



City of Dallas

# 2019 Water Conservation Plan

*Adopted by Resolution of the  
Dallas City Council on **Month, XX** 2019*

**Dallas Water Utilities**  
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Dallas, Texas 75201

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# Water Conservation Plan for the City of Dallas Water Utilities

## 1.0 Introduction

Dallas Water Utilities (DWU) is a major retail and wholesale provider of water in North Texas, currently serving over 2.5 million people within a 699 square mile service area. This includes all of the City of Dallas, 23 wholesale treated water customers, and five wholesale raw water customers located in the metropolitan area surrounding Dallas.

Dallas has actively procured water supplies, constructed reservoirs, and developed water treatment facilities which make it possible for DWU to provide water to its customers. In Fiscal Year (FY) 2017-2018, DWU delivered over 142 billion gallons of treated water and over 62 billion gallons of treated wastewater. As the regional population grows, so grows water demand. To meet that demand, DWU must plan to increase the available water supply and expand its transmission, treatment, and distribution facilities. DWU considers water conservation an integral part of this planning process. The 2014 Dallas Long Range Water Supply Plan (2014 LRWSP) identified and recommended conservation as a water management strategy. Of the recommended strategies, water conservation represents approximately 12% of Dallas' recommended future water supply.

The City of Dallas has had a water conservation program since the early 1980s. In 2001, Dallas increased its conservation efforts with the amendment of CHAPTER 49, "WATER AND WASTEWATER," of the Dallas City Code to include, CONSERVATION MEASURES RELATING TO LAWN AND LANDSCAPE IRRIGATION.

In 2016, DWU developed its *Water Conservation Five-Year Work Plan* (2016 Work Plan) an update to its *2010 Water Conservation Five-Year Strategic Plan*. The 2016 Work Plan includes phased implementation of best management practices (BMPs). This Water Conservation Plan incorporates data and strategies from the 2016 Work Plan.

### 1.1 State of Texas Requirements

The Texas Administrative Code Title 30, Chapter 288 (30 TAC § 288) requires holders of an existing permit, certified filing, or certificate of adjudication for the appropriation of surface water in the amount of 1,000 acre-feet a year or more for municipal, industrial, and other non-irrigation uses to develop, submit, and implement a water conservation plan and to update it according to a specified schedule. As such, DWU is subject to this requirement. Since DWU provides water as a municipal public and wholesale water supplier, DWU's Water Conservation Plan must include information necessary to comply with Texas Commission on Environmental Quality (TCEQ) requirements for each of these designations.

The requirements of Subchapter A that must be included in the City of Dallas Water Conservation Plan are summarized below.

#### ➤ *Minimum Requirements for Municipal Public and Wholesale Water Suppliers*

- Utility Profile: Includes 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. (Sections 3 and 4; [Appendix A](#))
- Description of the Wholesaler's Service Area: Includes population and customer data, water use data, water supply system data, and wastewater data. (Figure 3-1)
- Goals: Specific quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal and residential use, in GPCD. The goals

established by a public water supplier are not enforceable under this subparagraph. (Sections 2.2 and 2.3)

- Accurate Metering Devices: The TCEQ requires metering devices with an accuracy of plus or minus 5 percent for measuring water diverted from source supply. (Section 5.1)
- Universal Metering, Testing, Repair, and Replacement: The TCEQ requires that there be a program for universal metering of both customer and public uses of water for meter testing and repair, and for periodic meter replacement. (Section 5.2)
- Leak Detection, Repair, and Control of Unaccounted for Water: The regulations require measures to determine and control unaccounted-for water. Measures may include periodic visual inspections along distribution lines and periodic audits of the water system for illegal connections or abandoned services. (Sections 5.3 and 5.4)
- Continuing Public Education Program: TCEQ requires a continuing public education and information program regarding water conservation. (Section 5.5)
- Non-Promotional Rate Structure: Chapter 288 requires a water rate structure that is cost-based and which does not encourage the excessive use of water. (Section 5.8 and [Appendix A](#))
- Reservoir Systems Operational Plan: This requirement is to provide a coordinated operational structure for operation of reservoirs owned by the water supply entity within a common watershed or river basin in order to optimize available water supplies. (Section 5.10)
- Wholesale Customer Requirements: The water conservation plan must include 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 Title 30 TAC Chapter 288. (Section 5.9)
- A Means of Implementation and Enforcement: The regulations require a means to implement and enforce the Water Conservation Plan, as evidenced by an ordinance, resolution, or tariff, and a description of the authority by which the conservation plan is enforced. (Sections 5.0 through 5.17)
- Coordination with Regional Water Planning Groups: The water conservation plan should document the coordination with the Regional Water Planning Group for the service area of the public water supplier to demonstrate consistency with the appropriate approved regional water plan. (Section 5.12) and [Appendix \\_\\_\\_](#).

