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Water Conservation Plan

City of Fort Worth

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1.0 INTRODUCTION AND OBJECTIVE

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development of North Central Texas have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely already developed. Additional supplies to meet future demands will be expensive and difficult to secure. Severe drought conditions in recent years have highlighted the importance of the efficient use of our existing supplies to make them last as long as possible. Extending current supplies will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of water conservation plans.[1] The TCEQ guidelines and requirements are included in Appendix B. The City of Fort Worth has developed this water conservation plan in accordance with TCEQ guidelines and requirements. To develop a regional approach, Tarrant Regional Water District's Water Conservation and Drought Contingency Plan[2], of whom the City of Fort Worth is a customer, was consulted. This Water Conservation Plan replaces the previous plan dated March 2009.

The City of Fort Worth also recognizes that in order to achieve its goals of maximizing water conservation and efficiency, it is necessary to develop and implement a water conservation plan that goes beyond basic compliance with TCEQ guidelines and requirements. This plan reflects the City of Fort Worth's commitment to enhanced water conservation and efficiency strategies – particularly those best management practices established by the Water Conservation Implementation Task Force[3], which were incorporated, where practicable, in the development of these water conservation measures. The Water Conservation Implementation Task Force developed the Texas Water Development Board Report 362 Water Conservation Best Management Practices Guide in partial fulfillment of the Texas Legislature's charge to the TCEQ and Texas Water Development Board (TWDB) to develop recommendations for optimum levels of water use efficiency and conservation in the State.

[1] Superscripted numbers match references listed in Appendix A

The objectives of this Water Conservation Plan are as follows:

- To reduce water consumption from the levels that would prevail without conservation efforts.
- To reduce the loss and waste of water.
- To improve efficiency in the use of water.
- Encourage efficient outdoor water use.
- To document the level of recycling and reuse in the water supply.
- To extend the life of current water supplies by reducing the rate of growth in demand.

The City's plan will achieve significant conservation savings to help extend the life of existing supplies without burdening the customer with unnecessary additional costs.

2.0 TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

2.1 TCEQ RULES GOVERNING CONSERVATION PLANS

The TCEQ rules governing development of water conservation plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a water conservation plan is defined as "A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water." The elements in the TCEQ water conservation rules covered in this conservation plan are listed below.

Minimum Conservation Plan Requirements

The minimum requirements in the Texas Administrative Code for Water Conservation Plans for Public Water Suppliers are covered in this report as follows:

- 288.2(a)(1)(A) – Utility Profiles – Section 3.0 and Appendix C
- 288.2(a)(1)(B) – Record Management System – Section 5.2
- 288.2(a)(1)(C) – Specific, Quantified Goals – Section 4.0
- 288.2(a)(1)(D) – Accurate Metering – Section 5.2
- 288.2(a)(1)(E) – Universal Metering – Section 5.2
- 288.2(a)(1)(F) – Determination and Control of Water Loss – Section 5.2 and 5.3
- 288.2(a)(1)(G) – Public Education and Information Program – Section 6.1
- 288.2(a)(1)(H) – Non-Promotional Water Rate Structure – Section 6.2
- 288.2(a)(1)(I) – Reservoir System Operation Plan – Section 6.3
- 288.2(a)(1)(J) – Means of Implementation and Enforcement – Section 6.4
- 288.2(a)(1)(K) – Coordination with Regional Water Planning Groups – Section 6.6 and Appendix D
- 288.2(c) – Review and Update of Plan – Section 8.0

Conservation Additional Requirements (Population over 5,000)

The Texas Administrative Code includes additional requirements for water conservation plans for drinking water supplies serving a population over 5,000:

- 288.2(a)(2)(A) – Leak Detection, Repair, and Water Loss Accounting – Section 5.3
- 288.2(a)(2)(B) – Requirement for Water Conservation Plans by Wholesale Customers – Section 6.5

Additional Conservation Strategies

The Texas Administrative Code lists additional conservation strategies, which may be adopted by suppliers but are not required. Additional strategies adopted by the City of Fort Worth include the following:

- 288.2(a)(3)(A) – Conservation Oriented Water Rates – Section 6.2
- 288.2(a)(3)(B) – Ordinances, Plumbing Codes or Rules on Water-Conserving Fixtures – Section 7.1
- 288.2(a)(3)(D) – Reuse and Recycling of Wastewater – Section 7.2
- 288.2(a)(3)(F) – Considerations for Landscape Water Management Regulations – Section 7.3

In addition to being a public water supplier under TCEQ rules, the City of Fort Worth also acts as a wholesale provider to thirty one wholesale customers; thus, the TCEQ water conservation rules for wholesale providers are also addressed.

The TCEQ rules governing development of water conservation plans for wholesale water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.5 of the Texas Administrative Code, which is included in Appendix B. The elements in the TCEQ water conservation rules for wholesale water suppliers addressed in this Water Conservation Plan are listed below.

Minimum Conservation Plan Requirements for Wholesale Water Suppliers

The minimum requirements in the Texas Administrative Code for water conservation plans for wholesale water suppliers are covered in this Plan as follows:

- 288.5(1)(A) – Description of Service Area – Section 3.0 and Appendix C
- 288.5(1)BC) – Specific, Quantified Goals – Section 4.0
- 288.5(1)(C) – Measure and Account for Water Diverted – Section 5.1
- 288.5(1)(D) – Monitoring and Record Management System – Section 5.2
- 288.5(1)(E) – Program of Metering and Leak Detection and Repair – Section 5.3
- 288.5(1)(F) – Requirement for Water Conservation Plans by Wholesale Customers – Section 6.5
- 288.5(1)(G) – Reservoir System Operation Plan – Section 6.3
- 288.5(1)(H) – Means of Implementation and Enforcement – Section 6.4
- 288.5(1)(I) – Documentation of Coordination with Regional Water Planning Groups – Section 6.6
- 288.5(3) – Review and Update of Plan – Section 8.0

Additional Conservation Strategies for Wholesale Water Suppliers

The Texas Administrative Code lists additional water conservation strategies that can be adopted by a wholesale supplier but are not required. Additional strategies adopted by the City of Fort Worth include the following:

- 288.5(2)(C) – Program for Reuse and/or Recycling – Section 7.2

- 288.5(2)(D) – Other Measures - Section 6.1 (public education), and Sections 7.3 (landscape water management measures)

2.2 GUIDANCE AND METHODOLOGY FOR REPORTING ON WATER CONSERVATION AND WATER USE

In addition to TCEQ rules regarding water conservation, this plan also incorporates elements of the Guidance and Methodology for Reporting on Water Conservation and Water Use developed by TWDB and TCEQ, in consultation with the Water Conservation Advisory Council (the "Guidance").[4] The Guidance was developed in response to a charge by the 82nd Texas Legislature to develop water use and calculation methodology and guidance for preparation of water use reports and water conservation plans in accordance with TCEQ rules. The City of Fort Worth has considered elements of the Guidance in preparation of this Plan.

3.0 DESCRIPTION OF SERVICE AREA AND UTILITY PROFILE

The City of Fort Worth provides retail water and sewer service to approximately 770,000 residents and wholesale water service to 30 wholesale customers listed below. Service through wholesale customers accounts for approximately 350,000 additional residents. In total, Fort Worth provides water directly or indirectly to over 1.1 million people in Tarrant, Denton, Johnson, Parker and Wise counties. Figure 3-1 shows Fort Worth's water service area. Fort Worth's wholesale customers include:

- Aledo
- Bethesda WSC
- Burleson
- Crowley
- DFW Airport
- Dalworthington Gardens
- Edgecliff Village
- Everman
- Forest Hill
- Grand Prairie
- Haltom City
- Haslet
- Hurst
- Keller
- Kennedale
- Lake Worth
- North Richland Hills
- Northlake
- Richland Hills
- River Oaks
- Roanoke
- Saginaw
- Sansom Park
- Southlake
- Trophy Club MUD #1
- Trinity River Authority (TRA)
- Westlake
- Westover Hills
- Westworth Village
- White Settlement

The City purchases raw water from the Tarrant Regional Water District (TRWD). This water is from five major sources, as seen in Figure 3-2:

1. The West Fork of Trinity River via Lake Bridgeport, Eagle Mountain Lake and Lake Worth;
2. Clear Fork of the Trinity River via Lake Benbrook; (A pipeline connects Lake Benbrook to the Rolling Hills Water Treatment Plant to supplement supply to that plant. A pump station on the Clear Fork of the Trinity River also supplies the Holly Water Treatment Plant.)
3. Cedar Creek Reservoir, located approximately 75 miles southeast of Fort Worth; and
4. Richland-Chambers Reservoir, located approximately 75 miles southeast of Fort Worth.

