pure	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Axtell	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Birome	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Subtotals:	0.41	0.43	0.44	0.45	0.47	0.48	0.50

Blending of Arsenic Violation Water Alternative - Northern Option

<u>Item No.</u>	<u>Item Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Transmission Pipeline, 4"	88,923	LF	\$15	\$1,333,850
2	Transmission Pipeline, 8"	48,140	LF	\$28	\$1,347,920
3	Booster Pump Station #1, 20 hp	1	LS	\$795,000	\$795,000
4	Booster Pump Station #2, 10 hp	1	LS	\$762,000	\$762,000
5	Ground Storage Tank at well site	501,000	GAL	\$1	\$501,000
6	Groundwater Wells, 350 gpm	1	EA	\$811,201	\$811,210
				Construction Subtotal	\$5,551,000
					\$277,600
					\$1,110,200
					\$832,700
				Construction Total	\$7,771,500
<u>Easements</u>					
	Easement/Acquisition (pipeline)	63	AC	\$4,000	\$252,000
	Easement/Acquisition (well site and pump stations)	2	AC	\$8,000	\$16,000
				Easement Subtotal	\$268,000
				Project Total	\$8,040,000

Blending of Arsenic Violation Water Alternative - Northern Option - O&M Costs

Beginning year =	2015
Inflation rate =	0.0250
Interest rate =	0.0400
Cost of BPS/HSPS operations =	\$0.05 \$/1000 gal
Well Operations =	\$0.10 \$/1000 gal
Avg Daily Demand provided as % of AADD =	85%

Annual O&M Costs

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
WTP (Avg day demand, MGD)	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.45	0.45	0.45	0.45	0.46	0.46
Avg of avg day demand used, MGD	0.36	0.36	0.37	0.37	0.37	0.37	0.38	0.38	0.38	0.38	0.39	0.39	0.39
Annual O&M for Wells	\$13,224	\$13,309	\$13,395	\$13,481	\$13,567	\$13,655	\$13,743	\$13,832	\$13,921	\$14,011	\$14,101	\$14,193	\$14,285
Booster Pump Station #1	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119
Booster Pump Station #2	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Total O&M Costs	\$20,360	\$20,445	\$20,530	\$20,616	\$20,703	\$20,791	\$20,879	\$20,967	\$21,057	\$21,147	\$21,237	\$21,328	\$21,420
Inflated Total O&M Costs	\$20,360	\$20,956	\$21,570	\$22,202	\$22,852	\$23,523	\$24,213	\$24,924	\$25,656	\$26,409	\$27,185	\$27,985	\$28,808

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
2015 Present Worth of Annual O&M	\$20,360	\$20,150	\$19,942	\$19,737	\$19,534	\$19,334	\$19,136	\$18,940	\$18,746	\$18,555	\$18,365	\$18,178	\$17,993

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
WTP (Avg day demand, MGD)	0.46	0.47	0.47	0.47	0.48	0.48	0.48	0.48	0.49	0.49	0.49	0.50	0.50
Avg of avg day demand used, MGD	0.39	0.40	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.43
Annual O&M for Wells	\$14,377	\$14,470	\$14,564	\$14,659	\$14,754	\$14,850	\$14,947	\$15,044	\$15,142	\$15,241	\$15,340	\$15,440	\$15,541
Booster Pump Station #1	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119	\$5,119
Booster Pump Station #2	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Total O&M Costs	\$21,513	\$21,606	\$21,700	\$21,795	\$21,890	\$21,986	\$22,082	\$22,179	\$22,278	\$22,376	\$22,476	\$22,576	\$22,677
Inflated Total O&M Costs	\$29,656	\$30,529	\$31,428	\$32,354	\$33,308	\$34,290	\$35,302	\$36,344	\$37,417	\$38,523	\$39,661	\$40,834	\$42,041

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2015 Present Worth of Annual O&M Costs	\$17,811	\$17,630	\$17,451	\$17,274	\$17,099	\$16,927	\$16,756	\$16,587	\$16,420	\$16,255	\$16,092	\$15,930	\$15,770

Blending of Arsenic Violation Water Alternative - Northern Option - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Capital Costs	2010	2015	2020	2025	2030	2035	2040
Phase Capital Costs	\$0	\$8,040,000	\$0	\$0	\$0	\$0	\$0

Financing Cost

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Debt Service	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000
O&M Costs (Inflated)	\$20,360	\$20,956	\$21,570	\$22,202	\$22,852	\$23,523	\$24,213	\$24,924	\$25,656	\$26,409	\$27,185	\$27,985	\$28,808
Total Cost	\$612,360	\$612,956	\$613,570	\$614,202	\$614,852	\$615,523	\$616,213	\$616,924	\$617,656	\$618,409	\$619,185	\$619,985	\$620,808
Avg Water Sold (mgd)	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.45	0.45	0.45	0.45	0.46	0.46
Avg of Avg Water Sold (mgd)	0.36	0.36	0.37	0.37	0.37	0.37	0.38	0.38	0.38	0.38	0.39	0.39	0.39
Cost per 1,000 gal	\$3.94	\$3.91	\$3.89	\$3.87	\$3.85	\$3.83	\$3.81	\$3.79	\$3.77	\$3.75	\$3.73	\$3.71	\$3.69

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Debt Service	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$592,000	\$0	\$0	\$0	\$0	\$0	\$0
O&M Costs (Inflated)	\$29,656	\$30,529	\$31,428	\$32,354	\$33,308	\$34,290	\$35,302	\$36,344	\$37,417	\$38,523	\$39,661	\$40,834	\$42,041
Total Cost	\$621,656	\$622,529	\$623,428	\$624,354	\$625,308	\$626,290	\$627,302	\$36,344	\$37,417	\$38,523	\$39,661	\$40,834	\$42,041
Avg Water Sold (mgd)	0.46	0.47	0.47	0.47	0.48	0.48	0.48	0.48	0.49	0.49	0.49	0.50	0.50
Avg of Avg Water Sold (mgd)	0.39	0.40	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.43
Cost per 1,000 gal	\$3.68	\$3.66	\$3.64	\$3.62	\$3.60	\$3.58	\$3.57	\$0.21	\$0.21	\$0.21	\$0.22	\$0.22	\$0.23

Total Annual Average Demand: 4,389
 10-Year Avg for Cost per 1,000 gal: \$3.84
 Percentage factor: 85%
 What water needs to be sold at: \$4.52

Blending of Arsenic Violation Water Alternative - Northern Option - Economic Evaluation

2015 Present Worth of Capital Cost	\$8,040,000
2015 Present Worth of O&M Costs	\$467,000
Total 2015 Present Worth Cost	\$8,507,000
Total Average of ADD from 2015-2040 (acre-ft)	11,450
Total Present Worth Cost/acre-ft	\$743

Individual Treatment for Arsenic Violators

Description

Arsenic violators include: Axtell WSC, Birome WSC, EOL WSC, LTG WSC, Moore WS, M.S. WSC, Prairie Hill WSC, RMS WSC and City of Mount Calm

Assume treatment will be at existing storage sites and will reuse existing distribution system, so no additional tanks, pump stations or pipelines are needed.

Flow required based on gpm required.

Entity	Average Day Demand (mgd)							Max Day Demand (mgd)						
	2010	2015	2020	2025	2030	2035	2040	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20	0.37	0.39	0.40	0.42	0.43	0.45	0.46
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.33	0.34	0.35	0.36	0.37	0.38	0.39
Prairie Hill WSC	0.14	0.15	0.15	0.15	0.16	0.16	0.17	0.41	0.42	0.43	0.44	0.46	0.47	0.48
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.39	0.41	0.43	0.45	0.47	0.49	0.51
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.19	0.20	0.21	0.22	0.23	0.24	0.25
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07	0.07	0.07	0.07	0.07
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.09	0.09	0.09	0.09	0.09	0.09	0.09
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17	0.21	0.23	0.25	0.27	0.29	0.32	0.34

Individual Treatment for Arsenic Violators

<u>Cost Per Entity</u>	<u>Cost</u>
Axtell WSC	\$654,000
Birome WSC	\$654,000
Prairie Hill WSC	\$784,500
EOL WSC	\$1,084,500
LTG WSC	\$1,076,500
M.S. WSC	\$463,700
City of Mount Calm	\$463,700
Moore WS	\$463,700
RMS WSC	\$536,000

Note: Detailed cost information can be found in the Individual Treatment Technical Memorandum included with this report.

Individual Treatment for Arsenic Violators - O&M Costs

Note: Detailed cost information can be found in the Individual Treatment Technical Memorandum included with this report.

Annual O&M Costs - Axtell

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000
Total O&M Costs	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000
Inflated Total O&M Costs	\$26,000	\$26,650	\$27,316	\$27,999	\$28,699	\$29,417	\$30,152	\$30,906	\$31,678	\$32,470	\$33,282	\$34,114	\$34,967	\$35,841	\$36,737	\$37,656	\$38,597	\$39,562	\$40,551	\$41,565	\$42,604	\$43,669	\$44,761	\$45,880	\$47,027	\$48,203

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$26,000	\$25,625	\$25,255	\$24,891	\$24,532	\$24,178	\$23,830	\$23,486	\$23,147	\$22,813	\$22,484	\$22,160	\$21,840	\$21,525	\$21,215	\$20,909	\$20,607	\$20,310	\$20,017	\$19,728	\$19,444	\$19,163	\$18,887	\$18,615	\$18,346	\$18,082	\$567,092

Annual O&M Costs - Birome

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600
Total O&M Costs	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600
Inflated Total O&M Costs	\$15,600	\$15,990	\$16,390	\$16,799	\$17,219	\$17,650	\$18,091	\$18,543	\$19,007	\$19,482	\$19,969	\$20,469	\$20,980	\$21,505	\$22,042	\$22,593	\$23,158	\$23,737	\$24,331	\$24,939	\$25,562	\$26,201	\$26,857	\$27,528	\$28,216	\$28,922

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$15,600	\$15,375	\$15,153	\$14,935	\$14,719	\$14,507	\$14,298	\$14,092	\$13,888	\$13,688	\$13,491	\$13,296	\$13,104	\$12,915	\$12,729	\$12,545	\$12,364	\$12,186	\$12,010	\$11,837	\$11,666	\$11,498	\$11,332	\$11,169	\$11,008	\$10,849	\$340,255

Annual O&M Costs - Prairie Hill

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500
Total O&M Costs	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500	\$54,500
Inflated Total O&M Costs	\$54,500	\$55,863	\$57,259	\$58,691	\$60,158	\$61,662	\$63,203	\$64,783	\$66,403	\$68,063	\$69,765	\$71,509	\$73,296	\$75,129	\$77,007	\$78,932	\$80,906	\$82,928	\$85,001	\$87,126	\$89,305	\$91,537	\$93,826	\$96,171	\$98,576	\$101,040

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$54,500	\$53,714	\$52,939	\$52,176	\$51,423	\$50,681	\$49,950	\$49,230	\$48,520	\$47,820	\$47,130	\$46,451	\$45,781	\$45,120	\$44,470	\$43,828	\$43,196	\$42,573	\$41,959	\$41,354	\$40,757	\$40,170	\$39,590	\$39,019	\$38,456	\$37,902	\$1,188,711

Annual O&M Costs - EOL

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500
Total O&M Costs	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500	\$16,500
Inflated Total O&M Costs	\$16,500	\$16,913	\$17,335	\$17,769	\$18,213	\$18,668	\$19,135	\$19,613	\$20,104	\$20,606	\$21,121	\$21,649	\$22,191	\$22,745	\$23,314	\$23,897	\$24,494	\$25,107	\$25,734	\$26,378	\$27,037	\$27,713	\$28,406	\$29,116	\$29,844	\$30,590

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$16,500	\$16,262	\$16,027	\$15,796	\$15,568	\$15,344	\$15,123	\$14,905	\$14,690	\$14,478	\$14,269	\$14,063	\$13,860	\$13,660	\$13,463	\$13,269	\$13,078	\$12,889	\$12,703	\$12,520	\$12,339	\$12,161	\$11,986	\$11,813	\$11,643	\$11,475	\$359,885

Annual O&M Costs - LTG

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200
Total O&M Costs	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200	\$11,200
Inflated Total O&M Costs	\$11,200	\$11,480	\$11,767	\$12,061	\$12,363	\$12,672	\$12,989	\$13,313	\$13,646	\$13,987	\$14,337	\$14,695	\$15,063	\$15,439	\$15,825	\$16,221	\$16,626	\$17,042	\$17,468	\$17,905	\$18,353	\$18,811	\$19,282	\$19,764	\$20,258	\$20,764

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$11,200	\$11,038	\$10,879	\$10,722	\$10,568	\$10,415	\$10,265	\$10,117	\$9,971	\$9,827	\$9,686	\$9,546	\$9,408	\$9,272	\$9,139	\$9,007	\$8,877	\$8,749	\$8,623	\$8,498	\$8,376	\$8,255	\$8,136	\$8,019	\$7,903	\$7,789	\$244,286

Annual O&M Costs - MS WSC

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600
Total O&M Costs	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600
Inflated Total O&M Costs	\$2,600	\$2,665	\$2,732	\$2,800	\$2,870	\$2,942	\$3,015	\$3,091	\$3,168	\$3,247	\$3,328	\$3,411	\$3,497	\$3,584	\$3,674	\$3,766	\$3,860	\$3,956	\$4,055	\$4,156	\$4,260	\$4,367	\$4,476	\$4,588	\$4,703	\$4,820

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$2,600	\$2,563	\$2,526	\$2,489	\$2,453	\$2,418	\$2,383	\$2,349	\$2,315	\$2,281	\$2,248	\$2,216	\$2,184	\$2,153	\$2,121	\$2,091	\$2,061	\$2,031	\$2,002	\$1,973	\$1,944	\$1,916	\$1,889	\$1,861	\$1,835	\$1,808	\$56,709

Annual O&M Costs - Mount Calm

Annual O&M Costs - Moore WS

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600
Total O&M Costs	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600
Inflated Total O&M Costs	\$2,600	\$2,665	\$2,732	\$2,800	\$2,870	\$2,942	\$3,015	\$3,091	\$3,168	\$3,247	\$3,328	\$3,411	\$3,497	\$3,584	\$3,674	\$3,766	\$3,860	\$3,956	\$4,055	\$4,156	\$4,260	\$4,367	\$4,476	\$4,588	\$4,703	\$4,820

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$2,600	\$2,563	\$2,526	\$2,489	\$2,453	\$2,418	\$2,383	\$2,349	\$2,315	\$2,281	\$2,248	\$2,216	\$2,184	\$2,153	\$2,121	\$2,091	\$2,061	\$2,031	\$2,002	\$1,973	\$1,944	\$1,916	\$1,889	\$1,861	\$1,835	\$1,808	\$56,709

Annual O&M Costs - RMS WSC

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Annual O&M at Plant	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700
Total O&M Costs	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700	\$4,700
Inflated Total O&M Costs	\$4,700	\$4,818	\$4,938	\$5,061	\$5,188	\$5,318	\$5,451	\$5,587	\$5,726	\$5,870	\$6,016	\$6,167	\$6,321	\$6,479	\$6,641	\$6,807	\$6,977	\$7,152	\$7,330	\$7,514	\$7,701	\$7,894	\$8,091	\$8,294	\$8,501	\$8,714

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
2015 Present Worth of Annual O&M Costs	\$4,700	\$4,632	\$4,565	\$4,500	\$4,435	\$4,371	\$4,308	\$4,246	\$4,184	\$4,124	\$4,064	\$4,006	\$3,948	\$3,891	\$3,835	\$3,780	\$3,725	\$3,671	\$3,618	\$3,566	\$3,515	\$3,464	\$3,414	\$3,365	\$3,316	\$3,269	\$102,513

Individual Treatment for Arsenic Violators - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Financing Cost - Axtell