➤ ***Additional Requirements for Cities of More than 5,000 People***

- Program for Leak Detection, Repair, and Water Loss Accounting: The plan must include a description of the program of leak detection, repair, and water loss accounting for the water transmission, storage, delivery, and distribution system. (Sections 5.3 and 5.4)
- Record Management System: The plan must include a record management system to record water pumped, water deliveries, water sales and water losses which allows for the desegregation of water sales and uses into the following user classes (residential; commercial; public and institutional and industrial). (Sections 5.4 and 5.14)

- Requirements for Wholesale Customers: The plan must include 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 30 TAC § 288. 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 30 TAC § 288. (Section 5.9)
- Additional Conservation Strategies: TCEQ Rules also list additional optional but not required conservation strategies which may be adopted by suppliers. The following optional strategies are included in this plan:
  - Conservation-Oriented Water Rates. (Section 5.8 and **Appendix A**) and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;
  - Ordinances, Plumbing Codes and/or Rules on Water Conservation Fixtures. (Section 5.14)
  - Fixture Replacement Incentive Programs. (Sections 5.7.1 through 5.7.3)
  - Reuse and/or Recycling of Wastewater and/or Gray Water. (Sections 5.16 through 5.16.3)
  - Ordinance and/or Programs for Landscape Water Management (Sections 5.5.4 and 5.14).
  - Method for Monitoring the Effectiveness of the Plan.

This Water Conservation Plan sets forth a program of long-term measures under which the City of Dallas can improve the overall efficiency of water use and conserve its water resources. Short-term measures which respond to specific water management conditions (i.e., periods of drought, unusually high water demands, unforeseen equipment or system failure, or contamination of a water supply source) on the other hand, are described in the City of Dallas Drought Contingency Plan.

## **1.2 The Water Conservation Planning Process**

Water conservation has increasingly been an important element of Dallas’s long-range water supply strategy. Since adoption of the water conservation ordinance relating to lawn and landscape irrigation in October of 2001, Dallas has dramatically increased its efforts to promote water conservation. Since 2002, Dallas has had a broad-based media campaign to increase public awareness on water efficiency, particularly relating to outdoor use. This ongoing campaign has expanded to a regional campaign, shared with the Tarrant Regional Water District. Since the 2016 Water Conservation Five-Year Work Plan (Work Plan), DWU has continued to improve upon its diverse menu of programs with an ongoing, dynamic approach to conservation whereby programs are continually measured and evaluated systematically for effectiveness and efficiency.

This Water Conservation Plan is heavily based on the data and information gathered in the 2016 Work Plan. This included review of numerous water conservation programs, initiatives, data and literature, as well as input from industry personnel. The process for development of the 2016 Work Plan can be outlined as follows:

- Analyzed Dallas Water Utilities data;
- Reviewed water conservation programs in other large cities;
- Reviewed Texas Regulations pertaining to Water Conservation;

- Reviewed City of Dallas water system and associated master plans;
- Developed potential water conservation strategies;
- Evaluated water conservation strategies; and
- Sought input from stakeholder groups.

### 1.3 Organization of the Water Conservation Plan

The following information and procedures are provided in this plan:

- **Section 2.0, Water Conservation Planning Goals**, describes the benefits of water conservation, DWU's water conservation planning goals, and the specific, water demand reduction goals established by DWU for this Water Conservation Plan, including quantified five- and ten-year water loss and GPCD reduction goals.
- **Section 3.0, Population and Per Capita Water Demand Forecasts**, identifies DWU's wholesale customers, provides populations and per capita water demand projections, and discusses the impact wholesale customers will have on future water demand.
- **Section 4.0, Description of the DWU Water System**, describes DWU's water supply sources, water treatment plants, treated water storage and distribution systems, and wastewater treatment plants.
- **Section 5.0, DWU's Water Conservation Program**, describes DWU's existing water conservation program and enhancements as well as new conservation measures that are likely to be implemented.
- **Appendix A** provides the completed TCEQ Utility Profiles for Municipal Public Water Suppliers and Wholesale Public Water Suppliers, an implementation schedule, and Dallas' Standard Water Rates.