FIGURE 3-1: FORT WORTH'S WATER SERVICE AREA

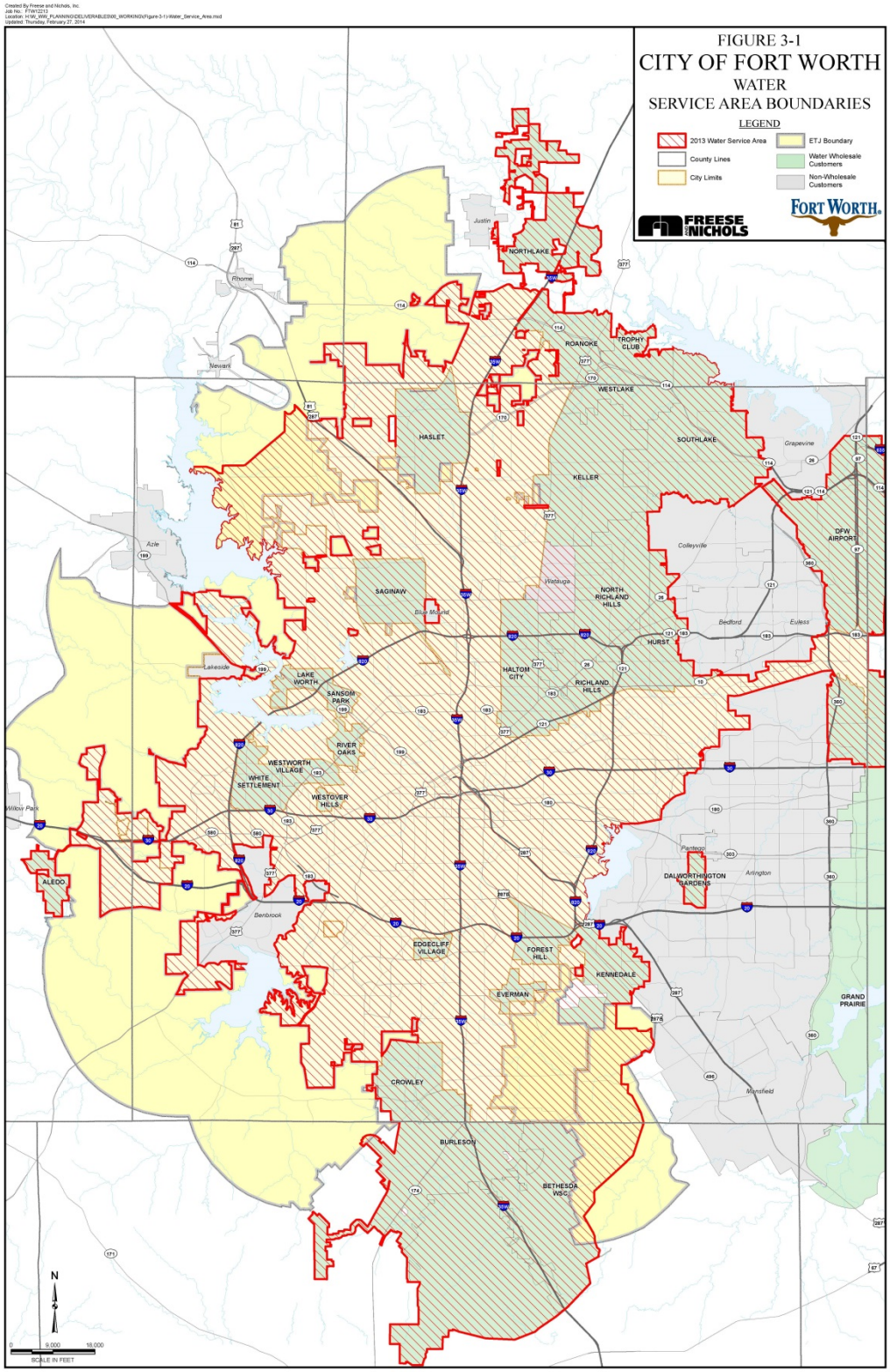
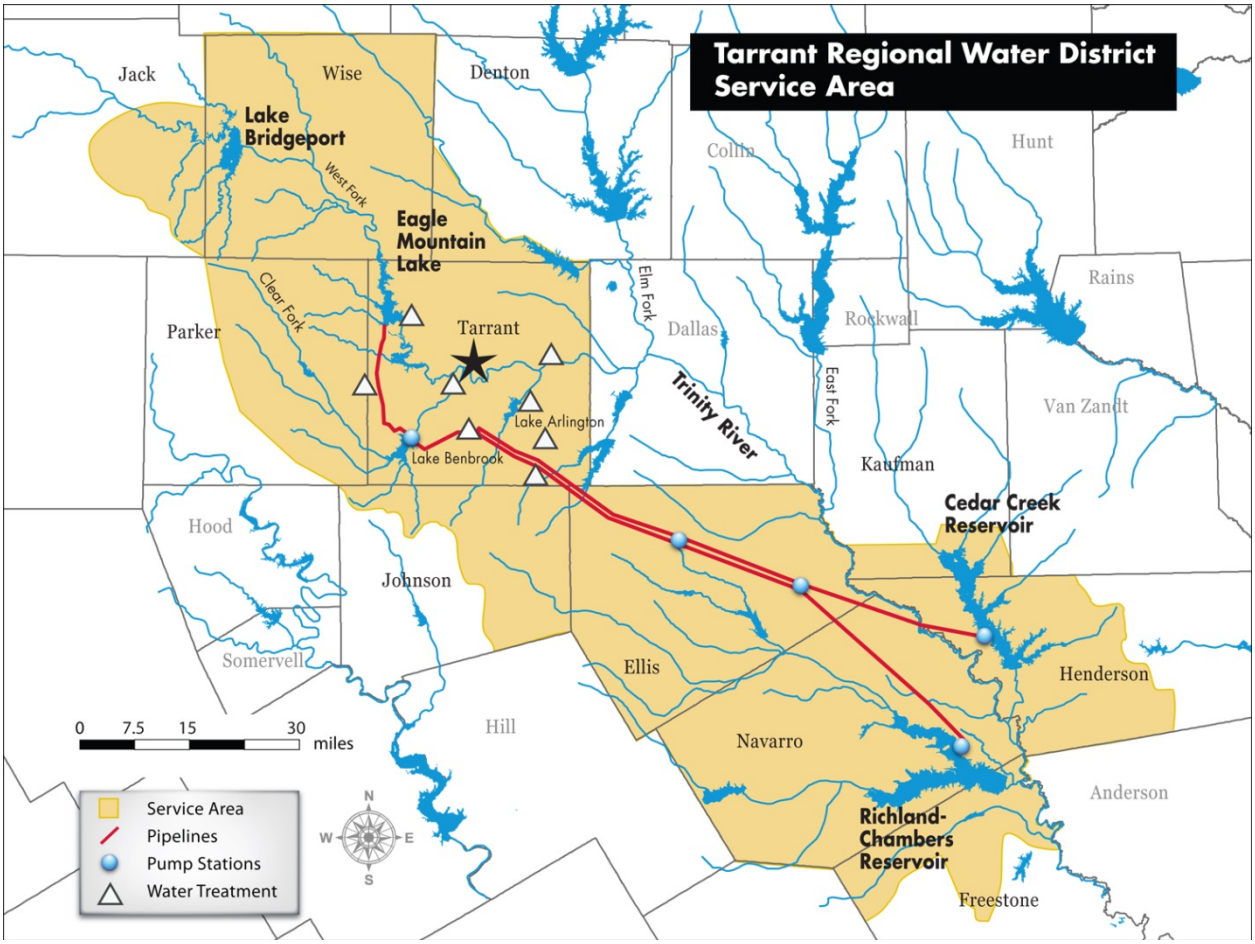


FIGURE 3-2: TARRANT REGIONAL WATER DISTRICT SUPPLY SOURCES



The City's service area is currently served by five water treatment plants. As of 2012, the total treatment capacity is 497 million gallons per day (MGD). A breakdown of treatment capacity by plant is provided in Table 3-1 below.

TABLE 3-1: 2012 TREATMENT PLANT CAPACITY

Treatment Plant	Design Capacity (MGD)	Reliable Pumping Capacity (MGD)
Rolling Hills, est. 1972	200	190
North Holly, est. 1918	80	75
South Holly, est. 1952	100	95
Eagle Mountain, est. 1992	105	100
Westside, est. 2012	12	12
Total	**497**	**472**

The City has a wastewater treatment capacity of 166 million gallons per day (MGD) at the Village Creek Water Reclamation Facility in east Fort Worth.

Appendix C contains Fort Worth's most recent water utility profiles based on the formats recommended by TCEQ for both retail suppliers and wholesale suppliers.