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total	
New Debt Service	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$980,000
O&M Costs (Inflated)	\$26,000	\$26,650	\$27,316	\$27,999	\$28,699	\$29,417	\$30,152	\$30,906	\$31,678	\$32,470	\$33,282	\$34,114	\$34,967	\$35,841	\$36,737	\$37,656	\$38,597	\$39,562	\$40,551	\$41,565	\$42,604	\$43,669	\$44,761	\$45,880	\$47,027	\$48,203	\$48,203	\$936,304
Total Cost	\$75,000	\$75,650	\$76,316	\$76,999	\$77,699	\$78,417	\$79,152	\$79,906	\$80,678	\$81,470	\$82,282	\$83,114	\$83,967	\$84,841	\$85,737	\$86,656	\$87,597	\$88,562	\$89,551	\$90,565	\$42,604	\$43,669	\$44,761	\$45,880	\$47,027	\$48,203	\$1,916,304	
Avg Water Sold (mgd)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	1,726	
Cost per 1,000 gal	\$1.24	\$1.24	\$1.24	\$1.24	\$1.25	\$1.25	\$1.25	\$1.25	\$1.26	\$1.26	\$1.26	\$1.27	\$1.27	\$1.27	\$1.28	\$1.28	\$1.29	\$1.29	\$1.30	\$1.30	\$0.61	\$0.62	\$0.63	\$0.64	\$0.65	\$0.66	-	

10-Year Avg for Cost per 1,000 gal: \$1.25

Economic Cost - Axtell

2015 Present Worth of Capital Costs	\$654,000
2015 Present Worth of O&M Costs	\$567,092
Total 2015 Present Worth Cost	\$1,221,092
Total Average Day Water Demand from 2015-2040 (acre-ft)	5,299
Total Present Worth Cost/acre-ft	\$230

Financing Cost - Birome

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
New Debt Service	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$49,000	\$0	\$0	\$0	\$0	\$0	\$0	\$980,000
O&M Costs (Inflated)	\$15,600	\$15,990	\$16,390	\$16,799	\$17,219	\$17,650	\$18,091	\$18,543	\$19,007	\$19,482	\$19,969	\$20,469	\$20,980	\$21,505	\$22,042	\$22,593	\$23,158	\$23,737	\$24,331	\$24,939	\$25,562	\$26,201	\$26,857	\$27,528	\$28,216	\$28,922	\$561,783
Total Cost	\$64,600	\$64,990	\$65,390	\$65,799	\$66,219	\$66,650	\$67,091	\$67,543	\$68,007	\$68,482	\$68,969	\$69,469	\$69,980	\$70,505	\$71,042	\$71,593	\$72,158	\$72,737	\$73,331	\$73,939	\$25,562	\$26,201	\$26,857	\$27,528	\$28,216	\$28,922	\$1,541,783
Avg Water Sold (mgd)	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	908
Cost per 1,000 gal	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.01	\$2.01	\$2.01	\$2.01	\$2.02	\$2.02	\$2.02	\$2.03	\$2.03	\$2.04	\$0.70	\$0.71	\$0.73	\$0.74	\$0.75	\$0.77	-

10-Year Avg for Cost per 1,000 gal: \$2.00

Economic Cost - Birome

2015 Present Worth of Capital Costs	\$654,000
2015 Present Worth of O&M Costs	\$340,255
Total 2015 Present Worth Cost	\$994,255
Total Average Day Water Demand from 2015-2040 (acre-ft)	2,788
Total Present Worth Cost/acre-ft	\$357

Financing Cost - Prairie Hill

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
New Debt Service	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$58,000	\$0	\$0	\$0	\$0	\$0	\$0	\$1,600,000
O&M Costs (Inflated)	\$54,500	\$55,863	\$57,259	\$58,691	\$60,158	\$61,662	\$63,203	\$64,783	\$66,403	\$68,063	\$69,765	\$71,509	\$73,296	\$75,129	\$77,007	\$78,932	\$80,906	\$82,928	\$85,001	\$87,126	\$89,305	\$91,537	\$93,826	\$96,171	\$98,576	\$101,040	\$1,962,638
Total Cost	\$112,500	\$113,863	\$115,259	\$116,691	\$118,158	\$119,662	\$121,203	\$122,783	\$124,403	\$126,063	\$127,765	\$129,509	\$131,296	\$133,129	\$135,007	\$136,932	\$138,906	\$140,928	\$143,001	\$145,126	\$89,305	\$91,537	\$93,826	\$96,171	\$98,576	\$101,040	\$3,122,638
Avg Water Sold (mgd)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	1,473
Cost per 1,000 gal	\$2.12	\$2.13	\$2.15	\$2.16	\$2.18	\$2.19	\$2.21	\$2.23	\$2.25	\$2.27	\$2.29	\$2.31	\$2.33	\$2.35	\$2.37	\$2.39	\$2.41	\$2.43	\$2.46	\$2.48	\$1.52	\$1.55	\$1.58	\$1.61	\$1.64	\$1.68	-

10-Year Avg for Cost per 1,000 gal: \$2.19

Economic Cost - Prairie Hill

2015 Present Worth of Capital Costs	\$784,500
2015 Present Worth of O&M Costs	\$1,188,711
Total 2015 Present Worth Cost	\$1,973,211
Total Average Day Water Demand from 2015-2040 (acre-ft)	4,520
Total Present Worth Cost/acre-ft	\$437

Financing Cost - EOL

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
New Debt Service	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$0	\$0	\$0	\$0	\$0	\$0	\$1,600,000
O&M Costs (Inflated)	\$16,500	\$16,913	\$17,335	\$17,769	\$18,213	\$18,668	\$19,135	\$19,613	\$20,104	\$20,606	\$21,121	\$21,649	\$22,191	\$22,745	\$23,314	\$23,897	\$24,494	\$25,107	\$25,734	\$26,378	\$27,037	\$27,713	\$28,406	\$29,116	\$29,844	\$30,590	\$594,193
Total Cost	\$96,500	\$96,913	\$97,335	\$97,769	\$98,213	\$98,668	\$99,135	\$99,613	\$100,104	\$100,606	\$101,121	\$101,649	\$102,191	\$102,745	\$103,314	\$103,897	\$104,494	\$105,107	\$105,734	\$106,378	\$27,037	\$27,713	\$28,406	\$29,116	\$29,844	\$30,590	\$2,194,193
Avg Water Sold (mgd)	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	1,918
Cost per 1,000 gal	\$1.47	\$1.46	\$1.45	\$1.45	\$1.44	\$1.43	\$1.43	\$1.42	\$1.42	\$1.41	\$1.40	\$1.40	\$1.39	\$1.39	\$1.38	\$1.38	\$1.38	\$1.37	\$1.37	\$1.36	\$0.34	\$0.35	\$0.35	\$0.36	\$0.37	\$0.37	-

10-Year Avg for Cost per 1,000 gal: \$1.44

Economic Cost - EOL

2015 Present Worth of Capital Costs	\$1,084,500
2015 Present Worth of O&M Costs	\$359,885
Total 2015 Present Worth Cost	\$1,444,385
Total Average Day Water Demand from 2015-2040 (acre-ft)	5,887
Total Present Worth Cost/acre-ft	\$245

Financing Cost - LTG

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total	
New Debt Service	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$0	\$0	\$0	\$0	\$0	\$0	\$1,600,000
O&M Costs (Inflated)	\$11,200	\$11,480	\$11,767	\$12,061	\$12,363	\$12,672	\$12,989	\$13,313	\$13,646	\$13,987	\$14,337	\$14,695	\$15,063	\$15,439	\$15,825	\$16,221	\$16,626	\$17,042	\$17,468	\$17,905	\$18,353	\$18,811	\$19,282	\$19,764	\$20,258	\$20,764	\$403,331	
Total Cost	\$91,200	\$91,480	\$91,767	\$92,061	\$92,363	\$92,672	\$92,989	\$93,313	\$93,646	\$93,987	\$94,337	\$94,695	\$95,063	\$95,439	\$95,825	\$96,221	\$96,626	\$97,042	\$97,468	\$97,905	\$18,353	\$18,811	\$19,282	\$19,764	\$20,258	\$20,764	\$2,003,331	
Avg Water Sold (mgd)	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	1,104	
Cost per 1,000 gal	\$2.39	\$2.38	\$2.37	\$2.36	\$2.34	\$2.33	\$2.32	\$2.31	\$2.30	\$2.28	\$2.27	\$2.26	\$2.25	\$2.24	\$2.23	\$2.22	\$2.21	\$2.20	\$2.19	\$2.19	\$0.41	\$0.41	\$0.42	\$0.43	\$0.43	\$0.44	-	

10-Year Avg for Cost per 1,000 gal: \$2.34

Economic Cost - LTG

2015 Present Worth of Capital Costs	\$1,076,500
2015 Present Worth of O&M Costs	\$244,286
Total 2015 Present Worth Cost	\$1,320,786
Total Average Day Water Demand from 2015-2040 (acre-ft)	3,389
Total Present Worth Cost/acre-ft	\$390

Financing Cost - MS

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
New Debt Service	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$0	\$0	\$0	\$0	\$0	\$700,000
O&M Costs (Inflated)	\$2,600	\$2,665	\$2,732	\$2,800	\$2,870	\$2,942	\$3,015	\$3,091	\$3,168	\$3,247	\$3,328	\$3,411	\$3,497	\$3,584	\$3,674	\$3,766	\$3,860	\$3,956	\$4,055	\$4,156	\$4,260	\$4,367	\$4,476	\$4,588	\$4,703	\$4,820	\$93,630
Total Cost	\$37,600	\$37,665	\$37,732	\$37,800	\$37,870	\$37,942	\$38,015	\$38,091	\$38,168	\$38,247	\$38,328	\$38,411	\$38,497	\$38,584	\$38,674	\$38,766	\$38,860	\$38,956	\$39,055	\$39,156	\$4,260	\$4,367	\$4,476	\$4,588	\$4,703	\$4,820	\$793,630
Avg Water Sold (mgd)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	310	
Cost per 1,000 gal	\$3.19	\$3.20	\$3.20	\$3.20	\$3.21	\$3.21	\$3.21	\$3.21	\$3.22	\$3.22	\$3.23	\$3.23	\$3.23	\$3.24	\$3.24	\$3.25	\$3.25	\$3.26	\$3.26	\$3.27	\$0.36	\$0.36	\$0.37	\$0.38	\$0.39	\$0.40	-

10-Year Avg for Cost per 1,000 gal: \$3.21

Economic Cost - MS

2015 Present Worth of Capital Costs	\$463,700
2015 Present Worth of O&M Costs	\$56,709
Total 2015 Present Worth Cost	\$520,409
Total Average Day Water Demand from 2015-2040 (acre-ft)	951
Total Present Worth Cost/acre-ft	\$547

Financing Cost - Mount Calm

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
New Debt Service	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$0	\$0	\$0	\$0	\$0	\$0	\$700,000
O&M Costs (Inflated)	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$67,600
Total Cost	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$37,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$767,600
Avg Water Sold (mgd)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	250	
Cost per 1,000 gal	\$4.06	\$4.05	\$4.04	\$4.03	\$4.01	\$4.00	\$3.99	\$3.98	\$3.97	\$3.95	\$3.94	\$3.93	\$3.92	\$3.91	\$3.90	\$3.88	\$3.87	\$3.86	\$3.85	\$3.84	\$0.26	\$0.26	\$0.26	\$0.26	\$0.26	\$0.26	-

10-Year Avg for Cost per 1,000 gal: \$4.01

Economic Cost - Mount Calm

2015 Present Worth of Capital Costs	\$463,700
2015 Present Worth of O&M Costs	\$56,709
Total 2015 Present Worth Cost	\$520,409
Total Average Day Water Demand from 2015-2040 (acre-ft)	767
Total Present Worth Cost/acre-ft	\$679

Financing Cost - Moore WS

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total	
New Debt Service	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$700,000
O&M Costs (Inflated)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Cost	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$700,000
Avg Water Sold (mgd)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	400	
Cost per 1,000 gal	\$2.30	\$2.29	\$2.29	\$2.29	\$2.29	\$2.29	\$2.29	\$2.28	\$2.28	\$2.28	\$2.28	\$2.28	\$2.27	\$2.27	\$2.27	\$2.27	\$2.27	\$2.26	\$2.26	\$2.26	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	-

10-Year Avg for Cost per 1,000 gal: \$2.29

Economic Cost - Moore WS

2015 Present Worth of Capital Costs	\$463,700
2015 Present Worth of O&M Costs	\$56,709
Total 2015 Present Worth Cost	\$520,409
Total Average Day Water Demand from 2015-2040 (acre-ft)	1,229
Total Present Worth Cost/acre-ft	\$423

Financing Cost - RMS WSC

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total	
New Debt Service	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$800,000
O&M Costs (Inflated)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Cost	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$800,000
Avg Water Sold (mgd)	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	1,343	
Cost per 1,000 gal	\$0.95	\$0.94	\$0.92	\$0.91	\$0.89	\$0.88	\$0.86	\$0.85	\$0.84	\$0.82	\$0.81	\$0.80	\$0.79	\$0.77	\$0.76	\$0.75	\$0.74	\$0.73	\$0.72	\$0.70	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	-

10-Year Avg for Cost per 1,000 gal: \$0.89

Economic Cost - RMS WSC

2015 Present Worth of Capital Costs	\$536,000
2015 Present Worth of O&M Costs	\$102,513
Total 2015 Present Worth Cost	\$638,513
Total Average Day Water Demand from 2015-2040 (acre-ft)	4,120
Total Present Worth Cost/acre-ft	\$155

New Surface Water Treatment Plant at Tehuacana Creek

Description

New Surface Water WTP for all entities near site - Axtell WSC, Birome WSC, Prairie Hill WSC EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, City of Mart, City of Marlin, Gholson WSC, Chalk Bluff WSC and Ross WSC.

New pipelines from the New WTP to Axtell WSC, Birome WSC, Prairie Hill WSC EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, City of Mart, City of Marlin, Gholson WSC, Chalk Bluff WSC, and Ross WSC distribution systems are needed.

Use of individual wells will be limited to summertime usage.

Flow required based on 2040 Avg Day Demand.

Entity	Average Day Demand (mgd)						
	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Prairie Hill WSC	0.16	0.16	0.16	0.17	0.17	0.18	0.18
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Pure WSC	0.04	0.04	0.04	0.04	0.04	0.04	0.04
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17
H&H WSC	0.15	0.16	0.16	0.17	0.18	0.19	0.20
McLennan County WCID No. 2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Ross WSC	0.20	0.21	0.22	0.24	0.25	0.26	0.27
City of Mart	0.37	0.38	0.39	0.40	0.42	0.43	0.45
City of Marlin	1.36	1.38	1.41	1.44	1.47	1.50	1.53
Gholson WSC	0.28	0.28	0.29	0.29	0.30	0.30	0.31
Chalk Bluff WSC	0.27	0.29	0.31	0.33	0.36	0.39	0.42
Subtotals:	3.74	3.85	3.98	4.11	4.24	4.39	4.54

NEW WTP EXPANSION REQUIREMENTS (based on design demand)

	2010	2015	2020	2025	2030	2035	2040
New WTP (100% Capacity)	0	0	4.60	4.70	4.90	5.00	5.20
New WTP (85% Capacity)	0	0	3.91	4.00	4.17	4.25	4.42
Total Capacity Required (based on 100%)	3.74	3.85	3.98	4.11	4.24	4.39	4.54
Total Capacity Required (based on 85%)	4.40	4.53	4.68	4.83	4.99	5.16	5.34
Additional Capacity Needed (based on 85%)	0.00	4.53	0.08	0.13	0.09	0.16	0.14
New WTP Capacity	0	4.60	4.70	4.90	5.00	5.20	5.40