## 2.0 Water Conservation Planning Goals

The objective of this Water Conservation Plan is to achieve efficient use of water through practices and measures that reduce water consumption and water losses and increase water reuse. Meeting this objective will allow available water supplies and existing infrastructure to be extended into the future.

### 2.1 Benefits of Water Conservation

A well-designed Water Conservation Plan will provide a blueprint for efficient water use. The benefits of water conservation not only include avoided costs, but include others benefits that hold significant importance in terms of value. Benefits of water conservation include:

- Delaying the need to develop expensive future water supplies. Costs associated with developing new water supplies (or purchasing new water) are numerous. These can include capital costs for construction of reservoirs, pumping facilities, pipelines, treatment plants, water storage, and related facilities; costs of obtaining water rights and permits; and operational costs such as labor, energy, and chemicals. To illustrate this fact the water demand projection in the 2014 LRWSP was on average, over the planning horizon (2020 to 2060), 19.3% lower primarily due to Dallas' conservation efforts
- Extending the life of existing water supplies and infrastructure. When water demands are maintained or reduced through conservation, higher system pressure is avoided. Without conservation, pressures within the water system will increase in localized areas to meet increasing

customer demands. Increased pressures within an aging infrastructure will mean more leaks from the system.

- Reduced peak requirements. A water system is sized to meet its customers' peak demands. When peak demands are reduced through water conservation, part of the system's capacity is available for other water customers. This, in effect, increases the base capacity of the system.
- Lowered capital and operating costs of the existing system. The need for expanding the water treatment and distribution system is delayed or avoided. Operational costs, such as power and chemicals, are also reduced.

Other benefits include positive environmental effects, improving customer good will and promoting a positive image for the City of Dallas.

## **2.2 DWU's Water Conservation Planning Goals**

Listed below are many of the planning goals considered important to DWU during the water conservation planning process:

- Reduce seasonal peak demands
- Reduce water loss and waste
- Decrease consumption measured as gallons per capita per day (GPCD)
- Maintain quality of life
- Allow continued economic growth and development
- Maintain public education for a heightened public awareness of water conservation in Dallas and the surrounding region
- "Lead by example" by continuing to upgrade city facilities with water efficient fixtures, landscapes, and irrigation systems wherever possible
- Facilitate regional conservation efforts among DWU wholesale customer cities and neighboring municipalities, districts and agencies
- Establish the foundation for continuation of water savings targets for the following five-year period
- Remain consistent with the Region C Water Plan
- Incorporate, to the extent practicable, measures identified in the Texas Water Development Board's (TWDB's) best management practices (BMP) Guide.

## **2.3 Quantified Five- and Ten-Year Goals for Water Savings**

Specific elements of the Water Conservation Plan, including planned initiatives, are described in Section 5.0. The development of the planned initiatives involved the identification and examination of numerous conservation strategies. These strategies were derived from several sources, including state agency directives, regional water planning groups, water conservation literature, water conservation programs used by other municipalities, and the City's existing Work Plan.

Targeted water savings are based on the planned BMPs, historical water use patterns, literature values, and experience with other utilities. Savings include the combined efforts of all program elements and components.



**Table 2-1: City of Dallas Five- and Ten-Year Goals for Water Savings**

	<b>Historic 5-yr Average</b>	<b>Baseline</b>	<b>5-yr Goal for Year 2019</b>	<b>10-yr Goal for Year 2024</b>
Total GPCD	181.8	181.8	172.89	164.41
Residential GPCD	67.8	67.8	64.48	61.31
Water Loss GPCD	31.8	31.8	30.24	8.76
Water Loss (Percentage)	18.11%	18.11%	10%	10%

The “Total” GPCD five- and ten-year targets (Table 2-1) include water use by DWU industrial customers. However, Dallas also uses other metrics to track the effectiveness of its water conservation efforts, including:

- Non-industrial per capita water use. Exclusive of water use by industrial customers, the five-year rolling average per capita water use in fiscal year 2017-18 was 169 GPCD.
- Residential per capita water use. Including single-family and multi-family residential uses, the five-year rolling average per capita water use in fiscal year 2017-18 was 67.8 GPCD.