4.0 SPECIFICATION OF WATER CONSERVATION GOALS

TCEQ rules require the adoption of specific water conservation goals for a water conservation plan. The goals for this water conservation plan include the following:

- Maintain the 5-year moving average total per capita water use below specified amount in Table 4-2.
- Maintain the level of water loss in the system below the specified amount in Table 5-3.
- Maintain the Infrastructure Leakage Index (ILI), as described in Section 5.3, below the specified amount in Table 5-3.
- Implement and maintain a program of universal metering and meter replacement and repair as discussed in Section 5.2.
- Increase efficient water usage and decrease waste in lawn irrigation by enforcement of landscape water management regulations as described in Section 7.3.
- Raise public awareness of water conservation and encourage responsible public behavior by a public education and information program as discussed in Section 6.1.

In the previous (2009) plan, total per capita use goals were 179 gpcd by 2015 and 170 gpcd by 2020 as outlined in Table 4-1 below. As of 2014, Fort Worth's five year average per capita use was 171 gpcd. This illustrates achieved conservation savings significantly ahead of the 2015 goal and very near to the year 2020 goal.

TABLE 4-1: PREVIOUS PLAN GPCD GOALS (2009)

Description	Units	2008	2015	2020
Total GPCD [a]	GPCD	192	179	170
Residential GPCD [b]	GPCD	93.10	87	83

a. Total GPCD = (Total Gallons in System ÷ Permanent Population) ÷ 365
b. Residential GPCD = (Gallons Used for Residential Use ÷ Residential Population) ÷ 365

As such, the 2020 and 2025 goals have been revised to reflect increased conservation as a result of measures included in this plan. Fort Worth has developed goals based on the recommendations of the Texas Water Conservation Implementation Task Force, which suggests a 1% reduction in gallons per capita per day per year. The current specific goals are outlined in Table 4-2. These goals were developed assuming a five year average per capita, and therefore some (dry) years will see higher per capita usage than these five year average goals. A series of dry years may lead to an average exceeding the goal. Figure

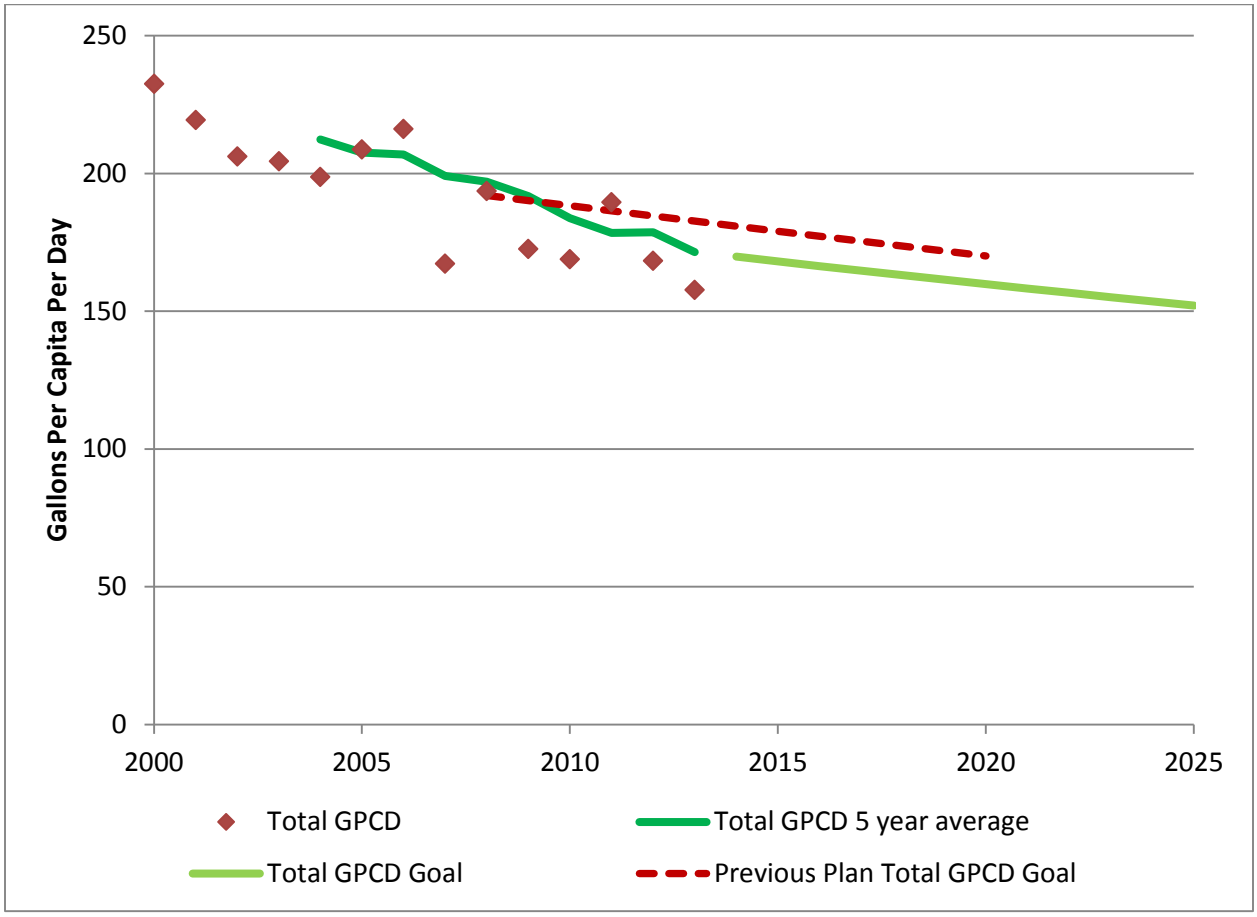
4-1 shows the total annual per capita since 2000, the five year average and the comparison between the previous goal and current goal.

TABLE 4-2: GPCD GOALS (2014)

Description	Units	2013	2020	2025
Total GPCD [a]	GPCD	171	160	152
Residential GPCD [b]	GPCD	81	76	72

c. Total GPCD = (Total Gallons in System ÷ Permanent Population) ÷ 365
d. Residential GPCD = (Gallons Used for Residential Use ÷ Residential Population) ÷ 365

FIGURE 4-1: FORT WORTH TOTAL PER CAPITA USE AND GOALS



4.1 ANALYSIS OF BEST MANAGEMENT PRACTICES

During each update of the Water Conservation Plan the City has evaluated the best management practices outlined in the Water Conservation Best Management Practices Guide[3]. For a complete analysis of the Best Management Practices (BMPs), refer to Tables 4-3 and 4-4 on the following pages. Table 4-3 looks at the implementation of the BMP's for the practices the City has implemented and the proposed implementation date for additional strategies. Table 4-4 looks at the potential savings in 2020 and 2025, the proposed cost in 2020 and 2025, the cost per thousand gallons, whether the practice will have an impact to revenues (low, medium or high) and whether the practice has other benefits such as additional supply sources, revenue recovery or education component.

It should also be noted that the Water Conservation Advisory Council is reviewing and updating these BMP's. At this point the Water Conservation Advisory Council has approved four BMPs for wholesale water providers.

1. Customer Contract Requirement for Water Conservation Plans and Drought Contingency Plans – It is a requirement of this plan that Fort Worth's wholesale customers complete water conservation plans and submit them to state agencies as well as the City of Fort Worth for review.

2. Technical Assistance and Outreach – The City holds regular meetings with its wholesale customers to update them on programs the City is implementing. Water conservation staff is available for wholesale customers to contact regarding their programs and to assist wholesale customers with implementing their own programs.

3. Wholesale Supplier Collective Purchase and Direct Distribution of Water Conservation Equipment – Since the City is both a retail and wholesale provider, it has conducted rebate and retrofit programs for retail customers. At this time the City does not intend to offer a collective purchase or direct distribution program for its wholesale customers.

4. Coordination with Customers on Cost Sharing Programs – While the City does not formally have a cost sharing program with its wholesale customers, the City does participate in the Water Efficiency Network of North Texas that organizes cooperative buying programs across the region.