New Surface Water Treatment Plant at Tehuacana Creek

<u>Item No.</u>	<u>Item Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	New WTP, 5.4 MGD	1	LS	\$18,500,000	\$18,500,000
2	Transmission Pipeline, 4"	130,774	LF	\$15	\$1,961,610
3	Transmission Pipeline, 6"	129,593	LF	\$18	\$2,332,680
4	Transmission Pipeline, 8"	71,520	LF	\$28	\$2,002,560
5	Transmission Pipeline, 10"	135,905	LF	\$31	\$4,213,060
6	Transmission Pipeline, 12"	27,817	LF	\$35	\$973,600
7	Raw Water Pipeline, 20"	5,074	LF	\$80	\$405,920
8	Booster Pump Station #1, 100 hp	1	LS	\$904,000	\$904,000
9	Booster Pump Station #2, 100 hp	1	LS	\$904,000	\$904,000
10	Booster Pump Station #3, 55 hp	1	LS	\$875,000	\$875,000
11	Booster Pump Station #4, 20 hp	1	LS	\$795,000	\$795,000
12	Booster Pump Station #5, 5 hp	1	LS	\$702,000	\$702,000
13	Booster Pump Station #6, 95 hp	1	LS	\$903,000	\$903,000
14	Booster Pump Station #7, 25 hp	1	LS	\$830,000	\$830,000
15	Booster Pump Station #8, 15 hp	1	LS	\$780,000	\$780,000
16	Booster Pump Station #9, 15 hp	1	LS	\$780,000	\$780,000
17	Booster Pump Station #10, 5 hp	1	LS	\$702,000	\$702,000
18	Booster Pump Station #11, 60 hp	1	LS	\$875,000	\$875,000
19	Booster Pump Station #12, 50 hp	1	LS	\$866,000	\$866,000
20	Booster Pump Station #13, 25 hp	1	LS	\$830,000	\$830,000
21	Reservoir	1	LS	\$20,000,000	\$20,000,000
Construction Subtotal					\$61,135,500
Mobilization and Demobilization (5%)					\$3,056,800
Contingency (20%)					\$12,227,100
Professional Services (15%)					\$9,170,400
Construction Total					\$85,589,800
Easements					
Easement/Acquisition (pipeline)		230	AC	\$4,000	\$920,000
Easement/Acquisition (WTP and pump stations)		16.5	AC	\$8,000	\$132,000
Easement Subtotal					\$1,052,000
Project Total					\$86,642,000

New Surface Water Treatment Plant at Tehuacana Creek - O&M Costs

Booster Pump Station #11	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615
Booster Pump Station #12	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513	\$15,513
Booster Pump Station #13	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188	\$4,188
Total O&M Costs	\$1,454,143	\$1,462,679	\$1,471,272	\$1,480,031	\$1,488,847	\$1,497,723	\$1,506,658	\$1,515,652	\$1,524,821	\$1,534,053	\$1,543,346	\$1,552,702	\$1,562,121
Inflated Total O&M Costs	\$2,004,552	\$2,066,727	\$2,130,840	\$2,197,114	\$2,265,457	\$2,335,937	\$2,408,619	\$2,483,572	\$2,561,062	\$2,640,981	\$2,723,405	\$2,808,413	\$2,896,086

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
O&M Costs	\$1,203,882	\$1,193,484	\$1,183,180	\$1,173,057	\$1,163,025	\$1,153,084	\$1,143,233	\$1,133,470	\$1,123,880	\$1,114,376	\$1,104,957	\$1,095,622	\$1,086,370

New Surface Water Treatment Plant at Tehuacana Creek - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Capital Costs	2010	2015	2020	2025	2030	2035	2040
Phase Capital Costs	\$0	\$86,642,000	\$0	\$0	\$0	\$0	\$0

Financing Cost

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Debt Service - New Plant	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000
O&M Costs (Inflated)	\$1,349,545	\$1,391,132	\$1,434,007	\$1,478,209	\$1,523,779	\$1,570,761	\$1,619,312	\$1,669,371	\$1,720,984	\$1,774,200	\$1,829,069	\$1,885,778	\$1,944,254
Total Cost	\$7,725,545	\$7,767,132	\$7,810,007	\$7,854,209	\$7,899,779	\$7,946,761	\$7,995,312	\$8,045,371	\$8,096,984	\$8,150,200	\$8,205,069	\$8,261,778	\$8,320,254
Avg Water Sold (mgd)	3.85	3.88	3.90	3.92	3.95	3.98	4.00	4.03	4.05	4.08	4.11	4.13	4.16
Avg of Avg Water Sold (mgd)	3.27	3.29	3.31	3.34	3.36	3.38	3.40	3.42	3.45	3.47	3.49	3.51	3.54
Cost per 1,000 gal	\$5.50	\$5.49	\$5.49	\$5.48	\$5.48	\$5.48	\$5.47	\$5.47	\$5.47	\$5.47	\$5.47	\$5.48	\$5.48

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Debt Service - New Plant	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$6,376,000	\$0	\$0	\$0	\$0	\$0	\$0
O&M Costs (Inflated)	\$2,004,552	\$2,066,727	\$2,130,840	\$2,197,114	\$2,265,457	\$2,335,937	\$2,408,619	\$2,483,572	\$2,561,062	\$2,640,981	\$2,723,405	\$2,808,413	\$2,896,086
Total Cost	\$8,380,552	\$8,442,727	\$8,506,840	\$8,573,114	\$8,641,457	\$8,711,937	\$8,784,619	\$2,483,572	\$2,561,062	\$2,640,981	\$2,723,405	\$2,808,413	\$2,896,086
Avg Water Sold (mgd)	4.19	4.22	4.24	4.27	4.30	4.33	4.36	4.39	4.42	4.45	4.48	4.51	4.54
Avg of Avg Water Sold (mgd)	3.56	3.58	3.61	3.63	3.65	3.68	3.70	3.73	3.75	3.78	3.80	3.83	3.86
Cost per 1,000 gal	\$5.48	\$5.49	\$5.49	\$5.50	\$5.51	\$5.51	\$5.52	\$1.55	\$1.59	\$1.63	\$1.67	\$1.71	\$1.75

Total Annual Average Demand: 39,675 million gallons
 10-Year Avg for Cost per 1,000 gal: \$5.48
 Percentage factor: 85%
 What needs to be sold at: \$6.45

New Surface Water Treatment Plant at Tehuacana Creek - Economic Evaluation

2015 Present Worth of Capital Costs	\$86,642,000
2015 Present Worth of O&M Costs	\$31,520,000
Total 2015 Present Worth Cost	\$118,162,000
Total Average of ADD from 2015-2040 (acre-ft)	103,501
Total Present Worth Cost/acre-ft	\$1,142

Carrizo-Wilcox Aquifer Pipeline

Description

Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC, Moore WS, Pure WSC, LTG WSC, City of Mount Calm, M.S. WSC, RMS WSC, H&H WSC, McLennan County WCID No. 2, Ross WSC, Gholson WSC and Chalk Bluff WSC get water from Carrizo-Wilcox Aquifer. Alternate option includes Waco.

Waco would receive whatever water supply is available after initial entities' demands are met. Total water supply available would not exceed 12,000 acre-ft/yr.

Two options: 1) All entities could use their existing wells during max month demands, and continue to use existing storage tanks. Or 2) All entities receive 2040 max day demand.

New pipelines to each of the entities are needed. Pipelines to be sized for: 1) 2040 Avg Day Demand or 2) 2040 Max Day Demand.

Entity	Average Day Demand (mgd)							Max Day Demand (mgd)						
	2010	2015	2020	2025	2030	2035	2040	2010	2015	2020	2025	2030	2035	2040
Axtell WSC	0.16	0.17	0.17	0.18	0.18	0.19	0.20	0.37	0.39	0.40	0.42	0.43	0.45	0.46
Birome WSC	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.33	0.34	0.35	0.36	0.37	0.38	0.39
Prairie Hill WSC	0.14	0.15	0.15	0.15	0.16	0.16	0.17	0.41	0.42	0.43	0.44	0.46	0.47	0.48
EOL WSC	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.39	0.41	0.43	0.45	0.47	0.49	0.51
Moore WS	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Pure WSC	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.09	0.09	0.09	0.09	0.09	0.09	0.09
LTG WSC	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.19	0.20	0.21	0.22	0.23	0.24	0.25
City of Mount Calm	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05
M.S. WSC	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07	0.07	0.07	0.07	0.07
RMS WSC	0.11	0.12	0.12	0.14	0.15	0.16	0.17	0.21	0.23	0.25	0.27	0.29	0.32	0.34
H&H WSC	0.15	0.16	0.16	0.17	0.18	0.19	0.20	0.39	0.41	0.44	0.46	0.48	0.51	0.53
McLennan County WCID No. 2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.35	0.35	0.35	0.36	0.36	0.36	0.36
Ross WSC	0.20	0.21	0.22	0.24	0.25	0.26	0.27	0.41	0.43	0.45	0.47	0.49	0.52	0.54
Gholson WSC	0.28	0.28	0.29	0.29	0.30	0.30	0.31	0.56	0.57	0.58	0.59	0.60	0.61	0.62
Chalk Bluff WSC	0.27	0.29	0.31	0.33	0.36	0.39	0.42	0.63	0.68	0.74	0.80	0.86	0.93	1.01
City of Waco	8.17	8.17	8.17	8.17	8.17	8.17	8.17	6.16	5.97	5.78	5.57	5.36	5.13	4.89
Subtotals with Waco:	10.16	10.24	10.33	10.41	10.51	10.61	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71
Subtotals without Waco:	2.00	2.08	2.16	2.25	2.34	2.44	2.54	4.55	4.74	4.93	5.14	5.35	5.58	5.82

Carrizo-Wilcox Aquifer Pipeline, Avg Day Demand, No Waco

<u>Item No.</u>	<u>Item Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Transmission Pipeline, 4"	143,399	LF	\$15	\$2,150,990
2	Transmission Pipeline, 6"	21,513	LF	\$18	\$387,240
3	Transmission Pipeline, 8"	137,787	LF	\$28	\$3,858,040
4	Transmission Pipeline, 10"	74,084	LF	\$31	\$2,296,610
5	Transmission Pipeline, 12"	0	LF	\$35	\$0
6	Transmission Pipeline, 16"	200,645	LF	\$57	\$11,436,770
7	Booster Pump Station #1, 10 hp	1	LS	\$762,000	\$762,000
8	Booster Pump Station #2, 5 hp	1	LS	\$702,000	\$702,000
9	Booster Pump Station #3, 45 hp	1	LS	\$860,000	\$860,000
10	Booster Pump Station #4, 15 hp	1	LS	\$780,000	\$780,000
11	Booster Pump Station #5, 95 hp	1	LS	\$903,000	\$903,000
12	Booster Pump Station #6, 15 hp	1	LS	\$780,000	\$780,000
13	Booster Pump Station #7, 10 hp	1	LS	\$762,000	\$762,000
14	Booster Pump Station #8, 65 hp	1	LS	\$890,000	\$890,000
15	Booster Pump Station #9, 25 hp	1	LS	\$830,000	\$830,000
16	Booster Pump Station #10, 150 hp	1	LS	\$1,300,000	\$1,300,000
17	Groundwater Wells, 1,000 gpm	2	EA	\$525,322	\$1,050,650
				Construction Subtotal	\$29,749,300
					\$1,487,500
					\$5,949,900
					\$4,462,400
				Construction Total	\$41,649,100
Easements					
	Easement/Acquisition (pipeline)	266	AC	\$4,000	\$1,064,000
	Easement/Acquisition (well site and pump stations)	6	AC	\$8,000	\$48,000
				Easement Subtotal	\$1,112,000
				Project Total	\$42,762,000

Carrizo-Wilcox Aquifer Pipeline, Avg Day, No Waco - O&M Costs

Beginning year =	2015
Inflation rate =	0.0250 %
Interest rate =	0.0400 %
Cost of BPS/HSPS operations =	\$0.05 \$/1000 gpd
Well Operations =	\$0.10 \$/1000 gal
% Average Day Operating =	85% %

Annual O&M Costs

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Avg day demand, MGD	2.08	2.09	2.11	2.13	2.14	2.16	2.18	2.19	2.21	2.23	2.25	2.27	2.28
Avg of avg day demand used, MGD	1.76	1.78	1.79	1.81	1.82	1.84	1.85	1.86	1.88	1.90	1.91	1.93	1.94
Annual O&M for Wells	\$64,405	\$64,914	\$65,427	\$65,945	\$66,466	\$66,992	\$67,529	\$68,071	\$68,617	\$69,168	\$69,723	\$70,291	\$70,863
Booster Pump Station #1	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Booster Pump Station #2	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Booster Pump Station #3	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385
Booster Pump Station #4	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205
Booster Pump Station #5	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130
Booster Pump Station #6	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103
Booster Pump Station #7	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Booster Pump Station #8	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391
Booster Pump Station #9	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615
Booster Pump Station #10	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402
Total O&M Costs	\$219,685	\$220,194	\$220,707	\$221,225	\$221,746	\$222,272	\$222,810	\$223,351	\$223,898	\$224,448	\$225,003	\$225,571	\$226,143
Inflated Total O&M Costs	\$219,685	\$225,699	\$231,881	\$238,235	\$244,767	\$251,480	\$258,391	\$265,495	\$272,797	\$280,305	\$288,023	\$295,968	\$304,137

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
2015 Present Worth of Annual O&M Costs	\$219,685	\$217,018	\$214,387	\$211,790	\$209,227	\$206,699	\$204,210	\$201,754	\$199,330	\$196,939	\$194,578	\$192,255	\$189,963

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Avg day demand, MGD	2.30	2.32	2.34	2.36	2.38	2.40	2.42	2.44	2.46	2.48	2.50	2.52	2.54
Avg of avg day demand used, MGD	1.96	1.97	1.99	2.01	2.02	2.04	2.06	2.07	2.09	2.11	2.13	2.14	2.16
Annual O&M for Wells	\$71,440	\$72,021	\$72,607	\$73,207	\$73,811	\$74,421	\$75,035	\$75,655	\$76,288	\$76,927	\$77,572	\$78,221	\$78,876
Booster Pump Station #1	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Booster Pump Station #2	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Booster Pump Station #3	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385	\$37,385
Booster Pump Station #4	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205	\$6,205
Booster Pump Station #5	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130	\$25,130
Booster Pump Station #6	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103	\$3,103
Booster Pump Station #7	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017	\$2,017
Booster Pump Station #8	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391	\$19,391
Booster Pump Station #9	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615	\$18,615
Booster Pump Station #10	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402	\$39,402
Total O&M Costs	\$226,720	\$227,301	\$227,888	\$228,487	\$229,092	\$229,701	\$230,315	\$230,935	\$231,569	\$232,207	\$232,852	\$233,501	\$234,156
Inflated Total O&M Costs	\$312,536	\$321,171	\$330,049	\$339,190	\$348,590	\$358,255	\$368,194	\$378,414	\$388,938	\$399,762	\$410,893	\$422,340	\$434,113

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2015 Present Worth of Annual O&M Costs	\$187,701	\$185,468	\$183,265	\$181,096	\$178,957	\$176,845	\$174,760	\$172,703	\$170,679	\$168,682	\$166,710	\$164,764	\$162,843

Carrizo-Wilcox Aquifer Pipeline, Avg Day Demand, No Waco - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Capital Costs	2010	2015	2020	2025	2030	2035	2040
Phase Capital Costs	\$0	\$42,762,000	\$0	\$0	\$0	\$0	\$0

Financing Cost

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Debt Service	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000
O&M Costs (Inflated)	\$219,685	\$225,699	\$231,881	\$238,235	\$244,767	\$251,480	\$258,391	\$265,495	\$272,797	\$280,305	\$288,023	\$295,968	\$304,137
Total Cost	\$3,366,685	\$3,372,699	\$3,378,881	\$3,385,235	\$3,391,767	\$3,398,480	\$3,405,391	\$3,412,495	\$3,419,797	\$3,427,305	\$3,435,023	\$3,442,968	\$3,451,137
Avg Water Sold (mgd)	2.08	2.09	2.11	2.13	2.14	2.16	2.18	2.19	2.21	2.23	2.25	2.27	2.28
Avg of Avg Water Sold (mgd)	1.76	1.78	1.79	1.81	1.82	1.84	1.85	1.86	1.88	1.90	1.91	1.93	1.94
Cost per 1,000 gal	\$4.44	\$4.42	\$4.39	\$4.36	\$4.34	\$4.31	\$4.29	\$4.26	\$4.24	\$4.21	\$4.19	\$4.16	\$4.14

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Debt Service	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$3,147,000	\$0	\$0	\$0	\$0	\$0	\$0
O&M Costs (Inflated)	\$312,536	\$321,171	\$330,049	\$339,190	\$348,590	\$358,255	\$368,194	\$378,414	\$388,938	\$399,762	\$410,893	\$422,340	\$434,113
Total Cost	\$3,459,536	\$3,468,171	\$3,477,049	\$3,486,190	\$3,495,590	\$3,505,255	\$3,515,194	\$378,414	\$388,938	\$399,762	\$410,893	\$422,340	\$434,113
Avg Water Sold (mgd)	2.30	2.32	2.34	2.36	2.38	2.40	2.42	2.44	2.46	2.48	2.50	2.52	2.54
Avg of Avg Water Sold (mgd)	1.96	1.97	1.99	2.01	2.02	2.04	2.06	2.07	2.09	2.11	2.13	2.14	2.16
Cost per 1,000 gal	\$4.12	\$4.09	\$4.07	\$4.05	\$4.03	\$4.00	\$3.98	\$0.43	\$0.43	\$0.44	\$0.45	\$0.46	\$0.47