### **3.0 Population Forecasts and Per Capita Water Use**

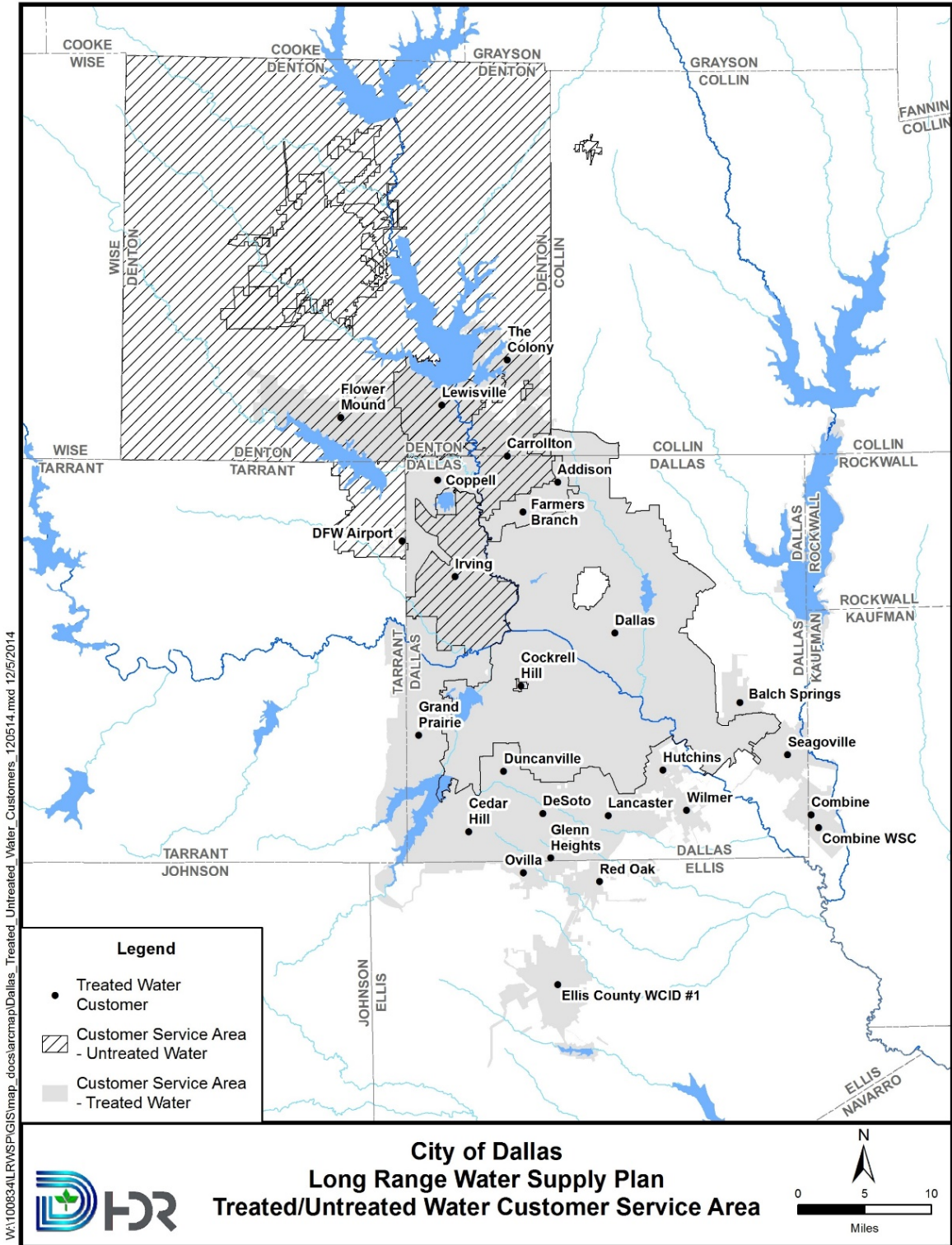
#### **3.1 DWU’s Customer and Population Forecast**