TABLE 4-3: WATER CONSERVATION BEST MANAGEMENT PRACTICES IMPLEMENTATION SCHEDULE

BMP	Description	Implementation Schedule				
		Currently Implemented	Implemented By Code	Implemented before 2015	Implemented before 2020	Implemented before 2025
1	System Water Audit and Water Loss	2002				
2	Water Conservation Pricing	1994				
3	Prohibition on Wasting Water	1994				
4	Plumbing Code Showerhead, Aerator and Toilet Flapper Retrofit		1992			
4a	Additional Showerhead, Aerator and Toilet Flapper Retrofit Program			✓		
5	Plumbing Code Residential Toilet Replacement Programs		2014			
5a	Additional Residential and Commercial Toilet Replacement Programs	2009				
6	Residential Clothes Washer Incentive Program		1992			
6a	Additional Residential Clothes Washer Incentive Programs				✓	
7	School Education	1990				
8	Water Survey for Single-Family and Multi-Family Customers	2007 Irrigation Audits				
9	Landscape Irrigation Conservation and Incentives	2003				
10	Water Wise Landscape Design and Conversion Programs				✓	
11	Athletic Field Conservation	2006				
12	Golf Course Conservation				✓	
13	Metering of All New Connections and Retrofit of Existing Connections	1980				
14	Wholesale Agency Assistance Programs			✓		
15	Conservation Coordinator	1990				
16	Water Reuse	1999				
17	Public Information	1983				
18	Rainwater Harvesting and Condensate Reuse					✓
19	New Construction Graywater					✓
20	Park Conservation				✓	

BMP	Description	Implementation Schedule				
		Currently Implemented	Implemented By Code	Implemented before 2015	Implemented before 2020	Implemented before 2025
21	Conservation Programs for Industrial, Commercial, and Institutional Accounts	2010				
22	Cost-Effectiveness Analysis for Municipal Water Users					✓
	Twice Per Week Watering Schedule				✓	
	Landscape Ordinance				✓	

TABLE 4-4: BEST MANAGEMENT PRACTICE COST-EFFECTIVENESS ESTIMATES

BMP Number	Description	Estimates of Current Costs and Savings						Rank for Expenditure	Potential Impact to Water Revenues	Other Benefits Achieved
		Estimated Savings		Estimated Costs		Cost Per Thousand Gallons				
		2020 (MGD)	2025 (MGD)	2020 ($ per Year)	2025 ($ per Year)	2020	2025			
	Plumbing Code*									
	Showerhead, Aerator and Toilet Flapper Retrofit	0.00	0.00	$0	$0	N/A	N/A	PL Code	Low	No
	Residential Toilet Replacement Programs	0.00	0.00	$0	$0	N/A	N/A	PL Code	High	No
	Residential Clothes Washer Incentive Programs	0.00	0.00	$0	$0	N/A	N/A	PL Code	High	No
	Necessary Programs - No Associated Savings									
14	Wholesale Agency Assistance Programs	0.00	0.00	$50,000	$50,000	N/A	N/A		High	Yes
15	Conservation Coordinator	0.00	0.00	$85,000	$95,000	N/A	N/A		Medium	Yes
17	Public Information BMP	0.00	0.00	$100,000	$100,000	N/A	N/A		Low	Yes
	Programs Not Recommended (RWPG)									
18	Rainwater Harvesting and Condensate Reuse	0.00	0.00	$0	$0	N/A	N/A		Low	No
19	New Construction Graywater BMP	0.00	0.00	$0	$0	N/A	N/A		Medium-High	No
	Cost for Existing and Additional Programs**									
	Twice per Week Watering Schedule	3.70	4.06	$100,000	$110,000	$0.07	$0.07	1	High	Yes
	Residential Landscape Ordinance	1.00	2.00	$60,000	$70,000	$0.16	$0.10	2	Low	No
2	Water Conservation Pricing*	0.56	0.97	$60,000	$70,000	$0.29	$0.20	3	Medium	No
3	Prohibition on Wasting Water	0.50	0.50	$60,000	$70,000	$0.33	$0.38	4	Medium	No

BMP Number	Description	Estimates of Current Costs and Savings						Rank for Expenditure	Potential Impact to Water Revenues	Other Benefits Achieved
		Estimated Savings		Estimated Costs		Cost Per Thousand Gallons				
		2020 (MGD)	2025 (MGD)	2020 ($ per Year)	2025 ($ per Year)	2020	2025			
8	Water Survey for Single-Family and Multi-Family Customers (Irrigation Audit)	0.25	0.25	$40,000	$50,000	$0.44	$0.55	5	Medium	Yes
1	System Water Audit and Water Loss (Leak Detection Repair)	3.00	5.00	$800,000	$880,000	$0.73	$0.48	6	Low	Yes
	Intensified Water Loss and Water Line Replacement Program	4.50	6.00	$1,200,000	$1,320,000	$0.73	$0.60	6	Low	Yes
10	Water Wise Landscape Irrigation Conservation and Incentives	0.50	0.50	$200,000	$200,000	$1.10	$1.10	8	Low	No
9	Landscape Irrigation Conservation and Incentives	1.00	1.00	$400,000	$400,000	$1.10	$1.10	8	Medium	No
5	Additional Residential Toilet Replacement Programs	1.10	1.21	$450,000	$495,000	$1.12	$1.12	10	High	No
7	School Education	3.35	4.27	$150,000	$200,000	$1.14	$1.02	11	Low	Yes
6	Additional Residential Clothes Washer Incentive Programs	0.10	0.11	$50,000	$100,000	$1.37	$2.49	12	Medium	No
20	Park Conservation BMP	0.50	0.50	$250,000	$250,000	$1.37	$1.37	12	Low	No
12	Golf Course Conservation	0.50	0.50	$250,000	$250,000	$1.37	$1.37	12	Low	No
11	Athletic Field Conservation	0.80	0.80	$400,000	$400,000	$1.37	$1.37	12	Low	No
16	Water Reuse	30.15	30.15	$20,000,000	$20,000,000	$1.82	$1.82	16	Medium	Yes
4	Additional Showerhead, Aerator and Toilet Flapper Retrofit	0.10	0.10	$75,000	$75,000	$2.05	$2.05	17	Low	No

BMP Number	Description	Estimates of Current Costs and Savings						Rank for Expenditure	Potential Impact to Water Revenues	Other Benefits Achieved
		Estimated Savings		Estimated Costs		Cost Per Thousand Gallons				
		2020 (MGD)	2025 (MGD)	2020 ($ per Year)	2025 ($ per Year)	2020	2025			
21	Conservation Programs for Industrial, Commercial and Institutional Accounts	0.22	0.24	$250,000	$275,000	$2.35	$2.59	18	Medium	Yes
13	Metering of all New Connections and Retrofit of Existing Connections	0.50	0.50	$500,000	$500,000	$2.74	$2.74	19	Low	Yes

* Based on *2016 Region C Water Plan*

** Based on savings and cost data from City of Fort Worth or published literature

5.0 METERING, WATER USE RECORDS, CONTROL OF UNACCOUNTED WATER, AND LEAK DETETECTION AND REPAIR

One of the key elements in water conservation is careful tracking of water use and control of losses. Programs for universal metering, meter testing, meter repair, and periodic meter replacement have been developed using American Water Works Association (AWWA) standards and are important elements in the City of Fort Worth's program to control losses.

5.1 PRACTICES TO MEASURE AND ACCOUNT FOR THE AMOUNT OF WATER DIVERTED FROM TRWD

Water deliveries from TRWD are metered by TRWD using meters with accuracy of at least ±5%. TRWD can access the meters at all reasonable times, and meters are calibrated to maintain the required accuracy.

5.2 MONITORING AND RECORD MANAGEMENT PROGRAM FOR DETERMINING DELIVERIES, SALES AND LOSSES

The City has an effective record management system in place. As required by TAC Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 (a)(2)(B), Fort Worth's record management system allows for the separation of water sales and uses into residential, commercial, municipal, and industrial categories. This information is included in the TCEQ required Water Conservation Implementation report, as described in Section 6.4.

The City of Fort Worth meters all of the connections in the distribution system. Meters range in size from 3/4" to 16". The meter size distribution is included in Table 5-1 below. All meters met AWWA accuracy standards when installed. In 2012, there were a total of 227,837 active retail customer meters in the City.

TABLE 5-1: METER SIZE DISTRIBUTION

Meter Size	Total Number
3/4"	193,240
1"	24,336
1 1/2"	3,608
2"	5,383
3"	684
4"	308
6"	199
8"	56
10"	22
12"	0
16"	1

The City has implemented a meter exchange program that provides for the annual replacement of meters in the system that do not register the correct amount of water flowing through them. This program has replaced more than 30,000 meters over the past five years.

5.3 LEAK DETECTION, REPAIR AND WATER LOSS ACCOUNTING

The system water audit is used annually to monitor the total level of non-revenue water. There are many variables which influence the revenue and non-revenue components of the City's water system including meter inaccuracy, data discrepancies, unauthorized consumption, reported breaks and leaks and unreported losses.