Total Annual Average Demand: 21,818 million gallons
 10-Year Avg for Cost per 1,000 gal: \$4.33
 Percentage factor: 85%
 What needs to be sold at: \$5.09

Carrizo-Wilcox Aquifer Pipeline, Avg Day Demand, No Waco - Economic Evaluation

2015 Present Worth of Capital Costs	\$42,762,000
2015 Present Worth of O&M Costs	\$4,933,000
Total 2015 Present Worth Cost	\$47,695,000
Total Average ADD from 2015-2040 (acre-ft)	56,916
Total Present Worth Cost/acre-ft	\$838

Carrizo-Wilcox Aquifer Pipeline, Max Day Demand, No Waco

<u>Item No.</u>	<u>Item Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Transmission Pipeline, 4"	28,138	LF	\$15	\$422,070
2	Transmission Pipeline, 6"	60,259	LF	\$18	\$1,084,670
3	Transmission Pipeline, 8"	55,002	LF	\$28	\$1,540,060
4	Transmission Pipeline, 10"	151,734	LF	\$31	\$4,703,760
5	Transmission Pipeline, 12"	16,284	LF	\$35	\$569,940
6	Transmission Pipeline, 16"	65,366	LF	\$57	\$3,725,870
7	Transmission Pipeline, 18"	41,473	LF	\$68	\$2,820,170
8	Transmission Pipeline, 30"	159,172	LF	\$136	\$21,647,400
9	Booster Pump Station #1, 45 hp	1	LS	\$840,000	\$840,000
10	Booster Pump Station #2, 190 hp	1	LS	\$1,650,000	\$1,650,000
11	Booster Pump Station #3, 65 hp	1	LS	\$890,000	\$890,000
12	Booster Pump Station #4, 50 hp	1	LS	\$866,000	\$866,000
13	Booster Pump Station #5, 25 hp	1	LS	\$830,000	\$830,000
14	Booster Pump Station #6, 10 hp	1	LS	\$762,000	\$762,000
15	Booster Pump Station #7, 140 hp	1	LS	\$1,250,000	\$1,250,000
16	Booster Pump Station #8, 60 hp	1	LS	\$875,000	\$875,000
17	Groundwater Wells, 1,000 gpm	8	EA	\$525,322	\$4,202,580
				Construction Subtotal	\$48,679,600
					\$2,434,000
					\$9,736,000
					\$7,302,000
				Construction Total	\$68,151,600
Easements					
	Easement/Acquisition (pipeline)	266	AC	\$4,000	\$1,064,000
	Easement/Acquisition (well site and pump stations)	5	AC	\$8,000	\$40,000
				Easement Subtotal	\$1,104,000
				Project Total	\$69,256,000

Carrizo-Wilcox Aquifer Pipeline, Max Day, No Waco - O&M Costs

O&M costs =	\$1.49 per 1,000 gallon
Beginning year =	2015
Inflation rate =	0.0250
Interest rate =	0.0400
Cost of BPS/HSPS operations =	\$0.05 \$/1000 gpd
Well Operations =	\$0.10 \$/1000 gal

Annual O&M Costs

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Avg day demand, MGD	2.08	2.09	2.11	2.13	2.14	2.16	2.18	2.19	2.21	2.23	2.25	2.27	2.28
Annual O&M for Wells	\$75,770	\$76,369	\$76,973	\$77,582	\$78,196	\$78,814	\$79,446	\$80,084	\$80,726	\$81,374	\$82,027	\$82,695	\$83,368
Booster Pump Station #1	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213
Booster Pump Station #2	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003
Booster Pump Station #3	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725
Booster Pump Station #4	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598
Booster Pump Station #5	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395
Booster Pump Station #6	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380
Booster Pump Station #7	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998
Booster Pump Station #8	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170
Total O&M Costs	\$350,250	\$350,849	\$351,453	\$352,062	\$352,676	\$353,294	\$353,926	\$354,564	\$355,206	\$355,854	\$356,507	\$357,175	\$357,848
Inflated Total O&M Costs	\$350,250	\$359,621	\$369,246	\$379,132	\$389,288	\$399,720	\$410,446	\$421,465	\$432,785	\$444,413	\$456,359	\$468,644	\$481,266

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
2015 Present Worth of Annual O&M Costs	\$350,250	\$345,789	\$341,388	\$337,047	\$332,765	\$328,540	\$324,382	\$320,279	\$316,231	\$312,239	\$308,300	\$304,422	\$300,597

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Avg day demand, MGD	2.30	2.32	2.34	2.36	2.38	2.40	2.42	2.44	2.46	2.48	2.50	2.52	2.54
Annual O&M for Wells	\$84,047	\$84,731	\$85,420	\$86,126	\$86,837	\$87,554	\$88,277	\$89,006	\$89,751	\$90,503	\$91,261	\$92,025	\$92,796
Booster Pump Station #1	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213
Booster Pump Station #2	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003	\$98,003
Booster Pump Station #3	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725
Booster Pump Station #4	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598
Booster Pump Station #5	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395
Booster Pump Station #6	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380
Booster Pump Station #7	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998
Booster Pump Station #8	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170
Total O&M Costs	\$358,527	\$359,211	\$359,900	\$360,606	\$361,317	\$362,034	\$362,757	\$363,486	\$364,231	\$364,983	\$365,741	\$366,505	\$367,276
Inflated Total O&M Costs	\$494,233	\$507,555	\$521,243	\$535,321	\$549,786	\$564,649	\$579,921	\$595,614	\$611,756	\$628,344	\$645,390	\$662,907	\$680,908

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2015 Present Worth of Annual O&M Costs	\$296,823	\$293,101	\$289,428	\$285,812	\$282,246	\$278,727	\$275,255	\$271,830	\$268,459	\$265,133	\$261,852	\$258,614	\$255,420

Carrizo-Wilcox Aquifer Pipeline, Max Day Demand, No Waco - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Capital Costs	2010	2015	2020	2025	2030	2035	2040
Phase Capital Costs	\$0	\$69,256,000	\$0	\$0	\$0	\$0	\$0

Financing Cost

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Debt Service	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000
O&M Costs (Inflated)	\$350,250	\$359,621	\$369,246	\$379,132	\$389,288	\$399,720	\$410,446	\$421,465	\$432,785	\$444,413	\$456,359	\$468,644	\$481,266
Total Cost	\$5,446,250	\$5,455,621	\$5,465,246	\$5,475,132	\$5,485,288	\$5,495,720	\$5,506,446	\$5,517,465	\$5,528,785	\$5,540,413	\$5,552,359	\$5,564,644	\$5,577,266
Avg Water Sold (mgd)	2.08	2.09	2.11	2.13	2.14	2.16	2.18	2.19	2.21	2.23	2.25	2.27	2.28
Cost per 1,000 gal	\$7.19	\$7.14	\$7.10	\$7.06	\$7.01	\$6.97	\$6.93	\$6.89	\$6.85	\$6.81	\$6.77	\$6.73	\$6.69

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Debt Service	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$5,096,000	\$0	\$0	\$0	\$0	\$0	\$0
O&M Costs (Inflated)	\$494,233	\$507,555	\$521,243	\$535,321	\$549,786	\$564,649	\$579,921	\$595,614	\$611,756	\$628,344	\$645,390	\$662,907	\$680,908
Total Cost	\$5,590,233	\$5,603,555	\$5,617,243	\$5,631,321	\$5,645,786	\$5,660,649	\$5,675,921	\$595,614	\$611,756	\$628,344	\$645,390	\$662,907	\$680,908
Avg Water Sold (mgd)	2.30	2.32	2.34	2.36	2.38	2.40	2.42	2.44	2.46	2.48	2.50	2.52	2.54
Cost per 1,000 gal	\$6.65	\$6.61	\$6.58	\$6.54	\$6.50	\$6.47	\$6.43	\$0.67	\$0.68	\$0.69	\$0.71	\$0.72	\$0.73

Total Annual Avg Demand: 21,818 million gallons
 10-Year Avg for Cost per 1,000 gal: \$7.00

Water from Carrizo-Wilcox Aquifer, Max Day Demand, No Waco - Economic Evaluation

2015 Present Worth of Capital Costs	\$69,256,000
2015 Present Worth of O&M Costs	\$7,805,000
Total 2015 Present Worth Cost	\$77,061,000
Total Average Day Water Demand from 2015-2040 (acre-ft)	66,960
Total Present Worth Cost/acre-ft	\$1,151

Carrizo-Wilcox Aquifer Pipeline, Max Day Demand, with Waco

<u>Item No.</u>	<u>Item Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Transmission Pipeline, 4"	28,138	LF	\$15	\$422,070
2	Transmission Pipeline, 6"	60,259	LF	\$18	\$1,084,670
3	Transmission Pipeline, 8"	55,002	LF	\$28	\$1,540,060
4	Transmission Pipeline, 10"	151,734	LF	\$31	\$4,703,760
5	Transmission Pipeline, 12"	16,284	LF	\$35	\$569,940
7	Transmission Pipeline, 16"	40,323	LF	\$57	\$2,298,420
10	Transmission Pipeline, 24"	91,712	LF	\$102	\$9,354,630
12	Transmission Pipeline, 36"	159,172	LF	\$169	\$26,900,070
13	Booster Pump Station #1, 30 hp	1	LS	\$835,000	\$835,000
14	Booster Pump Station #2, 260 hp	1	LS	\$1,810,000	\$1,810,000
15	Booster Pump Station #3, 150 hp	1	LS	\$1,300,000	\$1,300,000
16	Booster Pump Station #4, 65 hp	1	LS	\$890,000	\$890,000
17	Booster Pump Station #5, 25 hp	1	LS	\$830,000	\$830,000
18	Booster Pump Station #6, 10 hp	1	LS	\$762,000	\$762,000
19	Booster Pump Station #7, 140 hp	1	LS	\$1,250,000	\$1,250,000
	Booster Pump Station #8, 60 hp	1	LS	\$875,000	\$875,000
20	Groundwater Wells, 1,000 gpm	8	EA	\$525,322	\$4,202,580
Construction Subtotal					\$59,628,200
	Mobilization and Demobilization (5%)				\$2,981,500
	Contingency (20%)				\$11,925,700
	Professional Services (15%)				\$8,944,300
Construction Total					\$83,479,700
Easements					
	Easement/Acquisition (pipeline)	277	AC	\$4,000	\$1,108,000
	Easement/Acquisition (well site and pump stations)	5	AC	\$8,000	\$40,000
Easement Subtotal					\$1,148,000
Project Total					\$84,628,000

Carrizo-Wilcox Aquifer Pipeline, Max Day Demand, with Waco - O&M Costs

Beginning year = 2015
 Inflation rate = 0.0250
 Interest rate = 0.0400
 Cost of HSPS operations = \$0.05 \$/1000 gpd
 Well Operations = \$0.10 \$/1000 gal

Annual O&M Costs

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Avg day demand, MGD	10.24	10.26	10.28	10.29	10.31	10.33	10.34	10.36	10.38	10.40	10.41	10.43	10.45
Annual O&M for Wells	\$373,890	\$374,496	\$375,104	\$375,713	\$376,323	\$376,933	\$377,574	\$378,215	\$378,858	\$379,502	\$380,147	\$380,823	\$381,500
Booster Pump Station #1	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213
Booster Pump Station #2	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880
Booster Pump Station #3	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725
Booster Pump Station #4	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598
Booster Pump Station #5	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395
Booster Pump Station #6	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380
Booster Pump Station #7	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998
Booster Pump Station #8	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170
Total O&M Costs	\$737,247	\$737,854	\$738,462	\$739,070	\$739,680	\$740,291	\$740,931	\$741,573	\$742,215	\$742,859	\$743,504	\$744,180	\$744,858
Inflated Total O&M Costs	\$737,247	\$756,300	\$775,846	\$795,898	\$816,468	\$837,571	\$859,253	\$881,497	\$904,318	\$927,729	\$951,748	\$976,429	\$1,001,751

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
2015 Present Worth of Annual O&M Costs	\$737,247	\$727,212	\$717,313	\$707,550	\$697,921	\$688,422	\$679,080	\$669,865	\$660,776	\$651,810	\$642,967	\$634,270	\$625,691

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Avg day demand, MGD	10.47	10.49	10.51	10.53	10.55	10.57	10.59	10.61	10.63	10.65	10.67	10.69	10.71
Annual O&M for Wells	\$382,179	\$382,859	\$383,540	\$384,254	\$384,970	\$385,687	\$386,405	\$387,125	\$387,880	\$388,637	\$389,395	\$390,154	\$390,915
Booster Pump Station #1	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213	\$8,213
Booster Pump Station #2	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880	\$186,880
Booster Pump Station #3	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725	\$23,725
Booster Pump Station #4	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598	\$62,598
Booster Pump Station #5	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395	\$8,395
Booster Pump Station #6	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380	\$4,380
Booster Pump Station #7	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998	\$47,998
Booster Pump Station #8	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170	\$21,170
Total O&M Costs	\$745,536	\$746,216	\$746,897	\$747,612	\$748,327	\$749,045	\$749,763	\$750,483	\$751,238	\$751,994	\$752,752	\$753,512	\$754,273
Inflated Total O&M Costs	\$1,027,730	\$1,054,384	\$1,081,730	\$1,109,834	\$1,138,669	\$1,168,254	\$1,198,609	\$1,229,753	\$1,261,765	\$1,294,612	\$1,328,314	\$1,362,896	\$1,398,379

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2015 Present Worth of Annual O&M Costs	\$617,228	\$608,881	\$600,646	\$592,549	\$584,562	\$576,683	\$568,911	\$561,243	\$553,705	\$546,268	\$538,932	\$531,695	\$524,555

Carrizo-Wilcox Aquifer Pipeline, Max Day Demand, with Waco - Financial Evaluation

Interest Rate = 4.00% %
 Payment Period = 20 years

Capital Costs	2010	2015	2020	2025	2030	2035	2040
Phase Capital Costs	\$0	\$84,628,000	\$0	\$0	\$0	\$0	\$0

Financing Cost

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Debt Service	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000
O&M Costs (Inflated)	\$737,247	\$756,300	\$775,846	\$795,898	\$816,468	\$837,571	\$859,253	\$881,497	\$904,318	\$927,729	\$951,748	\$976,429	\$1,001,751
Total Cost	\$6,965,247	\$6,984,300	\$7,003,846	\$7,023,898	\$7,044,468	\$7,065,571	\$7,087,253	\$7,109,497	\$7,132,318	\$7,155,729	\$7,179,748	\$7,204,429	\$7,229,751
Avg Water Sold (mgd)	10.24	10.26	10.28	10.29	10.31	10.33	10.34	10.36	10.38	10.40	10.41	10.43	10.45
Cost per 1,000 gal	\$1.86	\$1.86	\$1.87	\$1.87	\$1.87	\$1.87	\$1.88	\$1.88	\$1.88	\$1.89	\$1.89	\$1.89	\$1.90

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Debt Service	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$6,228,000	\$0	\$0	\$0	\$0	\$0	\$0
O&M Costs (Inflated)	\$1,027,730	\$1,054,384	\$1,081,730	\$1,109,834	\$1,138,669	\$1,168,254	\$1,198,609	\$1,229,753	\$1,261,765	\$1,294,612	\$1,328,314	\$1,362,896	\$1,398,379
Total Cost	\$7,255,730	\$7,282,384	\$7,309,730	\$7,337,834	\$7,366,669	\$7,396,254	\$7,426,609	\$1,229,753	\$1,261,765	\$1,294,612	\$1,328,314	\$1,362,896	\$1,398,379
Avg Water Sold (mgd)	10.47	10.49	10.51	10.53	10.55	10.57	10.59	10.61	10.63	10.65	10.67	10.69	10.71
Cost per 1,000 gal	\$1.90	\$1.90	\$1.91	\$1.91	\$1.91	\$1.92	\$1.92	\$0.32	\$0.33	\$0.33	\$0.34	\$0.35	\$0.36

Total Annual Avg Demand: 99,331 million gallons
 10-Year Avg for Cost per 1,000 gal: \$1.87

Carrizo-Wilcox, Max Day Demand, with Waco - Economic Evaluation

2015 Present Worth of Capital Costs	\$84,628,000
2015 Present Worth of O&M Costs	\$16,246,000
Total 2015 Present Worth Cost	\$100,874,000
Total Average Day Water Demand from 2015-2040 (acre-ft)	304,856
Total Present Worth Cost/acre-ft	\$331

APPENDIX E

FHLM ARSENIC MEMO



Memorandum

*To: Allen Woelke, P.E.
Mary Hinson*

From: Robert Fowlie, P.E., BCEE

Date: July 27, 2015

*Subject: FHLM Arsenic Treatment Alternatives Analysis
CDM Smith Project No.: 107858-107160*

The Falls, Hill, Limestone, and McLennan Counties Regional Water System Council (FHLM Regional WSC) drinking water system consists of 18 entities and 35 groundwater wells. FHLM Regional WSC has identified 9 entities and 14 wells that have arsenic levels that are close to exceeding or have exceeded the Texas Commission on Environmental Quality (TCEQ) Drinking Water Standard for arsenic (10 parts per billion, or ppb). Arsenic concentrations in the 14 wells range from below 10 ppb to a maximum of 50 ppb (**Attachment 1**). The reported production capacities for the 14 wells range from 110 to 630 gallons per minute (gpm) (**Attachment 1**). This analysis evaluated arsenic treatment alternatives for 8 of the 12 wells that had annual average arsenic concentrations above the Drinking Water Standard; Axtell WSC, Birome WSC, Prairie Hill WSC, EOL WSC (Wells 1 and 3), LTG WSC (Wells 2 and 3) and MS WSC. Four additional wells were also evaluated, (City of Mount Calm WSC, EOL Well 2, Moore WS, and RMS WSC) because they have exceeded the 10 ppb standard in the past or are close to the standard.