DWU supplies retail treated municipal water to the City of Dallas. The 2018 estimated population of the City of Dallas was 1,286,380, according to the North Central Texas Council of Governments (NCTCOG). DWU supplies wholesale treated municipal water to 23 customer cities or entities and serves five wholesale raw water customers (one customer receives both treated and raw water). These wholesale customers are primarily located in Dallas, Denton, and Tarrant counties; however, portions extend into Collin, Ellis, and Kaufman counties. A map of the DWU service area, along with a list of wholesale customers, is shown in Figure 3-1. The 2018 estimated total population of the wholesale customers was approximately 1,174,110, according to NCTCOG. The total treated water population served for the past five years, based on NCTCOG population estimates, is illustrated in Table 3-1.

#### **3.2 Long-Range Water Planning Efforts**

The City of Dallas conducts long-range water planning efforts on a regular basis in order to maintain a reliable supply that meets the demand of the service area. 2014 LRWSP, includes revised population, per capita consumption, and total demand projections for Dallas and its wholesale customers. The updated population projections are presented in Table 3-2.

Figure 3-1: Dallas Water Utilities Service Area



**Table 3-1: Population Served (Retail and Wholesale Customers)**

Year	2014	2015	2016	2017	2018
<b>Total Population</b>	<b>2,469,220</b>	<b>2,493,030</b>	<b>2,345,170</b>	<b>2,431,140</b>	<b>2,460,490</b>

**Table 3-2: Population Projections for City of Dallas and Customer Cities**

City/Region	2020	2030	2040	2050	2060	2070
City of Dallas	1,242,135	1,347,717	1,531,681	1,707,057	1,841,064	1,905,498
Current Wholesale Customer Cities	1,820,739	2,179,474	2,464,242	2,781,101	3,100,019	3,430,458
Total	3,062,874	3,527,194	3,995,923	4,488,158	4,941,083	5,335,956

### **3.3 Impact of Wholesale Water Customers on Water Demand**

Wholesale water customers account for a significant portion of DWU's water demand. These customers currently use approximately 40 percent of all water (treated and untreated) and 33 percent of treated water supplied by DWU. By year 2070, use by DWU's current wholesale water customers could increase to approximately 50 percent of all water and 62 percent of treated water. Therefore, water demand reductions by DWU's wholesale customers are considered essential if DWU is to achieve its long-range water supply objectives.

Strategies to address this challenge are discussed in Section 5.5 (*Continuing Public Education Program*) and Section 5.9 (*Water Conservation Provisions in Wholesale Water Supply Contracts*).

### **4.0 Description of the DWU Water System**

DWU has supplied water to meet the needs of the City of Dallas since 1881. Additionally, DWU currently supplies treated water to 23 wholesale customers and untreated water to an additional five wholesale customers. Dallas meets these needs through a system of surface water reservoirs and through its transmission, treatment, and distribution facilities. Recycled water projects, existing and proposed, are also components of the DWU water system.

#### **4.1 Water Supply Sources**

DWU has seven surface water reservoirs, located in three geographically diverse river basins. Of the seven surface water reservoirs, six are currently connected to DWU's system with the seventh being scheduled for connection by 2027. DWU can balance the level of use in each connected reservoir to ensure that the supply of any single reservoir will not be prematurely exhausted.

The reservoirs comprising DWU's system are subdivided into western reservoirs and eastern reservoirs. This designation corresponds to DWU's overall water treatment system infrastructure, which includes the two western water treatment plants, Bachman Water Treatment Plant (WTP) and Elm Fork WTP, and one eastern water treatment plant, East Side WTP. DWU's distribution system is one integrated system which

the three water treatment plants feed into. A detailed list of City of Dallas Water Rights is included in [Appendix A](#).

#### **4.1.1 Western System**

The reservoirs in the western system in which DWU holds water rights include:

- Ray Roberts Lake
- Lewisville Lake
- Grapevine Lake
- Elm Fork Channel of the Trinity River (above Frazier Dam)

DWU also holds water rights for uncontrolled portions of the Elm Fork of the Trinity River watershed (i.e., areas located downstream of Lewisville Lake and Grapevine Lake which contribute stream flow to DWU's water supply diversion points on the Elm Fork).