The City of Fort Worth uses gallons per connection per day as its preferred water loss metric as it is less variable than other metrics to climatic conditions. In the previous plan, water loss (gallons per connection per day) was 110 with a goal of 95 by 2015 and 75 by 2020 (Table 5-2). Due to the City's water loss reduction program, as of 2012, the City has reached 76 gallons of water loss per connection per day (Table 5-3). This is significantly ahead of the 2015 goal and nearly to the 2020 goal.

The Texas Water Development Board has also asked that cities begin to include their water loss in gallons per capita per day and as a percentage of the total water use in the system. These are additional performance indicators that can be used to determine the effectiveness of the water. The City will continue to reduce water losses throughout the system by analyzing and updating the targets and goals of this section annually in conjunction with the water audit.

TABLE 5-2: PREVIOUS PLAN WATER LOSS GOALS (2009)

Description	Units	2008	2015	2020
Water loss	Gallons/connection per day	110	95	75

TABLE 5-3: WATER LOSS GOALS (2014)

Description	Units	2012	2020	2025
Water Loss GPCD [c]	GPCD	27	25	23
Water Loss Percentage [d]	%	13%	12%	10%
Water Loss Per Connection	Gallons/connection per day	76	72.5	70
Real losses	ILI	4.08	3.75	3.5

a. Total GPCD = (Total Gallons in System ÷ Permanent Population) ÷ 365
b. Residential GPCD = (Gallons Used for Residential Use ÷ Residential Population) ÷ 365
c. Water Loss GPCD = (Total Water Loss ÷ Permanent Population) ÷ 365
d. Water Loss Percentage = (Total Water Loss ÷ Total Gallons in System) x 100; or (Water Loss GPCD ÷ Total GPCD) x 100

The Infrastructure Leakage Index (ILI) is a calculation of the theoretical lowest leakage possible divided by existing calculated leakage. This is developed as a unique value for every city and includes variables such as the distance from the curb stop to the meter boxes, the pressure in the system, and the number of service lines or connections per mile of main. Within Fort Worth, the theoretical lowest leakage is approximately 3 million gallons per day. This is the theoretical lowest leakage currently possible with the existing infrastructure and service connection density.

Fort Worth has an ILI of approximately 4.08, which means that theoretically the leakage could be reduced 4.08 times before reaching the lowest possible value. This puts Fort Worth in the average zone of ILIs within the United States. The City will continue to reduce leaks in the system through its state-of-the-art technologies that employ acoustic leak-noise detectors to target and locate suspected leaks. Its leak detection program includes continuously monitoring almost 230,000 linear feet of pipe in critical areas, as well as surveying over 2.5 million linear feet annually. Leaks detected and repaired through this program were estimated to have saved over 350 million gallons of water in fiscal year 2013. In addition, the City will continue to encourage customers and field operators to report visual leakage.

The City has also piloted District Metered Areas (DMAs) which are part of current Best Management Practice leakage control zones. DMAs are discrete metered areas within the distribution system, usually supplying 1,000 to 3,000 properties. The City has studied pressure surges within the system and will continue to review the possibilities of pressure control in pilot zones within the city limits. This will be conducted in combination with the water-loss control measures developed within the main pressure zones such as District Metered Areas (DMAs).

6.0 OTHER REQUIRED CONSERVATION MEASURES

6.1 PUBLIC EDUCATION AND INFORMATION

The City of Fort Worth has an active, comprehensive water conservation public education program in place. The City coordinates with Tarrant Regional Water District (TRWD) to provide a regionally consistent message on the importance of water conservation.

The City has established a representative Customer Advisory Committee to promote community awareness of the City's conservation efforts. The Committee is also responsible for reviewing, assessing and providing direction for all of the City's conservation programs. The committee includes customers from residential, commercial, industrial, institutional, irrigators, and wholesalers. Under direction of this Committee, important components of the City's current program include:

- Brochure distribution.
- Over 2.7 million water bill inserts annually.
- Notification of local organizations, schools, and civic groups that the City of Fort Worth staff is available to make presentations on the importance of water conservation and ways to save water. In 2012, the City participated in 47 community events and provided support for displays, exhibits and presentations in the community on water conservation reaching over 11,300 people.
- Water conservation information on Fort Worth's website (fortworthtexas.gov, savefortworthwater.org).
- Encouragement of local media coverage of water conservation issues and the importance of water conservation.
- Education programs not only for schools within the Fort Worth Independent School District, but also for schools within the 13 other districts which operate within the wholesale customer boundaries. The program targets elementary and reached more 23,000 students in 2012.

6.2 WATER RATE STRUCTURE

The City of Fort Worth has conservation-oriented water rate structures in place. The City's current rate structure consists of the following six classes:

- Residential
- Commercial
- Industrial

- Super User
- Irrigation
- Gas Well Use

Each customer is first charged a flat rate based on meter size as outlined in Table 6-1. Usage charges are then assessed according to customer class as show in Table 6-2 to Table 6-7. An increasing block rate structure is in place for residential and irrigation classes to encourage water conservation. The City analyzes each customer class and sets rates in proportion to those classes which place the most demands upon the water system. The rates shown in the tables below were effective as of January 1, 2014 and are subject to change as the City continues to refine its rate structures to improve the impact on water conservation and manage the cost of service most effectively.

TABLE 6-1: MONTHLY METER CHARGES

Meter Size	Service Charge
5/8" or ¾"	$9.00
1"	$14.75
1½"	$26.00
2	$29.50
3	$93.50
4	$161.25
6	$345.00
8	$596.75
10	$911.25

TABLE 6-2: RESIDENTIAL WATER RATES

First 8 CCF	**$1.97 per CCF**
8 CCF to 20 CCF	**$2.80 per CCF**
20 CCF to 30 CCF	**$3.55 per CCF**
Above 30 CCF	**$4.40 per CCF**

Note: 1 CCF (hundred cubic feet) = 748.05 gallons

TABLE 6-3: COMMERCIAL WATER RATES

All volumes	**$2.30 per CCF**

TABLE 6-4: INDUSTRIAL WATER RATES

All volumes	**$2.25 per CCF**

TABLE 6-5: SUPER USER WATER RATES

All volumes	**$1.85 per CCF**

TABLE 6-6: IRRIGATION WATER RATES

First 50 CCF	**$2.80 per CCF**
50 to 100 CCF	**$3.55 per CCF**
Above 100 CCF	**$4.40 per CCF**

TABLE 6-7: GAS WELL RATES

Gas Well Use	**$4.79 per CCF**

6.3 RESERVOIR SYSTEM OPERATION

Fort Worth is a raw water customer of Tarrant Regional Water District (TRWD). As such, TRWD is responsible for operation of their reservoir system which consists of seven major reservoirs – Lake Bridgeport, Eagle Mountain Lake, Lake Worth, Cedar Creek Reservoir, Richland-Chambers Reservoir, Lake Arlington and Lake Benbrook. TRWD's reservoir system operation plan seeks to maximize efficiency of water withdraws within the constraints of existing water rights. Other priorities include maintaining water quality and minimizing potential impacts on recreational users, fish, and wildlife. Each reservoir is operated on a policy of flood release above the conservation elevation. TRWD coordinates its Operation Plan with all of its water customers and provides recommendations for the operations of regional treatment systems including the City of Fort Worth. For more information regarding TRWD's Reservoir System Operation please refer to TRWD's Water Conservation Plan.

6.4 IMPLEMENTATION AND ENFORCEMENT

The City of Fort Worth completes the TCEQ required Water Conservation Implementation Report by May 1 of each year. The report includes various water conservation strategies that have been implemented, including the date of implementation. Additionally, the report includes progress made on the five and ten year per capita water use goals from this Plan. If the goals are not being met, Fort Worth must document why not. The amount of water saved is also documented in this report.

6.5 REQUIREMENT FOR WATER CONSERVATION PLANS BY WHOLESALE CUSTOMERS

The wholesale service area includes 30 customers. In 2012 there were estimated to be approximately 350,000 people within the combined wholesale customer service area. Table 6-8 shows each wholesale customer, the amount of water purchased from the City in 2013 and whether they are also a wastewater customer.