The purpose of this memorandum is to identify a reliable and cost effective arsenic removal process that will bring the wells into compliance with the TCEQ Standard for arsenic. The recommended treatment process should also be simple to operate and easy to incorporate into the existing water systems. Two commonly used methods of arsenic removal include:

1. Adsorption using iron-based adsorptive media
2. Coagulation followed by granular media filtration

Both treatment methods offer removal of arsenic to near non-detect levels; however, other factors such as flow rate, arsenic concentration, and water quality parameters can make one process more cost effective than the other. Both treatment methods are discussed in detail below.

Iron-Based Adsorptive Media

Adsorption using iron-based adsorptive media (IBS) is a well-established arsenic treatment. In the IBS process, arsenic adsorbs onto the surface of a filter bed of media as oxidized raw water is

Mr. Allen Woelke, P.E.
Ms. Mary Hinson
July 27, 2015
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passed through. Arsenic continues to adsorb onto the media until the adsorptive capacity of the media is reached. Upon media exhaustion, the spent filter media is replaced with new media.

The IBS process is sensitive to pH levels. For optimum arsenic removal, the pH should be between 7.0 and 7.5. The pH of the water in the affected wells ranges from 7.9 to 8.5. If the IBS process is implemented, pH adjustment before treatment may be necessary to increase the efficacy of the media. If the pH is reduced it will have to be increased back to pre-treatment levels to prevent dissolution of scale in the water distribution system.

The media life can be reduced by other interfering ions in the water, particularly vanadium, phosphate, silica, and sulfate. A review of water quality data indicates that the concentration of silica in several wells is high and may compete with arsenic in the removal process. Sulfate concentrations are not high enough to cause interference with arsenic removal and phosphate and vanadium data is insufficient to determine if interference caused by these ions is a concern.

The Prairie Hill, EOL, LTG, MS, and RMS wells are disinfected with chlorine gas. In addition to disinfection properties, chlorine is a strong oxidant which contributes to arsenic treatment by oxidizing arsenate (As(III)) to the more readily removable arsenite (As(V)). Arsenite is adsorbed at higher rates than arsenate onto IBS media and onto the iron hydroxide floc in the coagulation filtration system.

IBS filter media requires infrequent backwashing to remove solids accumulation on the filter bed and to re-stratify the media to reduce head loss. Backwashing does not remove the arsenic from the filter media and water from the process can be discharged to the sanitary sewer (if available) or captured in a holding tank and recycled back to the head of the treatment process. Solids generated in the backwash process typically do not require special equipment for dewatering and can be disposed of along with the spent media in a landfill that will accept residuals from treatment processes as non-hazardous waste. Most landfills will require a toxicity characteristic leaching procedure (TCLP) before the media and solids are accepted for disposal.

The primary advantage of an IBS system is the simplicity of the operation. It does not require frequent backwashing or solids handling facilities. It is possible to have the manufacturer of the filter media provide all of the components of the system (filter vessels, media, backwash recovery system, and controls) so that there is one company with responsibility for the equipment.

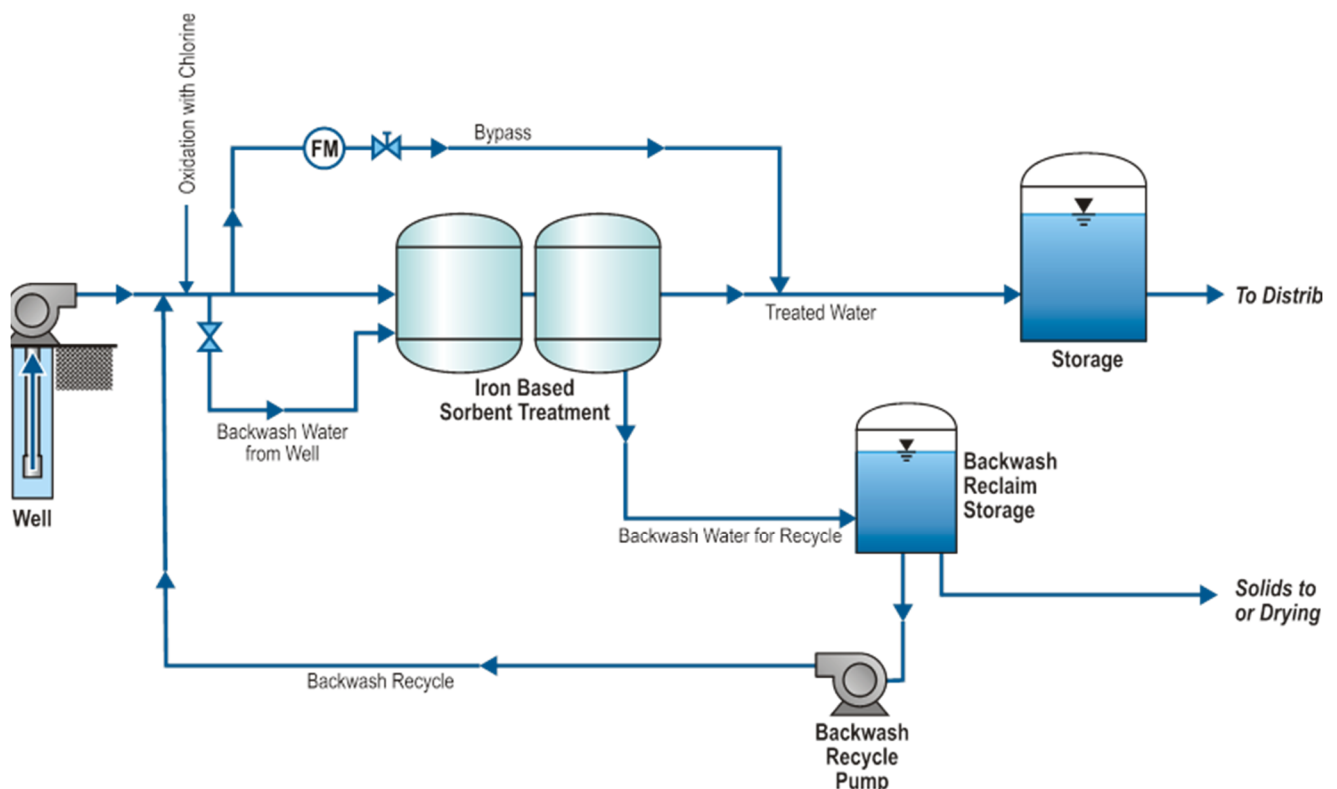
The main disadvantage of the IBS system is that the filter media can have a relatively short usable life and is expensive to replace. Filter media usually requires replacement every 18 to 30 months depending on the level of arsenic in the water, the presence of interfering ions, and well utilization. The lower the concentration of arsenic and interfering ions, the longer the media will last.

Water sources with low arsenic concentrations can also incorporate a bypass system to further extend media life. A portion of the untreated higher arsenic water bypasses the treatment vessels

and is blended with treated low arsenic water to produce a finished water that meets the treatment objective of 8 ppb.

A process flow diagram for a proposed IBS treatment process with a bypass system is shown on **Figure 1**. A typical site layout is provided in **Attachment 2**.

Figure 1: IBS Treatment Process Flow Diagram



A pilot test of the IBS process was conducted by Severn Trent Services (Severn Trent) in June 2014 using their Bayoxide 33 media at the Prairie Hill WSC. The results of the pilot test indicated that pH reduction was required to achieve low arsenic concentrations in the treated water and to extend the life of the IBS media. The estimated media life for the Prairie Hill WSC was 31 months.

CDM Smith contacted Severn Trent about the FHLM wells requiring treatment to obtain recommended treatment system configurations, pH adjustment requirements, estimated media life, equipment costs and operations and maintenance costs. The treatment system parameters for IBS systems are presented below in **Table 1**.

Table 1: IBS Treatment Design Parameters and Estimated O&M Costs

Entity Raw Water Flowrate Raw Water As Concentration	Proposed Treatment Flowrate (gpm) and % Bypass	Treatment Vessel Quantity and Size	pH Adjustment	Annual O&M Cost	Media Life (months)
Axtell WSC 570 gpm 14.4 ug/L As	351 gpm (38.5% bypass)	1 – 8’ Dia Vessel	None	\$30,500	15.9
			Yes	\$26,000	22.6
Birome WSC 525 gpm 11.9 ug/L As	259 (50.6% bypass)	1 – 8’ Dia Vessel	None	\$17,500	27.7
			Yes	\$15,600	38.2
City of Mount Calm* 130 gpm 5.7 ug/L As	66 (75% bypass)	1 – 3.5’ Dia Vessel	None	\$2,600	56.5
Prairie Hill WSC 630 gpm 23.3 ug/L As	499 (20.7% bypass)	2 – 8’ Dia Vessel	None	\$60,700	13.9
			Yes	\$54,500	17.8
EOL WSC (Wells 1 & 3) 495 gpm 11.0 ug/L As	212 (57.1% bypass)	1 – 7’ Dia Vessel	None	\$11,800	30.7
EOL WSC (Well 2)* 278 gpm 17.0 ug/L As	200 (28% bypass)	1 – 6’ Dia Vessel	None	\$4,700	63.7
LTG WSC (Well 2) 195 gpm 15.1 ug/L As	125 (36% bypass)	2 – 4’ Dia Vessel	None	\$6,500	37.6
LTG WSC (Well 3) 330 gpm 10.9 ug/L As	139 (58% bypass)	1 – 6’ Dia Vessel	None	\$4,700	63.7
MS WSC 110 gpm 15.1 ug/L As	46 (58% bypass)	1 – 3.5’ Dia Vessel	None	\$2,600	56.5
Moore WSC* 100 gpm 16.7 ug/L As	71 (29% bypass)	1 – 3.5’ Dia Vessel	None	\$2,600	56.5
RMS WSC* 340 gpm 11 ug/L As	170 (50% bypass)	1 – 6’ Dia Vessel	None	\$4,700	63.7

Notes:

1 – Data provided by Severn Trent Services

2 – O&M Costs for pH adjustment assume hydrochloric acid injection

*Treatment parameters were estimated by CDM Smith using data provided from Severn Trent for other similar facilities.

As shown in **Table 1**, pH reduction at the proposed treatment facilities at Axtell, Birome, and Prairie Hill will increase the effectiveness of arsenic removal and improve the efficacy of the media. Estimated annual operations and maintenance costs are based on media replacement costs, the cost of chemicals required for pH adjustment, and electricity.

Table 2 summarizes the estimated system costs for the arsenic removal equipment, controls, and pH adjustment systems (as needed) provided by Severn Trent. The system costs are also presented as a cost per gallon treated. Costs range from \$0.22 to \$0.52 per gallon treated.

Table 2: IBS Treatment Process System Cost Estimation Comparison

Entity	Flowrate (gpm)	System Cost w/o pH Adjustment	Cost per Gallon	System Cost w/ pH Adjustment	Cost per Gallon
Axtell WSC	570	\$187,000	\$0.23	\$219,000	\$0.27
Birome WSC	525	\$187,000	\$0.25	\$219,000	\$0.29
City of Mount Calm*	130	\$68,700	\$0.37	NR	--
Prairie Hill WSC	630	\$317,500	\$0.35	\$349,500	\$0.39
EOL WSC (Wells 1 & 3)	495	\$153,500	\$0.22	NR	--
EOL WSC (Well 2)*	278	\$141,000	\$0.35	NR	--
LTG WSC (Well 2)	195	\$145,500	\$0.52	NR	--
LTG WSC (Well 3)	330	\$141,000	\$0.30	NR	--
MS WSC	110	\$68,700	\$0.43	NR	--
Moore WS*	100	\$68,700	\$0.47	NR	--
RMS WSC*	340	\$141,000	\$0.29	NR	--

Notes:

NR – pH adjustment is not required for these well sites.

Capital costs for pH adjustment assume hydrochloric acid injection.

*Costs estimated by CDM Smith based on cost information provided for Severn Trent for all other facilities.

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Coagulation/Granular Media Filtration

The coagulation/granular media filtration (C/GF) process requires addition of ferric chloride coagulant followed by conventional granular media filtration to remove arsenic. Ferric chloride forms an iron floc which adsorbs the arsenic. The water is then filtered through granular media which removes the floc from the water. As with the IBS process, arsenic must be oxidized with chlorine prior to coagulant addition.

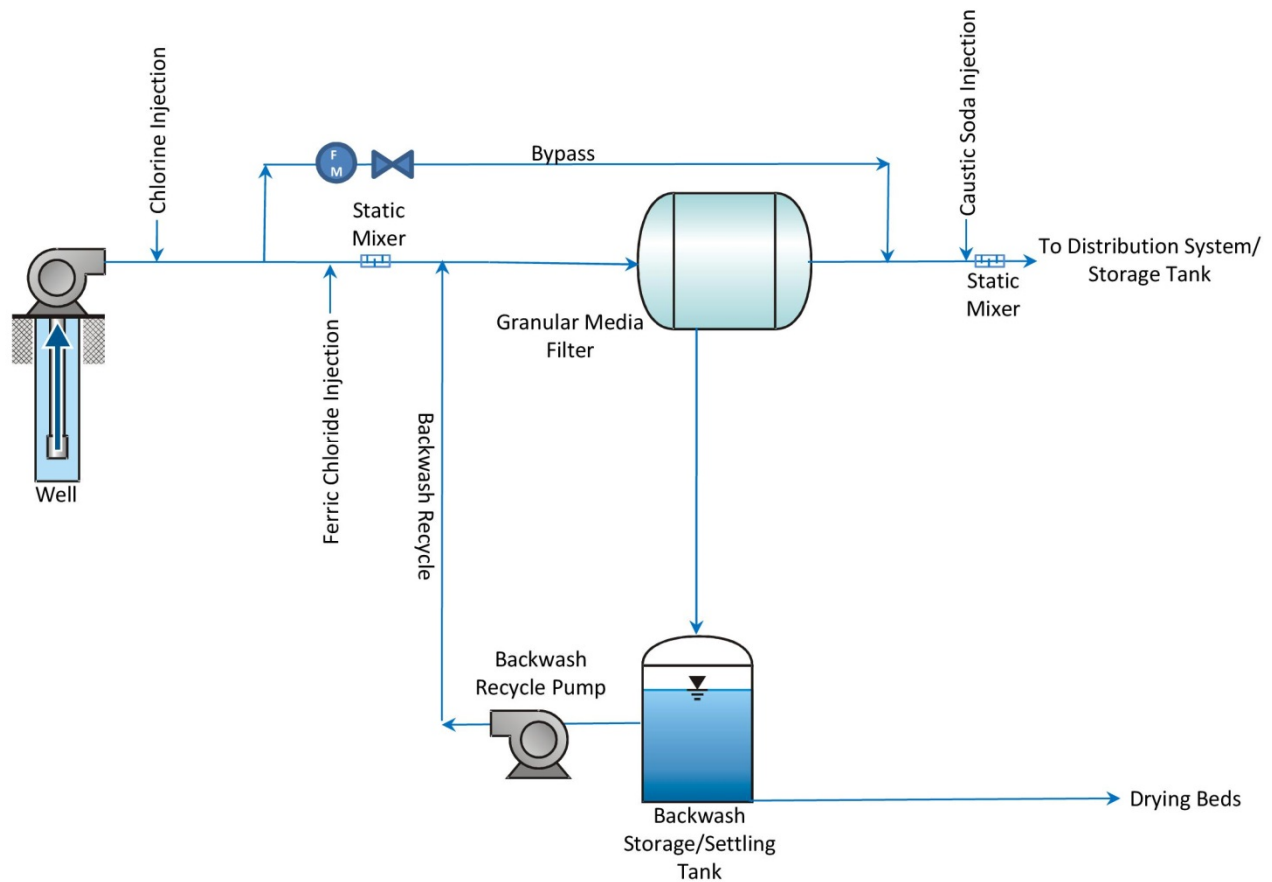
The efficiency of arsenic removal in the C/GF process is also sensitive to pH with a range of 6.8 to 7.2 being optimal. The pH in the affected wells ranges from 7.9 to 8.5. The addition of ferric chloride should be sufficient to reduce the pH to the optimal range. Pilot testing is typically used to determine if additional pH adjustment is necessary and to determine pH reduction and coagulant chemical dosages.