Additionally, DWU holds water rights in Lake Palestine, but this reservoir is not presently connected to the DWU Water System. Lake Palestine, which is physically located southeast of Dallas, will be connected to the Western System through the Bachman WTP. This connection is scheduled for 2027.

#### **4.1.2 Eastern System**

The reservoirs in the eastern system in which Dallas holds water rights and/or supply contracts include:

- Lake Ray Hubbard
- Lake Tawakoni
- Lake Fork
- Lake Palestine (unconnected)

DWU holds water rights and a water supply contract in Lake Palestine, but this reservoir is not presently connected to the DWU water system. In addition, DWU treats raw water from Lake Jim Chapman for the City of Irving and delivers treated water to the City of Irving.

#### **4.1.3 Others**

DWU holds storage and diversion rights for White Rock Lake, located on White Rock Creek, in northeastern Dallas. The City of Dallas also has permitted reuse of return flows from the City of Lewisville Wastewater Treatment Plant (WWTP) and Town of Flower Mound WWTP in the Elm Fork of the Trinity River and from Dallas' Southside and Central WWTPs in the Trinity River.

Table 4-1 presents a summary of the current water rights associated with each of the reservoirs comprising DWU's raw water sources. A map of DWU reservoirs is located in [Appendix A](#).

## **4.2 Water Treatment Plants**

DWU maintains three water treatment plants (Elm Fork, Bachman, and East Side) serving both retail and wholesale customers. The treatment plants have a combined treatment capacity of 900 million gallons per day (MGD) and a current total firm pumping capacity of 905 MGD.

**The Elm Fork Water Treatment Plant (WTP)** is located in Carrollton near the intersection of I-35 East and Whitlock Lane. The plant has a rated treatment capacity of 310 MGD with a high-service pumping capacity of 324 MGD. The plant receives gravity flow through the Elm Fork of the Trinity River from Ray Roberts Lake, Lewisville Lake, and Grapevine Lake. The intake structure, located north of the Carrollton Dam, diverts water by gravity flow to two low-service pump stations. One pump

station is off-site and the other is on the plant site. The raw water is then pumped to the ozone application facility located at the plant.

**Table 4-1: Summary of Available Water Supply Sources**

	Source	Amount Authorized (MGD)	Firm Yield Available to DWU (MGD)
Surface Water	Lake Ray Hubbard	8.0	53.9
	Lewisville Lake	490.0	171.1
	Ray Roberts Lake	5.3	
	Elm Fork Run-of-River	17.3	
	Grapevine Lake	75.8	6.5
	Reuse	220.5	153.2 <sup>a,b</sup>
Groundwater	NA	--	--
Contracts	Sabine River Authority – Lake Tawakoni	169.9	170
	Sabine River Authority – Lake Fork	107	107 <sup>b</sup>
	Upper Neches River Municipal Water Authority – Lake Palestine	102.0	102 <sup>c</sup>
Other	NA	--	--

<sup>a</sup> Yield is based on 2012 to \_\_\_ annual wastewater discharges with Water Reuse Permit 12468B conditions and restrictions. This number will vary annually depending upon discharge.

<sup>b</sup> Not fully connected

<sup>c</sup> Not connected

**The Bachman WTP** is located in Dallas, Texas, north of Love Field Airport and adjacent to Bachman Lake. Bachman WTP is Dallas’ oldest operating water treatment plant with a rated treatment capacity of 150 MGD, a storage capacity of 9.5 million gallons (MG), and a high-service pumping capacity of 180 MGD. Raw water is diverted from the Elm Fork of the Trinity River through Fishing Hole Lake to a raw water pump station located off-site of the water treatment plant. The raw water is then pumped to the ozone application facility located at the plant.

**The East Side WTP** is located in Sunnyvale, Texas. The plant is Dallas’ largest water treatment plant with a rated treatment capacity of 440 MGD and a firm raw water pumping capacity of 500 MGD. The plant receives raw water from three reservoirs- Lake Ray Hubbard, Lake Tawakoni and Lake Fork via



three raw water pump stations and one balancing reservoir. From the east, the Iron Bridge Pump Station, located at Lake Tawakoni, and the Lake Fork Pump Station transport raw water to the Tawakoni Balancing Reservoir (TBR). From TBR, raw water flows by gravity through two water lines to the ozone application facility at the plant. The Forney Raw Water Pump Station transports raw water from Lake Ray Hubbard directly to the ozone application facility utilizing two pressurized lines.