TABLE 6-8: WHOLESALE CUSTOMERS

Wholesale Customer	2013 Usage (MG)	Wastewater Customer
Aledo	69.6	No
Bethesda WSC	939.4	Yes
Burleson	1,666.2	Yes
Crowley	576.6	Yes
DFW Airport	400.3	No
Dalworthington Gardens	159.2	No
Edgecliff Village	141.2	Yes
Everman	0.0	Yes
Forest Hill	440.4	Yes
Grand Prairie	679.8	No
Haltom City	1,766.7	Yes
Haslet	157.9	No
Hurst	1,938.9	Yes
Keller	2,579.1	No
Kennedale	171.8	Yes
Lake Worth	258.0	Yes
North Richland Hills	2,653.6	Yes
Northlake	75.1	Yes
Richland Hills	257.7	Yes
River Oaks	0.0	Yes
Roanoke	500.3	No
Saginaw	1,042.8	Yes
Sansom Park	0.0	Yes
Southlake	3,551.8	No
Trophy Club MUD #1	793.6	No
Trinity River Authority (TRA)	0.0	Yes
Westlake	401.5	No
Westover Hills	210.6	Yes
Westworth Village	112.1	Yes
White Settlement	424.7	Yes
Total	**21,969**	

Each of the City's wholesale customers is contractually obliged to develop, implement, and update Water Conservation Plans or conservation measures using the applicable requirements of TCEQ Water Conservation Plans, Drought Contingency Plans, Guidelines and Requirements, Texas Administrative Code 30 TAC Chapter 288(a)(2)(C). Each of the City's wholesale customers are also contractually obligated to adopt any mandatory measures in this plan such as time of day restrictions and the twice per week watering schedule. The City has sent a copy of its Water Conservation and Drought Contingency plans to each of its wholesale customers to aid with the development of their plans.

The conservation goals as outlined in this section of the Water Conservation Plan are intended as guides for the wholesale customers. When existing contracts are renewed, requirements for implementation of water conservation plans will be incorporated into the respective wholesale customer contracts.

The City expects each wholesale customer to voluntarily reduce its water use through conservation practices. The targets in Table 6-9 below are recommended for each wholesale customer. The City encourages each wholesale customer to implement conservation plans which reduce water use within 10% of the target goals.

TABLE 6-9: WHOLESALE CUSTOMER TARGETS

	Total GPCD	Residential GPCD	Unaccounted-For Water Per Connection Per Day
By 2020	168	85	105*
By 2025	159	80	100*

** Unaccounted-for water targets are based on the new AWWA water audit practices which approve the performance indicator for water losses as gallons lost per connection per day. This includes real and apparent losses. The commonly used percentage is not recommended as it is too variable depending on usage. These are guidelines and are related to the average wholesale customer in a year of average rainfall. These are voluntary guidelines.*

The City requests that each wholesale customer provide a copy of their Water Conservation Plan and required water system audit (as required by the Texas Water Development Board water audit reporting requirement as specified by House Bill 3338) to the City of Fort Worth. This will be required in any new contracts developed with wholesale customers as specified in 30 TAC Chapter 288.

In 2000 the City of Fort Worth's Wholesale customers accounted for slightly over a quarter of the raw water pumped. In 2013 the wholesale customers accounted for approximately a third of the raw water pumped. Fort Worth will hold quarterly meetings with their wholesale customers to provide information on Fort Worth's program and conservation best management practices.

6.6 COORDINATION WITH REGIONAL WATER PLANNING GROUPS

The City has been working with the local Regional Water Planning Groups (Region C and G) to help develop the water conservation plan documents. This Water Conservation Plan has been discussed with Regional Water Planning Group consultants and is consistent with their methodology and structure. Letters documenting that a copy of the Water Conservation Plan was sent to the Chairs of the Region C and G Water Planning Groups are attached in Appendix D.

7.0 ADDITIONAL CONSERVATION EFFORTS

7.1 WATER-CONSERVING PLUMBING FIXTURES

The City of Fort Worth should adopt new plumbing code standards to be consistent with the 1.28 gallon toilet requirement of the Texas Health and Safety Code, Title 5, Subtitle B, Chapter 372 effective January 1, 2014. This code should be formally adopted by the City Council and included in the Code of Ordinances. This code encourages water conservation through the requirement that all toilets sold, offered for sale or distributed must be a dual flush toilet that may not exceed 1.28 gallons per flush on average or for one full flush. The projected demands for Fort Worth that will be included in the *2016 Region C Water Plan* will account for the new plumbing code requirement. The City routinely inspects new construction, remodeling, add-ons, etc., through building permits to ensure installation of fixtures adheres to current codes.

The City has several programs to encourage the replacement of high water use fixtures, the SmartFlush voucher program and SmartFlush commercial program. The City also has the CARE program for low income and elderly customers for toilet replacement. Since 2009 these programs combined to distribute over 30,000 toilets.

7.2 REUSE

The City of Fort Worth currently has a direct reuse program in place at its Village Creek Water Reclamation Facility which supplies reuse water to Dallas-Fort Worth Airport, Arlington and Euless. Expansion of the reuse program is a major component of the City's vision to manage its water resources in the most efficient manner. The City is currently conducting a feasibility study to expand its direct reuse program to potentially supply the central part of the City. The feasibility study is looking to identify customers currently using potable water for irrigation or other purposes that could convert to reuse.

TRWD has a Texas water right allowing the diversion of return flows of treated wastewater from the Trinity River. The water will be pumped from the river into constructed wetlands for treatment and then pumped into Richland-Chambers Reservoir and Cedar Creek Reservoir. The wetlands project will ultimately provide 115,500 acre-feet per year, of which 10,000 acre-feet per year can be supplied from existing facilities. A portion of this indirect reuse is provided to the City of Fort Worth.

7.3 LANDSCAPE WATER MANAGEMENT

The City has an existing ordinance which prohibits wasting water. This ordinance prohibits watering between 10 a.m. and 6 p.m. year round. In addition the Irrigation ordinance requires that only licensed irrigators alter existing or install new irrigation systems within Fort Worth. The City has adopted ordinances to require rain and freeze sensors on new irrigation systems.

The City has conducted pilot programs to assess different water-saving methodologies and technologies at City athletic fields. The Gateway Park development includes synthetic turf on soccer and rugby fields to improve levels of water conservation at this facility. The best, most effective methods will be considered for all appropriate City facilities. Once it has been determined that specific landscape water management techniques are effective, they will be presented to private facilities such as golf courses and to customers with significant irrigated areas.

The City and other regional water providers (North Texas Municipal Water District, Tarrant Regional Water District, Upper Trinity Regional Water District, the Trinity River Authority and the city of Dallas) have collaborated and agreed upon implementing a year round no more than twice per week watering schedule. The City will have a mandatory twice per week water schedule similar to Stage 1 of its drought plan. The schedule is included as Table 7-1. The two instances when this schedule has been implemented during Stage 1 drought (in 2011 and currently in 2013-2014) it has shown to have savings of 8 percent and 9 percent respectively.

TABLE 7-1: TWICE PER WEEK WATERING SCHEDULE

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
No outdoor watering	Non-residential	Residential addresses ending in (0,2,4,6,8)	Residential addresses ending in (1,3,5,7,9)	Non-residential	Residential addresses ending in (0,2,4,6,8)	Residential addresses ending in (1,3,5,7,9)

7.4 CONSERVATION PROGRAMS FOR INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL ACCOUNTS

The City contracts with a vendor to offer comprehensive audits to these customers. These audits generally consist of a review of the current water use for the customer, their processes, and an audit of their irrigation system (if applicable). All of the analysis from the report is then summarized into a report detailing recommended improvements, the cost, savings and return on investment. Based on analysis

performed by the vendor the program can account for savings of approximately 65-80 million gallons annually at an approximate cost of $2.35 per thousand gallons.

7.5 ADDITIONAL PRACTICES, METHODS, AND TECHNIQUES

7.5.1 Internal City Water Conservation Effort

The City has implemented water conservation measures internally within City Hall and a number of its other buildings and parks and will continue to do so over the next five-year planning period. This includes retrofits of toilets, faucets, and showerheads, and development of a landscape program in conjunction with the Parks and Community Services Department. The City will also continue to analyze water savings from these measures. The City will also promote demonstration gardens such as the Water Conservation Garden at the Fort Worth Botanic Gardens.

7.5.2 Water Conservation Advisory Committee

The Water Conservation Advisory Committee was formed in August of 2005 to review the current outlook for water supply in North Central Texas, evaluate potential conservation strategies and make recommendations to the Water Director. The Committee comprises a diverse cross section of customer classes and interests. This committee provides review of specific water conservation measures.

7.5.3 Graywater

Residential graywater use (i.e., recycling water within the home using a dual plumbing system) is another potential water supply. The Texas Administrative Code Chapter 210 has rules governing the use of graywater for domestic purposes, industrial, commercial or institutional purposes and irrigation. At this time this practice is not considered economically feasible on a large residential scale, however it may be evaluated on a case-by-case basis for other customer classes.

7.5.4 Rainwater Harvesting and Condensate Reuse

Rainwater harvesting and condensate reuse provide a potential source of supply that could be used for non-potable purposes such as landscape irrigation. Large properties with this potential supply could offset a portion of their irrigation demand depending on the storage capacity. Rainwater and condensate reuse should be evaluated on a case-by-case basis to determine if it is cost effective for large properties. At this time the City will not implement a rebate/giveaway program, but the City will continue to educate the

public about the possibility of rain water harvesting and direct them to classes such as the Master Gardner's.