The main advantage of the C/GF process is the typical media life is expected to be 8 to 10 years, which is significantly longer than that of IBS.

The main disadvantage of the C/GF process is that the filter bed requires frequent backwashing which generates large volumes of water. Similar to an IBS system, backwash water can be captured and recycled back to the head of the treatment process. Backwash, solids consisting of ferric hydroxide and adsorbed arsenic, must either be discharged to a sanitary sewer (if available) or removed from the backwash tank, dewatered, tested for Toxicity Characteristic Leaching Procedure (TCLP), and taken as non-hazardous waste to a permitted landfill.

The process flow diagram for the C/GF system is shown on **Figure 2**. A typical site layout is provided in **Attachment 3**.

Figure 2: C/GF Treatment Process Flow Diagram



CDM Smith contacted Tonka Equipment about the FHLM wells that would require treatment to obtain recommended treatment system configurations, pH adjustment requirements, and operations and maintenance costs. The treatment system parameters and estimated annual operations and maintenance costs for C/GF systems are presented below in **Table 3**. Annual operations and maintenance costs are estimated on media life, coagulant addition, and electricity.

Table 3: C/GF Treatment Design Parameters and Estimated O&M Costs

Entity Raw Water As Concentration	Treatment Flowrate (gpm)	Treatment Vessel	Average pH	Estimated Ferric Chloride Consumption (lbs/day)	Annual O&M Cost
Axtell WSC 14 ug/L As	569	3 – 8' Dia Vessel	8.5	28	\$14,000
Birome WSC 12 ug/L As	528	3 – 7.6' Dia Vessel	8.3	22.2	\$12,000
City of Mount Calm 5.7 ug/L As	132	3 – 3.6' Dia Vessel	7.8	1.5	\$2,500
Prairie Hill WSC 25.2 ug/L As	632	4 – 7' Dia Vessel	8	55.4	\$23,000
EOL WSC (Wells 1 & 3) 13.3 ug/L As	493	4 – 6.6' Dia Vessel	7.9	18.9	\$10,500
EOL WSC (Wells 2) 17.0 ug/L As	278	4 – 5.6' Dia Vessel	8.1	15.7	\$8,000
LTG WSC (Well 2) 15.1 ug/L As	194	3 – 5' Dia Vessel	8.1	10.3	\$5,000
LTG WSC (Well 3) 29 ug/L As	333	3 – 6' Dia Vessel	7.8	33.6	\$13,500
MS WSC 12 ug/L As	111	4 – 3' Dia Vessel	8.2	3.9	\$2,500
Moore WS 16.7 ug/L As	100	3- 3' Dia Vessel	NA	4.8*	\$3,500*
RMS WSC 11 ug/L As	340	3 - 6' Dia Vessel	NA	12.2*	\$6,500*

Notes:

NA – Data not available.

*Costs estimated by CDM Smith based on cost information provided by Tonka Equipment for all other facilities.

Table 4 summarizes the estimated capital costs for the chemical injection system, arsenic removal equipment, and controls provided by Tonka Equipment. These capital costs are also presented as a cost per gallon treated. Costs range from \$0.36 to \$0.91 per gallon treated.

Table 4: C/GF System Cost Estimation Comparison

Plant Location	gpm	System Cost	Cost per Gallon
Axtell WSC	570	\$305,000	\$0.37
Birome WSC	525	\$290,000	\$0.38
City of Mount Calm	130	\$70,000	\$0.37
Prairie Hill WSC	630	\$325,000	\$0.36
EOL WSC (Wells 1 and 3)	495	\$315,000	\$0.44
EOL WSC (Well 2)	280	\$275,000	\$0.68
LTG WSC (Well 2)	195	\$255,000	\$0.91
LTG WSC (Well 3)	330	\$265,000	\$0.56
MS WSC	110	\$80,000	\$0.51
Moore WS	100	\$62,000	\$0.43
RMS WSC	340	\$265,000	\$0.54

Selecting an Arsenic Removal Process

The recommended arsenic treatment process should meet the following requirements:

- Effective arsenic removal (i.e. finished water ≤ 8 ppb of arsenic)
- Low capital and O&M costs
- Ease of operation

Both the IBS adsorption and C/GF processes offer effective arsenic removal below a finished water goal of 8 ppb. Treatment system and O&M costs, provided by vendors Severn Trent and Tonka Equipment, were previously presented for both treatment processes. The major difference between C/GF and IBS systems is that the C/GF process requires chemical storage and feed systems for the coagulant and requires larger backwash tanks and more complex solids processing facilities.

Table 5 summarizes the treatment system costs and O&M costs, as well as, includes other costs associated with the treatment plant and a 20-year present worth value. Other treatment plant costs include the following items, as applicable:

- Site work
- Yard and facility piping
- Chemical feed systems
- Backwash holding tank
- Backwash recycle pumps

- Metal building enclosure
- Drying beds

Table 5 System, O&M, and Present Worth Cost Summary

Entity	System Cost IBS	Construction Cost Other	Annual O&M	Present Worth 20 Year	Capital Cost C/GF	Construction Cost Other	Annual O&M	Present Worth 20 Year i=0.03
Axtell WSC	\$219,000	\$435,000	\$26,000	\$1,041,000	\$305,000	\$575,000	\$14,000	\$1,088,000
Birome WSC	\$219,000	\$435,000	\$15,600	\$886,000	\$290,000	\$575,000	\$12,000	\$1,044,000
City of Mount Calm	\$68,700	\$395,000	\$2,600	\$502,000	\$70,000	\$575,000	\$2,000	\$675,000
Prairie Hill WSC	\$349,500	\$435,000	\$54,500	\$1,595,000	\$325,000	\$575,000	\$23,000	\$1,242,000
EOL WSC (Wells 1 & 3)	\$153,500	\$395,000	\$11,800	\$724,000	\$315,000	\$575,000	\$10,500	\$1,046,000
EOL WSC (Well 2)	\$141,000	\$395,000	\$4,700	\$606,000	\$275,000	\$575,000	\$8,000	\$969,000
LTG WSC (Well 2)	\$145,500	\$395,000	\$6,500	\$637,000	\$255,000	\$575,000	\$5,000	\$904,000
LTG WSC (Well 3)	\$141,000	\$395,000	\$4,700	\$606,000	\$265,000	\$575,000	\$13,500	\$1,041,000
MS WSC	\$68,700	\$395,000	\$2,600	\$502,000	\$80,000	\$575,000	\$2,500	\$692,000
Moore WSC	\$68,700	\$395,000	\$2,600	\$502,000	\$62,000	\$575,000	\$3,500	\$689,000
RMS WSC	\$141,000	\$395,000	\$4,700	\$606,000	\$265,000	\$575,000	\$6,500	\$937,000
Total	\$1,715,600	\$4,465,000	\$136,300	\$8,207,000	\$2,507,000	\$4,025,000	\$100,500	\$10,327,000

As shown in **Table 5**, the total 20-year present worth value for the IBS treatment process is approximately \$2,120,000 less than the C/GF process. However, the 20 present worth for an IBS system at the Prairie Hill WSC is more than a C/GF system. This is because Prairie Hill has a higher arsenic concentration (25 ug/L) and higher treatment flow than any of the other systems. It has been our experience that IBS media requires more frequent replacement when the arsenic concentrations are above 20 ppb and flows are relatively high. IBS media is expensive and the cost of the media replacement is what causes the higher present worth cost.

If the treatment systems are operated on a regional basis, we recommend using one treatment process (IBS) to facilitate operations. If the systems are to be operated individually, we recommend that the operators select the system with the lowest present worth and the one they are most comfortable operating. IBS and C/GF media remove arsenic equally well. The main difference

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between the two processes is the backwashing and solids handling facilities required for a C/GF system are more slightly more complex than those required for an IBS system.

Attachments

cc: file

Attachment 1

Table 1: FHLM Regional WSC Entity Well Arsenic Concentrations

Entity	Arsenic (ppb)				
	Entity Provided		TCEQ Provided		
	Low	High	Low	High	Current
<i>Axtell WSC</i>	12.7	15.4	12.7	23.7	14.4
<i>Birome WSC</i>	9.1	15.3	8.87	15.4	11.1
<i>City of Mount Calm</i>	ND	ND	<2	9.34	7.91
<i>Prairie Hill WSC</i>	20	29	18.7	31.7	23.2
<i>EOL WSC (Wells 1 & 3)</i>	11	12	4.96	21.6	11
<i>EOL WSC (Well 2)</i>	15	22	7.53	26.4	18.8
<i>Moore WS</i>	ND	16.7	ND	ND	ND
<i>LTG WSC (Well 2)</i>	6.2	20.7	6.1	24.1	7.5
<i>LTG WSC (Well 3)</i>	8.1	35.8	7.36	50.6	10.9
<i>MS WSC</i>	ND	9.9	8.6	15.2	10.9
<i>RMS WSC</i>	ND	11	ND	ND	ND

Attachment 1

Table 2: FHLM Regional WSC Entity Well Capacities and Demands

Entity	Well Capacity, gpm	Well Capacity, MGD	Current Max Demand, MGD	2040 Max Demand, MGD
<i>Axtell WSC</i>	570	0.82	0.46	0.46
<i>Birome WSC</i>	525	0.76	0.39	0.39
<i>City of Mount Calm</i>	130	0.19	--	0.05
<i>Prairie Hill WSC</i>	630	0.91	0.48	0.48
<i>EOL WSC (Wells 1 & 3)</i>	495	0.71	0.51	0.51
<i>EOL WSC (Well 2)</i>	275	0.4	--	--
<i>Moore WS</i>	ND	ND	0.6	0.09
<i>LTG WSC (Well 2)</i>	195	0.28	0.25	0.25
<i>LTG WSC (Well 3)</i>	330	0.48	--	--
<i>MS WSC</i>	110	0.16	0.07	0.07
<i>RMS WSC</i>	340	0.49	0.41	0.34

Attachment 1

Table 3: FHLM Regional WSC Entity Well pH

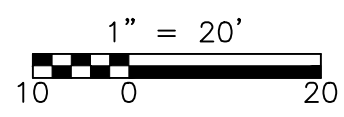
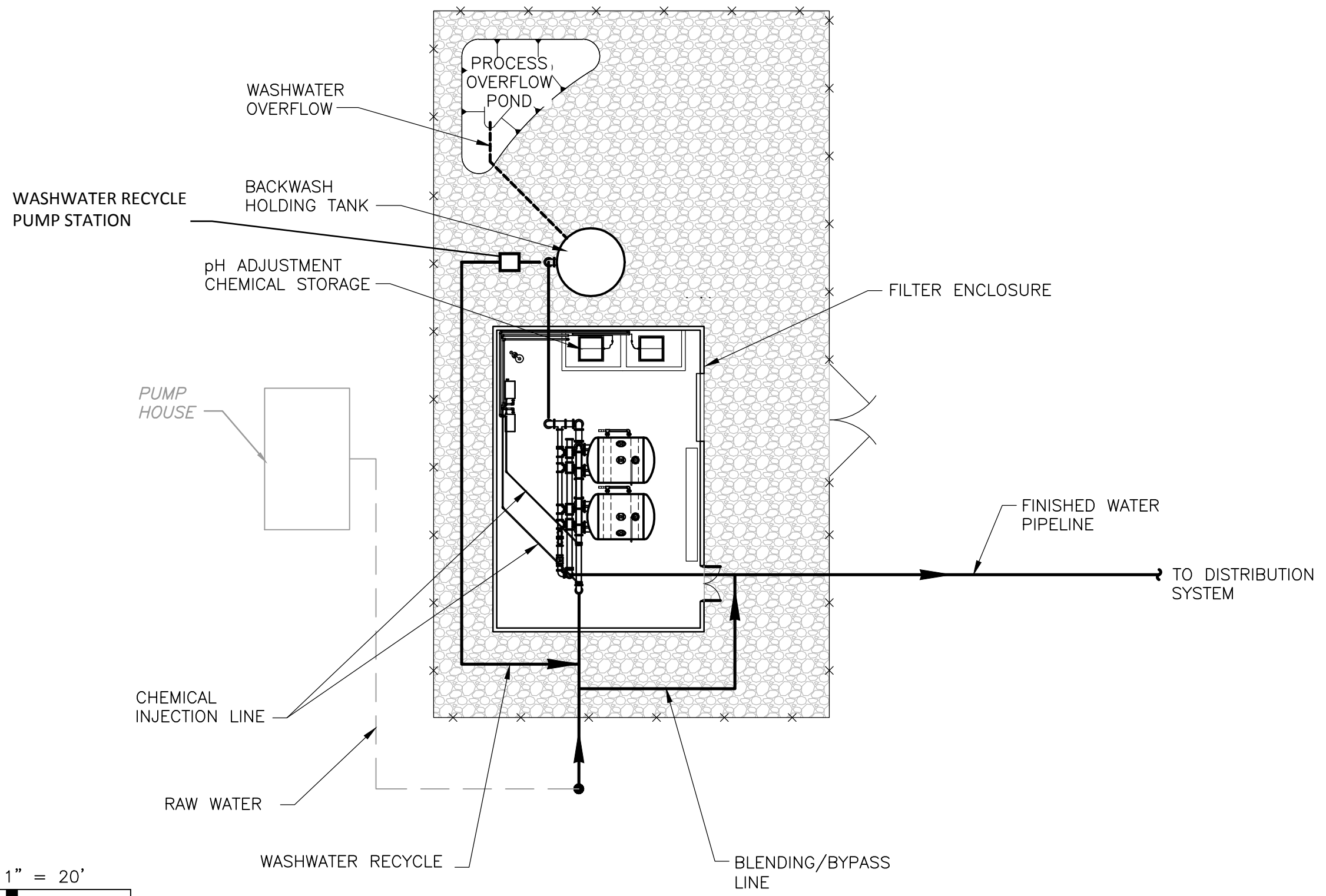
Entity	pH				
	Entity Provided		TCEQ Provided		
	Low	High	Low	High	Current
<i>Axtell WSC</i>	ND	8.2	8.3	8.5	8.5
<i>Birome WSC</i>	8.1	8.6	8.1	8.5	8.4
<i>City of Mount Calm</i>	ND	ND	7.8	8.2	7.8
<i>Prairie Hill WSC</i>	ND	8.1	8	8.47	8
<i>EOL WSC (Wells 1 & 3)</i>	ND	7.9	7.9	8.2	7.9
<i>EOL WSC (Well 2)</i>	ND	8.1	8	8.3	8.1
<i>Moore WS</i>	ND	ND	ND	ND	ND
<i>LTG WSC (Well 2)</i>	ND	ND	7.84	8.4	8.1
<i>LTG WSC (Well 3)</i>	ND	ND	7.8	8.09	7.8
<i>MS WSC</i>	ND	ND	8	8.3	8.2
<i>RMS WSC</i>	ND	ND	ND	ND	ND