The Water department has partnered with the Storm water Department for the past three years to offer a rain barrel distribution program. The program works with a direct supplier to offer customers rain barrels at the direct. Then City staff works to advertise the program, register customers and provide a distribution date for customers to pick up their rain barrel. The program has minimal cost for the City to implement.

7.5.5 Weather Stations

TRWD is developing an interactive weather station program to install weather stations throughout its service area to provide consumers with a weekly e-mail and information through a website in determining an adequate amount of supplemental water that is needed to maintain healthy grass in specific locations. This service will provide the public advanced information regarding outdoor irrigation needs, thereby reducing water use. Through a series of selections on the type of irrigation system a consumer has, a weekly email that will tell the customer how long (in minutes) an irrigation system needs to run based on the past seven days of weather. This recommendation provides the actual amount of supplemental water that is required for a healthy lawn based on research of the Texas A&M Agrilife Extension Service and proven technologies. Fort Worth will promote this program, encourage its retail and wholesale customers to participate in the program, and make the information available through its website.

7.5.6 Residential Landscape Ordinance

The City of Fort Worth is projected to have substantial population growth in the next fifty years. The additional population will require additional housing. A residential landscape ordinance could impact the landscaping of future homes. The residential landscape ordinance should be crafted in conjunction with the City Planning and Development Department to identify drought tolerant turf, groundcover, shrubs and trees that are allowed to be planted at new homes. Once an ordinance is crafted it should be reviewed by the Water Conservation Advisory Committee. It is recommended that the City consider adopting a residential landscape ordinance in the next five years.

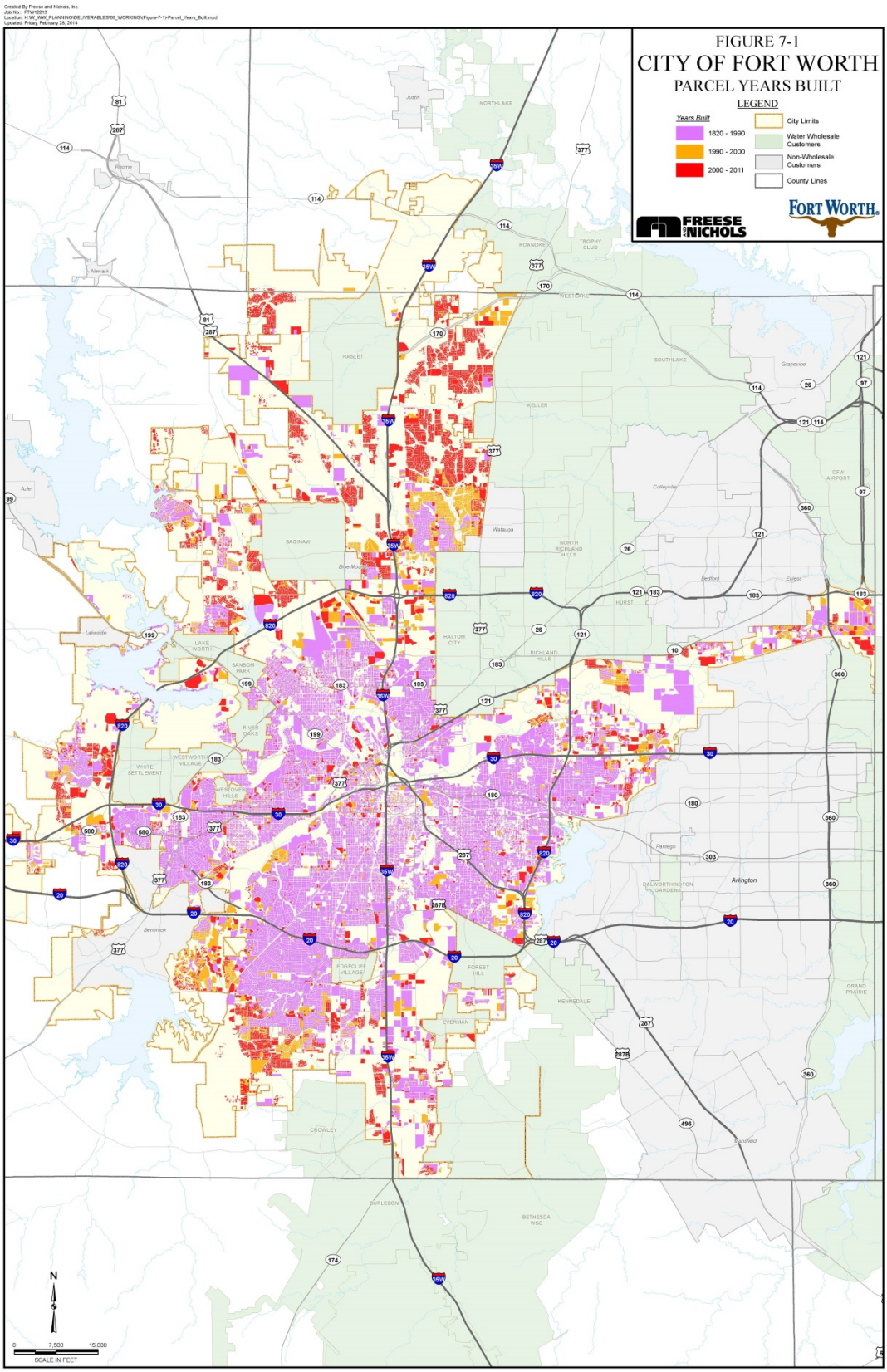
7.5.7 GIS tools

GIS is a powerful analysis tool to analyze data with a spatial component. Conservation staff will begin working with GIS staff in the water department to build a database for water conservation (including program participation, water use, violations etc.). The GIS tools available could be as simple as identifying

target areas for retrofit program based on the Tarrant County Appraisal District data, to as detailed as tying water use to each individual parcel within the City. Figure 7-1 shows the year built of homes within the Fort Worth city limits. Those areas shaded in purple represent homes that were built prior to 1990 and potentially to have older high use plumbing fixtures. Areas shaded in orange were built between 1990-2000, while those shaded in red were built after 2000.

As the amount of data continues to increase and with the possibility of smart meters, GIS is a potential tool to manage the data and identify where water conservation, leak detection and meter replacement programs should be targeted to achieve the greatest savings.

FIGURE 7-1 – CITY OF FORT WORTH PARCEL YEAR BUILT



7.5.8 Smart Meters

New technology known as smart meters or Advanced Metering Infrastructure (AMI) has the potential to change the way water consumption is measured. Many cities have begun to test these meters through pilot programs to determine if they should begin to use these meters as part of their meter replacement program. The advantages of these meters are that they can be read remotely reducing staff cost and provide real time meter readings to identify leaks or other anomalies in water use. Smart meters also have the potential to provide a valuable education component where a customer could view a "dashboard" of their previous, current and projected water use. Some of the disadvantages of these meters are the capital cost to convert to these systems including the additional cost to manage the data they provide. City staff will develop a pilot program to determine the cost effectiveness and potential savings of using smart meters in the next five years.

8.0 ADOPTION OF WATER CONSERVATION PLAN; PERIODIC REVIEW AND UPDATE OF PLAN

Opportunity for public comment on the plan was provided at a City of Fort Worth public meeting on February 27, 2014. Appendix E contains a copy of the minutes of the April 1, 2014 City Council meeting at which this Water Conservation Plan was adopted.

TCEQ requires that water conservation plans be reviewed and, if necessary, updated every five years to coincide with the regional water planning process. This Water Conservation Plan will be updated as required by TCEQ and, in addition, will be continually reassessed for opportunities to improve water efficiency and conservation based on new or updated information.

APPENDIX A

LIST OF REFERENCES

APPENDIX A

LIST OF REFERENCES

1. Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.5, and Subchapter B, Rule 288.22, downloaded from http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=288, June 2013.

2. Tarrant Regional Water District, "Water Conservation and Drought Contingency Plan", prepared by the Tarrant Regional Water District, April 2009

3. Water Conservation Implementation Task Force: "Texas Water Development Board Report 362, Water Conservation Best Management Practices Guide," prepared for the Texas Water Development Board, Austin, November 2004.