Attachment 1

Table 4: FHLM Regional WSC Entity Well Interfering Ion Concentrations

Entity	Iron (mg/L)					Phosphate (mg/L)		Silica (mg/L)	Sulfate (mg/L)					Vanadium (ppb)	
	Entity Provided		TCEQ Provided			Entity Provided		Entity Provided	Entity Provided		TCEQ Provided			Entity Provided	
	Low	High	Low	High	Current	Low	High	High	Low	High	Low	High	Current	Low	High
<i>Axtell WSC</i>	ND	ND	<0.05	0.041	0.027	ND	ND	28.5	ND	99.7	104	117	117	ND	ND
<i>Birome WSC</i>	0.01	0.24	0.016	0.242	0.058	ND	ND	30.1	ND	97.4	110	118	110	ND	ND
<i>City of Mount Calm</i>	ND	ND	0.158	0.22	0.15	ND	ND	ND	ND	ND	135	147	135	ND	ND
<i>Prairie Hill WSC</i>	ND	0.033	<0.02	<0.05	<0.02	ND	<1	35	ND	110	119	128	126	ND	2.2
<i>EOL WSC (Wells 1 & 3)</i>	ND	0.067	<0.05	0.081	0.067	ND	ND	31.8	ND	142	135	142	142	ND	ND
<i>EOL WSC (Well 2)</i>	ND	0.088	0.088	0.116	0.088	ND	ND	ND	ND	117	113	120	ND	ND	ND
<i>Moore WS</i>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
<i>LTG WSC (Well 2)</i>	ND	0.024	0.014	0.232	0.024	ND	ND	ND	ND	ND	11.7	96	89	ND	ND
<i>LTG WSC (Well 3)</i>	ND	0.065	0.065	0.193	0.065	ND	ND	ND	ND	114	114	124	114	ND	ND
<i>MS WSC</i>	ND	ND	0.019	0.062	0.049	ND	ND	ND	ND	ND	90.8	104	104	ND	ND
<i>RMS WSC</i>	ND	0.019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Target Maximum Concentrations	0.3					0.5		20	200					25	

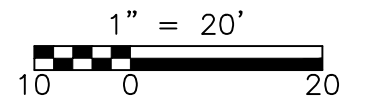
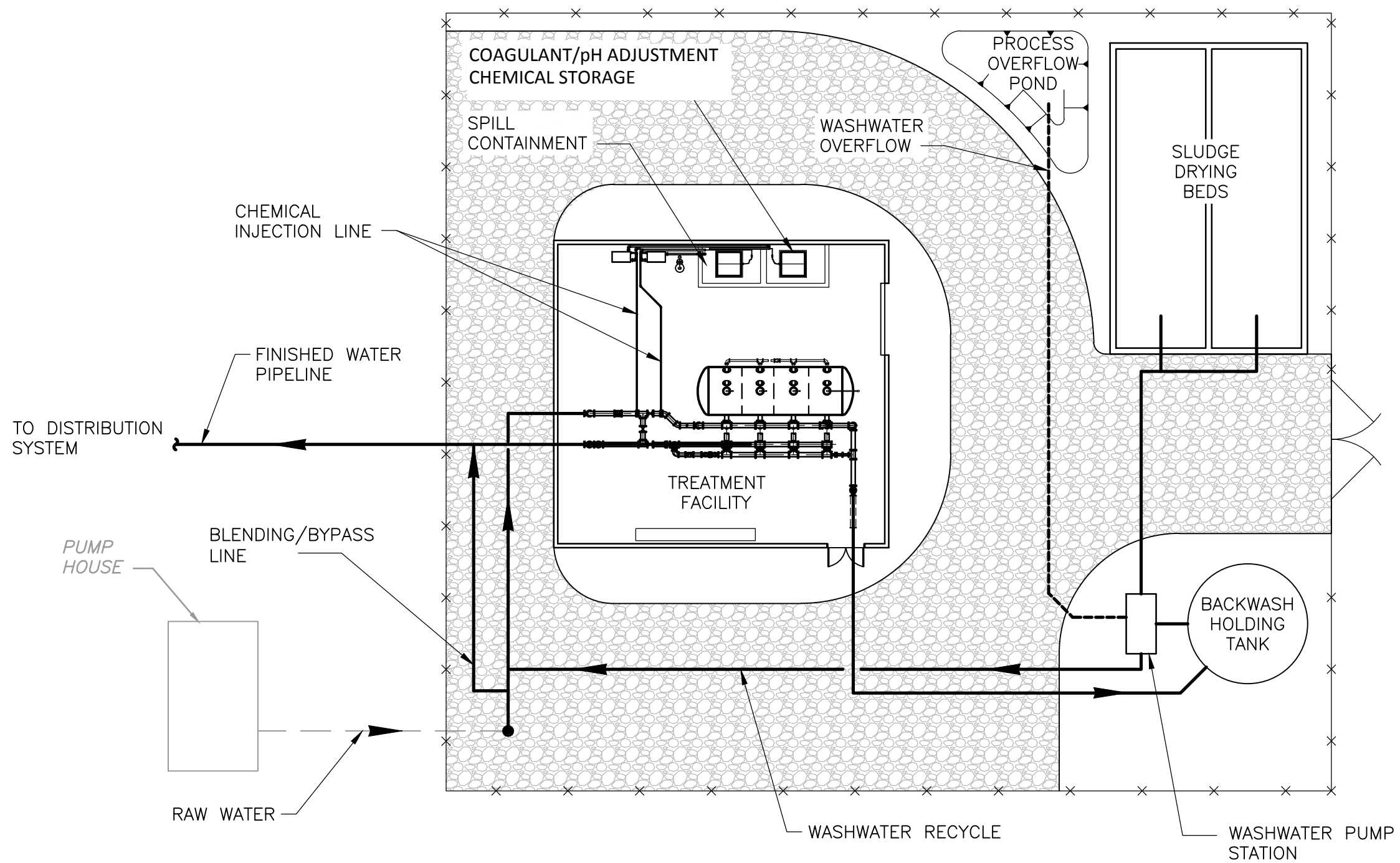
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FHLM REGIONAL WSC

Attachment 2
Typical Site Layout for Iron Based Adsorption
Technology

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APPENDIX F

**AGENDAS AND SIGN-IN
SHEETS FOR PROJECT AND
PUBLIC MEETINGS**

Meeting Agenda

FHLM - TWDB Regional Water Facility Study

DATE: *Thursday, July 10, 2014*
TIME: *6:30 – 8:00 p.m.*
LOCATION: *Brazos River Authority, Board Room*

Items for Discussion:

- | | |
|-------------|--|
| 6:30 – 6:40 | 1. Welcome and Introduction <ul style="list-style-type: none">• Attendees: TWDB and Project Participants |
| 6:40 – 6:55 | 2. TWDB Program Overview <ul style="list-style-type: none">• Background• History• Purpose of Regional Facility Program |
| 6:55 – 7:15 | 3. Regional Water Study <ul style="list-style-type: none">• Study Area• Project Participants• Scope of Work• Project Schedule |
| 7:15 – 7:25 | 4. Project Data Request |
| 7:25 – 7:30 | 5. In-kind Service Documentation |
| 7:30 – 8:00 | 6. Roundtable Discussion |

FHLM-TWDB Regional Water Facility Study
Project Kick-off Meeting
July 10, 2014

Name	Title	City/Entity	Phone Number	Email Address
Burl Shelton	PRESIDENT	GITOLSON WATER	799-2000	Burl Shelton @ yahoo.com
Jamie Adamson	Office Manager	Gholson Water Supply Corp.	652-1254	gholson_water_supply@live.com
Carol Couch	City Secretary	Mart	876-2462	CitySecretary@cityofmart.net
R.C Fletcher	Interim City Mgr	Marlin	254 883 1450	citymanager@marlinTX.net
Elizabeth Nelson	Mayor - Marlin	Marlin	254 883 3605	b.nelson@marlinTX.net
Dolores Paar	IT/IS Supervisor	Cargill, Inc.	254-412-3438	ejr967@stgglobal.net
MIKE DULOCK	VICE PRESIDENT	EOL	254 717 7377	mikedulock@aol.com
DAVID WREN	PRESIDENT	TMS	254 896 7842	WRENWRANCH@GMAIL.COM
Barry Hamel	MGR.	Chalk Bluff WSC ^{Pure WSC}	254-799-1268	BHAM@Hot.PR.COM
Anna Busby	Bookkeeper	EOL WSC	254 863 0404	eolwsc@aol.com
JERRY MANS	Director	Prairie Hill Water Supply	254-715-2309	jerbet1943@hotmail.com
JOE BERNOSKY	DIRECTOR	CITY OF WACO UTILITIES	254-750-8074	josephb@ci.waco.tx.us
Miles Whitney		Duff Cons. Eng	254-756-5414	miles.whitney@duffengineering.com
Rodney Adamek		Duff Consul. Eng	254-756-5414	rodney@duffengineering.com
GERALD PRYTH	DIRECTOR	BIROME WSC	817-260-8625	
Charles Beseda	President FHLM	FHLM & Birome	254-749-5784	cb458@sbe.global.net
DAVID MEESY	BEAURACON PROJECT MGR	TWDB	512-936-0852	david.meesy@TWB.TX.GOV
Allen Woelke	Vice President	CDMSmith	512-816-1100	woelkea@cdmsmith.com
Betty Mans		Prairie Hill Water	254-715-2309	jerbet1943@hotmail.com

Meeting Agenda

FHLM-TWDB Regional Water Facility Study

DATE: *Wednesday, December 17, 2014*
TIME: *6:30 – 8:30 p.m.*
LOCATION: *Brazos River Authority
4600 Cobbs Drive
Waco, Texas 76710*

Items for Discussion:

- | | |
|-------------|--|
| 6:30 – 6:45 | 1. Welcome and Introductions <ul style="list-style-type: none">• Attendees: TWDB and Project Participants• Project Overview and Schedule |
| 6:45 – 7:30 | 2. Regional Water Facility Study <ul style="list-style-type: none">• General Observations – Study Area• Population Projections• Water Demand Projections• Preliminary Regional Alternatives |
| 7:30 – 7:40 | 3. Q&A Discussion |
| 7:40 – 8:20 | 4. Working Session – Regional Alternatives Discussion |
| 8:20 – 8:30 | 5. Wrap Up and Next Steps |

TWDB-FHLM Regional Water Facility Study
Project Meeting No. 2
December 17, 2014

Name	Title	City/Entity	Phone Number	Email Address
Steven Hauglit	City Council	Mt. Calm	254-993-4211	Jupiter2@live.com
Chal Bul	City Mgr	Bokone WSO	254-749-5784	CharlesBul@Yahoo.com
JOE BERNOSKY	DIRECTOR OF UTILITIES	CITY OF WACO	254-750-8079	josphb@waco.tx.org
Mehdi Taheri	EPA		214-665-2298	taheri.Mehdi@epa.gov
Henry Witt III	Mayor Protem	City of Mart	254-723-5199	henry.witt3@yahoo.com
Matt Gerath	Director	LTA	254-822-1720	mgerath@txFD-iv.com
Marvin Baikey	Concile	CITY OF MICHAM	254-993-4441	
Barry Hamel	Mgr./operator	Chalk Bluff ^{Pinkus} WSO	254 709 8889	BarryH@Hot.RP.com
LC Corwish	city council	Mt CALM TX	254 993 4321	
Robert Kris	water op	Mt CALM	254-993-4411	
DON RAMSEY	BOARD MEMBER	LEROY	254-744-4799	MAIL@ANGUSVALLEYPAKINSUPPLY.CO
Linda Jordan	Board Member	Prairie Hill	254-344-2343	brujordan@hotmail.com
JAY ELLIOTT	Falls City Judge	FALLS CNTY	913-702-4503	jay.t.elliott@gmail.com
R.C. Fletcher	Int City Mgr	Marlin	254 883 1450	citymanager@marlin.tx.net
BURL SHELTON	PRESIDENT	G. HOLSON WATER	254 722-1581	burlshelton@yahoo.com
LARRY MOORE	Co Owner	MOORE'S W.S.	254-315-8818	beaverlake_1@juno.com
Elizabeth Nelson	Mayor-Martin	Marlin	254-883-3506	eln964@sbcglobal.net
Dolores Pear	EHS Supr.	Cargill	254-412-3438	dolores_parker@cargill.com

Meeting Agenda

TWDB-FHLM Regional Water Facility Study

DATE: *Wednesday, April 29, 2015*
TIME: *6:30 – 8:30 p.m.*
LOCATION: *Heart of Texas Council of Governments
1514 South New Road
Waco, TX 76711*

Items for Discussion:

- | | |
|-------------|--|
| 6:30 – 6:40 | 1. Welcome and Introductions <ul style="list-style-type: none">• Attendees: TWDB & Participants• Project Overview & Schedule |
| 6:40 – 7:40 | 2. Regional Water Facility Study <ul style="list-style-type: none">• Project Recap & Initial Regional Alternatives• Revised Population & Water Demand Projections• Water Supply Discussion• Final Regional Alternatives |
| 7:40 – 7:50 | 3. Preliminary Conclusions |
| 7:50 – 8:20 | 4. Working Session/Q&A Discussion |
| 8:20 – 8:30 | 5. Wrap Up and Next Steps |

TWDB-FHLM Regional Water Facility Study
Project Meeting No. 3
April 29, 2015

Name	Title	City/Entity	Phone Number	Email Address
Mike Maw Erskine	FMR Mayor	Marlin	803-2841	Csmnde124@AOL
Elizabeth Nelson	Mayor - Marlin	Marlin	883-3605	ezn964@spcglobal.net
Mary Dumm	Sec. Treas	NS Water	896-7961	—
Reverend Pugh	Board Member	NS Water	875-2267	—
Annette Siclaff	Member/VP	NS Water/RMS	896-0158	asiclaff879@windstream.net
Mike Dubeck	VP	FOL Water	863-5426	mikedubeck@col.or
Joseph Dubeck	General Manager	STOOD	759-5610	stdgeed@att.net
Dalores	EHS Supv	Cargill Corp	412-3438	dalores_paa@Cargill.com
Gil Gregory	Pres Manager	MARLIN	931-9335	ggregory@mebgrou.com
Allen Noecke	VP	CDM Smith		wnoecka@cdmsmith.com
DAVID Weesey	PROJECT MGR	TWDB		
Wayne Hamilton	Researcher	Baylor	281-889-7161	wayne.hamilton@Baylor.edu
Anna Adamek, P.E.	PRESIDENT	Duff Consulting Engineers	756-5414	anna@duffengineering.com
Jay T. Elliott	Falls County Judge	Falls County	254-873-1426	jay.t.elliott@co.falls.tx.us
Linda Jordan	Director	Prairie Hill	254-344-2343	brujordan@hotmail.com
Carol Couch	City Secretary	Mart	254-876-2462	citysecretary@cityofmart.net
Brenner Brown	Manager	TWDB	512-475-1128	brenner.brown@twdb.texas.gov
Bill Blount		Axtell	254-863-5885	BlountsepeA01

Meeting Agenda

TWDB-FHLM Regional Water Facility Study

DATE: *Wednesday, August 19, 2015*
TIME: *6:30 – 8:30 p.m.*
LOCATION: *Heart of Texas Council of Governments
1514 South New Road
Waco, TX 76711*

Items for Discussion:

- | | |
|-------------|---|
| 6:30 – 6:40 | 1. Welcome and Introductions <ul style="list-style-type: none">• Attendees: TWDB & Participants• Project Overview & Schedule |
| 6:40 – 7:30 | 2. Regional Water Facility Study <ul style="list-style-type: none">• Highlights of the initial draft report• Review comments from project participants• Timeline to finalize report |
| 7:30 – 7:50 | 3. Funding opportunities and programs offered by TWDB |
| 7:50 – 8:20 | 4. Q&A Discussion/Next Steps |
| 8:20 – 8:30 | 5. Wrap Up |