4. Water Conservation Advisory Council: Guidance and Methodology for Reporting on Water Conservation and Water Use, December 2012

5. Texas Commission on Environmental Quality Annual Report. http://www.tceq.texas.gov/permitting/water_rights/conserve.html#imple

APPENDIX B

TEXAS COMMISSION OF ENVIRONMENTAL QUALITY RULES ON MUNICIPAL WATER CONSERVATION PLANS

APPENDIX B

TEXAS COMMISSION OF ENVIRONMENTAL QUALITY RULES ON MUNICIPAL WATER CONSERVATION PLANS

TITLE 30	ENVIRONMENTAL QUALITY
PART 1	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
CHAPTER 288	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
SUBCHAPTER A	WATER CONSERVATION PLANS
RULE §288.1	**Definitions**

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

(1) Agricultural or Agriculture--Any of the following activities:

(A) cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or non-soil media by a nursery grower;

(C) raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) raising or keeping equine animals;

(E) wildlife management; and

(F) planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure.

(2) Agricultural use--Any use or activity involving agriculture, including irrigation.

(3) Best management practices--Voluntary efficiency measures that save a quantifiable amount of water, either directly or indirectly, and that can be implemented within a specific time frame.

(4) 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 water supply is made available for future or alternative uses.

(5) Commercial use--The use of water by a place of business, such as a hotel, restaurant, or office building. This does not include multi-family residences or agricultural, industrial, or institutional users.

(6) Drought contingency plan--A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).

(7) Industrial use--The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, and the development of power by means other than hydroelectric, but does not include agricultural use.

(8) Institutional use--The use of water by an establishment dedicated to public service, such as a school, university, church, hospital, nursing home, prison or government facility. All facilities dedicated to public service are considered institutional regardless of ownership.

(9) Irrigation--The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water from a public water supplier.

(10) Irrigation water use efficiency--The percentage of that amount of irrigation water which is beneficially used by agriculture crops or other vegetation relative to the amount of water diverted from the source(s) of supply. Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for vegetative maintenance and growth, salinity management, and leaching requirements associated with irrigation.

(11) Mining use--The use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field re-pressuring.

(12) Municipal use--The use of potable water provided by a public water supplier as well as the use of sewage effluent for residential, commercial, industrial, agricultural, institutional, and wholesale uses.

(13) Nursery grower--A person engaged in the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, who grows more than 50% of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, grow means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease, and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(14) Pollution--The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(15) Public water supplier--An individual or entity that supplies water to the public for human consumption.

(16) Residential use--The use of water that is billed to single and multi-family residences, which applies to indoor and outdoor uses.

(17) Residential gallons per capita per day--The total gallons sold for residential use by a public water supplier divided by the residential population served and then divided by the number of days in the year.

(18) Regional water planning group--A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

(19) Retail public water supplier--An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

(20) Reuse--The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-

owned water.

(21) Total use--The volume of raw or potable water provided by a public water supplier to billed customer sectors or nonrevenue uses and the volume lost during conveyance, treatment, or transmission of that water.

(22) Total gallons per capita per day (GPCD)--The total amount of water diverted and/or pumped for potable use divided by the total permanent population divided by the days of the year. Diversion volumes of reuse as defined in this chapter shall be credited against total diversion volumes for the purposes of calculating GPCD for targets and goals.

(23) Water conservation plan--A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

(24) Wholesale public water supplier--An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

(25) Wholesale use--Water sold from one entity or public water supplier to other retail water purveyors for resale to individual customers.

Source Note: The provisions of this §288.1 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective August 15, 2002, 27 TexReg 7146; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective January 10, 2008, 33 TexReg 193; amended to be effective December 6, 2012, 37 TexReg 9515

TITLE 30	ENVIRONMENTAL QUALITY
PART 1	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
CHAPTER 288	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
SUBCHAPTER A	WATER CONSERVATION PLANS
RULE §288.2	**Water Conservation Plans for Municipal Uses by Public Water Suppliers**

(a) A water conservation plan for municipal water use by public water suppliers must provide information in response to the following. If the plan does not provide information for each requirement, the public water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for municipal uses by public water suppliers must include the following elements:

(A) a utility profile in accordance with the Texas Water Use Methodology, including, but not limited to, information regarding population and customer data, water use data (including total gallons per capita per day (GPCD) and residential GPCD), water supply system data, and wastewater system data;

(B) a record management system which allows for the classification of water sales and uses into the most detailed level of water use data currently available to it, including, if possible, the sectors listed in clauses (i) - (vi) of this subparagraph. Any new billing system purchased by a public water supplier must be capable of reporting detailed water use data as described in clauses (i) - (vi) of this subparagraph:

(i) residential;

(I) single family;

(II) multi-family;

(ii) commercial;

(iii) institutional;

(iv) industrial;

(v) agricultural; and,

(vi) wholesale.

(C) specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use in total GPCD and residential GPCD. The goals established by a public water supplier under this subparagraph are not enforceable;

(D) metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply;

(E) a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement;

(F) measures to determine and control water loss (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.);

(G) a program of continuing public education and information regarding water conservation;

(H) a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water;

(I) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies; and

(J) a means of implementation and enforcement which shall be evidenced by:

(i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and

(ii) a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(K) documentation of coordination with the regional water planning groups for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional content requirements. Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected

population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements:

(A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system;

(B) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

(3) Additional conservation strategies. Any combination of the following strategies shall be selected by the water supplier, in addition to the minimum requirements in paragraphs (1) and (2) of this subsection, if they are necessary to achieve the stated water conservation goals of the plan. The commission may require that any of the following strategies be implemented by the water supplier if the commission determines that the strategy is necessary to achieve the goals of the water conservation plan:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) adoption of ordinances, plumbing codes, and/or rules requiring water-conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition;

(C) a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures;

(D) reuse and/or recycling of wastewater and/or graywater;

(E) a program for pressure control and/or reduction in the distribution system and/or for customer connections;

(F) a program and/or ordinance(s) for landscape water management;

(G) a method for monitoring the effectiveness and efficiency of the water conservation plan; and

(H) any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) A water conservation plan prepared in accordance with 31 TAC §363.15 (relating to Required Water Conservation Plan) of the Texas Water Development Board and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and the Texas Water Development Board.

(c) A public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Source Note: The provisions of this §288.2 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective December 6, 2012, 37 TexReg 9515

TITLE 30	ENVIRONMENTAL QUALITY
PART 1	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
CHAPTER 288	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
SUBCHAPTER A	WATER CONSERVATION PLANS
RULE §288.5	**Water Conservation Plans for Wholesale Water Suppliers**

A water conservation plan for a wholesale water supplier must provide information in response to each of the following paragraphs. If the plan does not provide information for each requirement, the wholesale water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for wholesale water suppliers must include the following elements:

(A) a description of the wholesaler's service area, including population and customer data, water use data, water supply system data, and wastewater data;

(B) specific, quantified five-year and ten-year targets for water savings including, where appropriate, target goals for municipal use in gallons per capita per day for the wholesaler's service area, maximum acceptable water loss, and the basis for the development of these goals. The goals established by wholesale water suppliers under this subparagraph are not enforceable;

(C) a description as to which practice(s) and/or device(s) will be utilized to measure and account for the amount of water diverted from the source(s) of supply;

(D) a monitoring and record management program for determining water deliveries, sales, and losses;

(E) a program of metering and leak detection and repair for the wholesaler's water storage, delivery, and distribution system;

(F) a requirement in every water supply contract entered into or renewed after official adoption of the

water conservation plan, and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements of this chapter. If the customer intends to resell the water, then the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter;

(G) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin. The reservoir systems operations plans shall include optimization of water supplies as one of the significant goals of the plan;

(H) a means for implementation and enforcement, which shall be evidenced by a copy of the ordinance, rule, resolution, or tariff, indicating official adoption of the water conservation plan by the water supplier; and a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(I) documentation of coordination with the regional water planning groups for the service area of the wholesale water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional conservation strategies. Any combination of the following strategies shall be selected by the water wholesaler, in addition to the minimum requirements of paragraph (1) of this section, if they are necessary in order to achieve the stated water conservation goals of the plan. The commission may require by commission order that any of the following strategies be implemented by the water supplier if the commission determines that the strategies are necessary in order for the conservation plan to be achieved:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) a program to assist agricultural customers in the development of conservation pollution prevention and abatement plans;

(C) a program for reuse and/or recycling of wastewater and/or graywater; and

(D) any other water conservation practice, method, or technique which the wholesaler shows to be

appropriate for achieving the stated goal or goals of the water conservation plan.

(3) Review and update requirements. The wholesale water supplier shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. A wholesale water supplier shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Source Note: The provisions of this §288.5 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective December 6, 2012, 37 TexReg 9515

APPENDIX C

CITY OF FORT WORTH UTILITY PROFILES BASED ON TCEQ FORMAT

APPENDIX D

LETTERS TO REGION C AND REGION G WATER PLANNING GROUPS

APPENDIX E

ADOPTION OF WATER CONSERVATION PLAN

APPENDIX E

ADOPTION OF WATER CONSERVATION PLAN