**TWDB-FHLM Regional Water Facility Study
Project Meeting No. 4
August 19, 2015**

Name	Title	City/Entity	Phone Number	Email Address
Linda Jordan	Director	Prairie Hill WSC	254-344-2343	brujordan@hotmail.com
Tricia Freytag	Manager	Axtell WSC	254-749-5731	
Jamie Adamson	Office Manager	Gholson WSC	(51) 829-2907	gholson-water-supply@hotmail.com
Lejean Buckley	MS Director	MS	254-875-2269	
Mary Dunn	Sec-Try	MS	254-896-796	
Bobby Havel	mgn/operates	Chalk Bluff / Free water	254-709-8859	BHavel@Hot.RR-Pan
Dolores Parr	ETS Supv	Cargill	254-412-3438	dolores_parr@Cargill.com
Claude Delcamp	ETS man	Cargill	254-412-3437	midway-delcamp@Cargill.com
Mehdi Taheri	EPA	Dallas	47214-665-2298	taheri.Mehdi@epa.gov
Matt Gerath	Director	LTG	254-644-8627	mgerath@gmail.com
Lann Bookout	Planner	TWDB	512-936-9489	lann.bookout@twdb.texas.gov
Fred Kubitz	MANAGER	EOL, WSC	254-744-3388	
Rick Jaska	Board Director	Ross	254-722-0680	
Carol Couch	City Secretary	Marh	254-876-2462	
Citizen White	President	Axtell	254-744-2820	cwhite@integy.com
Allen Woelke	VP	CDM Smith	512-346-1100	
Susan Ral	President	Susan Ral Consulting	512-796-1692	susur@ralconsulting.com

APPENDIX G

**TWDB FINAL DRAFT REVIEW
COMMENTS AND RESPONSE MEMO**

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

October 9, 2015

Mr. Charles Beseda
FHLM Regional Water Supply Corporation
402 HCR 3110 South
Penelope, Texas 76676

RE: Regional Water Facility Grant Contract between the Texas Water Development Board (TWDB) and FHLM Regional Water Supply Corporation (FHLM); TWDB Contract No. 1448321704, Draft Report Comments for Falls, Hill, Limestone and McLennan Counties Regional Water Facility Study

Dear Mr. Beseda:

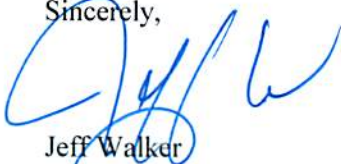
Staff members of the TWDB have completed a review of the draft report prepared under the above-referenced contract. ATTACHMENT I provides the comments resulting from this review. As stated in the TWDB contract, FHLM will consider revising the final report in response to comments from the Executive Administrator and other reviewers. In addition, FHLM will include a copy of the Executive Administrator's draft report comments in the Final Report.

The TWDB looks forward to receiving one (1) electronic copy of the entire Final Report in Portable Document Format (PDF) and six (6) bound double-sided copies. **Please further note, that in compliance with Texas Administrative Code Chapters 206 and 213 (related to Accessibility and Usability of State Web Sites), the digital copy of the final report must comply with the requirements and standards specified in statute. For more information, visit <http://www.sos.state.tx.us/tac/index.shtml>.** If you have any questions on accessibility, please contact David Carter with the Contract Administration Division at (512) 936-6079 or David.Carter@twdb.texas.gov

FHLM shall also submit one (1) electronic copy of any computer programs or models, and, if applicable, an operations manual developed under the terms of this Contract.

If you have any questions concerning the contract, please contact Tom Entsminger, the TWDB's designated Contract Manager for this planning project, at (512) 936 0802 or tom.entsminger@twdb.texas.gov

Sincerely,



Jeff Walker
Deputy Executive Administrator
Water Supply and Infrastructure

Enclosure

c: Tom Entsminger, TWDB

Our Mission

To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas

Board Members

Bech Bruun, Chairman | Kathleen Jackson, Member
Kevin Patteson, Executive Administrator

Attachment I
TWDB Comments on
Falls, Hill, Limestone and McLennan Counties
Regional Water Facility Study
Contract No.: 1448321704
Final Draft Report Review – Submitted August 31, 2015

Reviewers: Lann Bookout, Tom Barnett, Tom Entsminger

The draft final report has been reviewed and determined to satisfy the project scope of work. Additional comments and other suggestions on the report are included below:

Section 1

1.0 Executive Summary: Please include a table that indicates the total capital cost of each proposed project alternative, as included in the detailed cost summaries in Section 7.5.

1.4 Determination of Alternatives: From the description of the blending alternative here and in 6.3.1, it is not clear that the source for blending will be from a separate new source, different from the current supply (which has the arsenic contamination). Please consider adding language to clarify this.

Section 2

2.1 Project Background: To clarify TWDB’s status as a non-regulatory funding agency at the top of page 2-3, please consider an edit such as, “Following the study, the participants along with other regulatory *and funding* agencies (TCEQ, TWDB, and USDEPA)[...]”

Fig. 2-1: Please specify the aquifer used by each participating entity.

Section 4

Section 4, General: Where practicable, please consider expanding on the sources and uses of local information in development of the study’s population and demand projections.

4.1 Population Projections: Please clarify how the information was obtained on build-out of entity service areas and how it was incorporated into the population projections, if at all.

Fig. 4-1 to 4-4: Please double-check that these figures are accurately titled (the titles say “Population Density” but they appear to illustrate population projections) and consider labeling the counties on these maps.

Table 4-2: Please clarify the methodology employed for population projections. It is currently unclear how each entity’s growth rates were determined based on the tables in Appendix B and explanation on page 4-6.

Section 5

Fig. 5-1: Please update or replace this map with a higher-resolution copy (entity names are not legible).

Fig. 5-20: Please consider re-naming this graph to clarify that it refers to the Desired Future Conditions established by GMA 8.

Section 6

6.0 Development of Regional Alternatives: To help the reader keep track of which entities are included in each alternative, please consider adding a simple table summarizing each alternative's participants.

6.3.4 New Surface Water Treatment Plant: Please consider specifying what potential new reservoir this alternative would utilize and briefly discussing any obstacles (permitting, etc.) that might impact its feasibility due to the study participants' available timeframes.

Section 8

8.0 Potential Funding Sources: Please correct the reference to "Brazoria County Regional Water System" on page 8-1.

8.1.1.2 State Loan Program (Development Fund II): To ensure the audience can find program information more easily, please use the name "Texas Water Development Fund (DFund)" to match references on the TWDB web site.

8.1.14 State Water Implementation Fund for Texas (SWIFT): Please clarify that the deferral of principal and interest is one of three options for SWIFT financing, the other two being subsidized loan interest rates and Board Participation.

SUSAN K. ROTH, P.E., PMP

WATER AND WASTEWATER CONSULTING

December 20, 2015

Lann Bookout
Project Manager
Texas Water Development Board
1700 North Congress Avenue
Austin, Texas 78711

Subject: **FHLM Regional Water Facility Study – Response to TWDB Comments on Final Draft Report**

Dear Lann:

In response to the TWDB review comments (dated October 9, 2015) on the Final Draft Report for the FHLM Regional Water Facility Study, please reference the attached memorandum. The review comments, where applicable, have been addressed and incorporated into the final report.

It has been a pleasure working with you and TWDB on this important study for project participants in the FHLM Counties. Please feel free to call at (512) 796-6692 or email me at susan@srothconsulting.com if you have any questions.

Sincerely,



Susan K. Roth, P.E., PMP
President
Susan Roth Consulting, LLC

Memorandum

FHLM Regional Water Facility Study: Response to TWDB Review Comments on Final Draft Report

FROM: Susan K. Roth, P.E. (Susan Roth Consulting, LLC)
DATE: December 20, 2015

SECTION 1

Comment #1 1.0 Executive Summary: Please include a table that indicates the total capital cost of each proposed project alternative, as included in the detailed cost summaries in Section 7.5.

Response: Added Table 1-3: Capital Cost Summary for All Alternatives to Section 1.5 on page 1-8.

Comment #2 1.4 Determination of Alternatives: From the description of the blending alternative here and in 6.3.1, it is not clear that the source for blending will be from a separate new source, different from the current supply (which has the arsenic contamination). Please consider adding language to clarify this.

Response: In Section 1.4, page 1-5, the text was revised to clarify that blending water for the northern alternative would come from a new well drilled in McLennan County in the portion of the Trinity Aquifer that does not have arsenic issues; the blending water for the southern alternative would be obtained contractually from the City of Robinson RO WTP, which receives its water from the Brazos River. In Section 6.3.1, page 6-3, the text was revised to clarify the southern alternative blending water would be obtained contractually from the City of Robinson RO WTP, which receives its water from the Brazos River. In Section 6.4, page 6-19, text was revised to clarify the northern alternative blending water would come from the Trinity Aquifer. In Section 6.5.1, page 6-24, the text was revised to clarify that the blending water for the northern alternative would come from a new well drilled in McLennan County in the portion of the Trinity Aquifer that does not have arsenic issues; the blending water for the southern alternative would be obtained contractually from the City of Robinson RO WTP, which receives its water from the Brazos River.

SECTION 2

Comment #1 2.1 Project Background: To clarify TWDB's status as a non-regulatory funding agency at the top of page 2-3, please consider an edit such as, "Following the study,

the participants along with other regulatory and funding agencies (TCEQ, TWDB, and USEPA)[...].”

Response: Text has been revised to incorporate requested revision on page 2-3.

Comment #2 Fig. 2-1: Please specify the aquifer used by each participating entity.

Response: Figure 2-1, page 2-5, has been revised to include the aquifer and/or surface water source for each participating entity.

SECTION 4

Comment #1 Section 4, General: Where practicable, please consider expanding on the sources and uses of local information in development of the study’s population and demand projections.

Response: Text has been expanded in Section 4 to provide further explanation of sources and local information used to develop the study’s population and demand projections.

Comment #2 4.1 Population Projections: Please clarify how the information was obtained on build-out of entity service areas and how it was incorporated into the population projections, if at all.

Response: Text has been expanded on page 4-1 to address this review comment.

Comment #3 Fig. 4-1 to 4-4: Please double-check that these figures are accurately titles (the titles say “Population Density” but they appear to illustrate population projections) and consider labeling the counties on these maps.

Response: For Figures 4-1 to 4-4, titles have been changed to say “Population Density” and county lines and titles have been added.

Comment #4 Table 4-2: Please clarify the methodology employed for population projections. It is currently unclear how each entity’s growth rates were determined based on the tables in Appendix B and explanation on page 4-6.

Response: On page 4-6, the text has been expanded to further explain the methodology and calculation of the population projections in the tables on page 4-6 and Appendix B.

SECTION 5

Comment #1 Figure 5-1: Please update or replace this map with a higher-resolution copy (entity names are not legible).

Response: Figure 5-1 on page 5-7 has been updated to be more legible.

Comment #2 Figure 5-20: Please consider re-naming this graph to clarify that it refers to the Desired Future Conditions established by GMA 8.

Response: Figure 5-20, page 5-18, has been re-named “Figure 5-20: Groundwater Elevations in the Trinity Aquifer (per the Desired Future Conditions established by GMA 8)”.

SECTION 6

Comment #1 6.0 Development of Regional Alternatives: To help the reader keep track of which entities are included in each alternative, please consider adding a simple table summarizing each alternative’s participants.

Response: Table 6-2 in Section 6.5, page 6-23, summarizes which project participants are included in each final alternative.

Comment #2 6.3.4 New Surface Water Treatment Plant: Please consider specifying what potential new reservoir this alternatives would utilize and briefly discussing any obstacles (permitting, etc.) that might impact its feasibility due to the study participants’ available timeframes.

Response: In Section 6.3.4, page 6-4, text was added to describe any obstacles that might be encountered due to the construction of the new reservoir.

SECTION 8

Comment #1 8.0 Potential Funding Sources: Please correct the reference to “Brazoria County Regional Water System” on page 8-1.

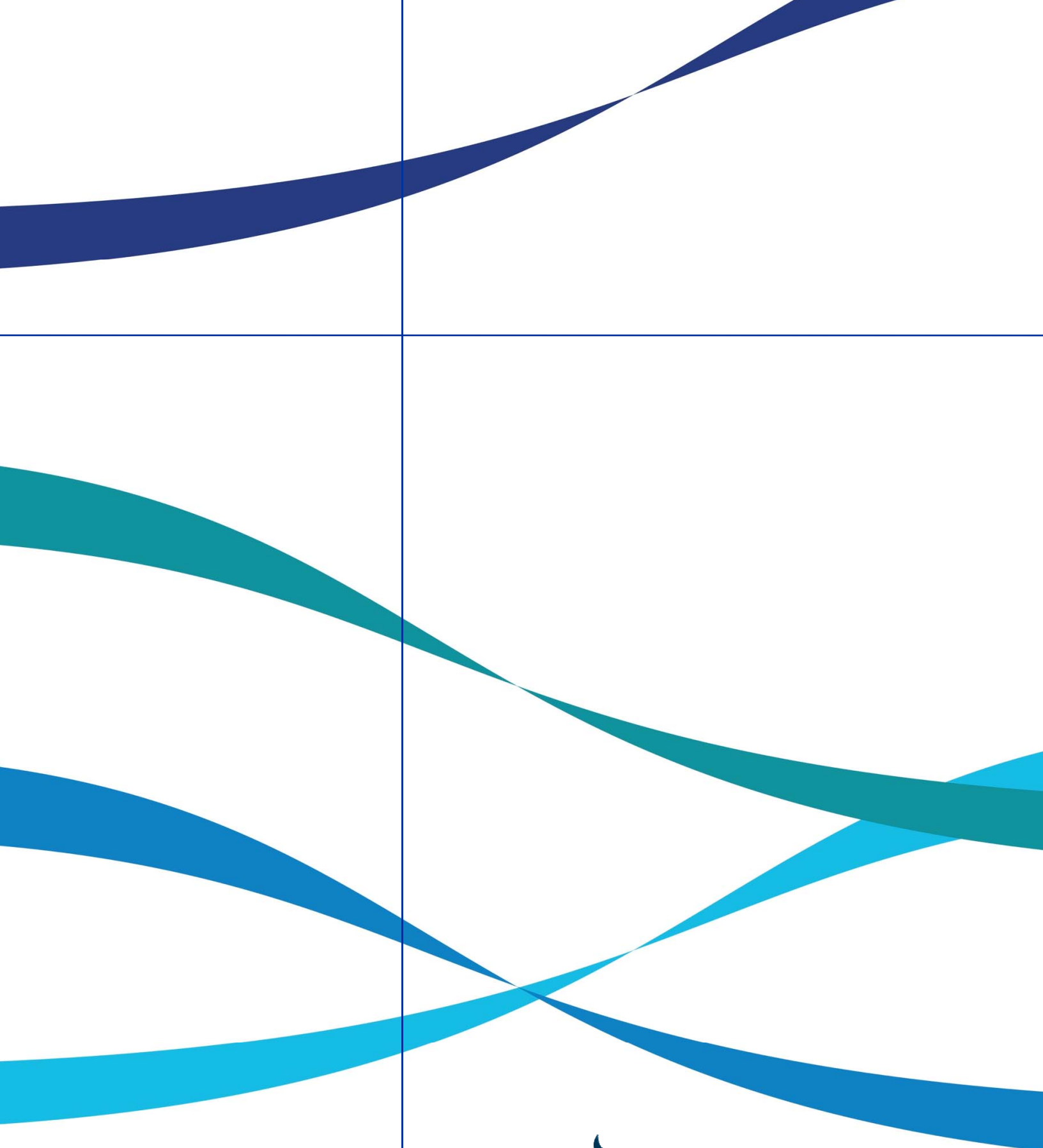
Response: Text has been revised on page 8-1 to address this review comment.

Comment #2 8.1.1.2 State Loan Program (Development Fund II): To ensure the audience can find program information more easily, please use the name “Texas Water Development Fund (DFund)” to match references on the TWDB website.

Response: Text has been revised in Section 8.1.1.2 on page 8-3 to address this review comment.

Comment #3 8.1.1.4 State Water Implementation Fund for Texas (SWIFT): Please clarify that the deferral of principal and interest in one of three options for SWIFT financing, the other two being subsidized loan interest rates and Board Participation.

Response: Text has been expanded in Section 8.1.1.4 on page 8-3 to address this review comment.



SUSAN ROTH
water and wastewater consulting