Several improvements are currently under consideration to increase the overall capacity of the eastern system including the construction of new 144" raw water pipelines from Lake Tawakoni to the TBR and from TBR to the East Side WTP as well as treatment capacity improvements at the East Side WTP to increase the plant's rated capacity to 540 MGD.

### **4.3 Treated Water Storage and Distribution Systems**

The DWU distribution system is divided into nine major pressure zones (Central Low, North High, South High, East High, Pleasant Grove, Red Bird High, Renner High, Trinity Heights and Cedar Dale) with several intermediate areas of service supplied via inline boosters and pressure reducing valves. Each pressure zone includes one or more ground/elevated storage tanks that are designed to act both as pressure equalizer and fire protection storage within the area.

Once water has been treated at one of the three DWU treatment plants (Bachman; Elm Fork; East Side), the finished water is then pumped into the distribution system. Transfers from treatment plants are accomplished by means of "high service" pumps that are located at the plant sites and throughout the system. These "high service" stations are supplied directly from the plant clear wells. There are 30 pump stations, 11 clear wells, 12 ground storage reservoirs, and nine elevated storage tanks in the Dallas distribution system.

The treatment plant clear wells have a combined storage capacity of 90 MG; the ground storage reservoirs and elevated storage tanks have a total 178.4 MG and 15.5 MG, respectively. The total combined storage capacity of the system is approximately 260.4 MG.

DWU's treated water distribution system consists of approximately 4,982 linear miles of pipe. The capacity of the treated water distribution system is constantly being upgraded and re-assessed to improve the ability of the distribution system to meet customers' needs and to replace aging infrastructure.

### **4.4 Wastewater Treatment Plants**

DWU operates two wastewater treatment plants (WWTPs) - Central and Southside - that serve the City of Dallas as well as 11 wholesale wastewater customer cities. The WWTPs have a combined annual average flow permitted capacity of 280 MGD with 545 MGD 2-hour peak. A general description of the plants is as follows:

- Central WWTP is currently rated at 170 MGD and is located four miles south of downtown Dallas. The Central WWTP permit includes a future capacity of 200 MGD. The annual average flow for FY 2017-18 was 88.47 MGD. The Central WWTP consists of two parallel treatment trains known as the Dallas Plant and White Rock Plant. Each has influent pump stations, preliminary treatment facilities, primary clarification, trickling filters, and secondary clarifiers. The combined flow from the Dallas and White Rock plants is then pumped to common aeration basins, final clarifiers, chlorination, filtration, and de-chlorination facilities. Sludge from the Central WWTP is pumped approximately 13 miles to the Southside WWTP for additional treatment.
- Southside WWTP is currently permitted at 110 MGD and is located 18 miles southeast of downtown Dallas. The annual average flow for FY 2017-18 was 52 MGD. The Southside WWTP consists of an influent pump station, preliminary treatment facilities, primary clarification, aeration basins, secondary clarifiers, chlorination, filtration, and dechlorination facilities. The sludge

handling facilities at the Southside WWTP include solids thickening, anaerobic digestion, solids dewatering, and dedicated land disposal.

A small portion of the city's wastewater is transported to the Trinity River Authority (TRA) Central Regional Wastewater Treatment Facility and to the City of Garland Duck Creek WWTP. Additional DWU wastewater system data is presented in the TCEQ's Utility Profiles for Municipal and Wholesale Suppliers provided in [Appendix A](#). Also included in [Appendix A](#) is a map of DWU's water and wastewater treatment plants.

## **5.0 DWU's Water Conservation Program**

DWU continues to be a leader in water conservation efforts in the North Texas Region. DWU was the first in North Texas to implement mandatory Time of Day and Maximum Twice-Weekly watering requirements, and the first to have a public awareness campaign. Additionally, DWU continues to expand its diverse menu of incentive-based programs, public education and outreach strategies. Most recently, DWU revamped its SaveDallasWater.com website to reflect a fresh approach to interfacing with the public and a proactive social media presence.

This section provides a description of DWU's existing water conservation program and the enhancements or new conservation measures that are planned to achieve or exceed DWU's stated water conservation goal.

### **5.1 Accurate Supply Source Metering**

DWU has a comprehensive program to meter water diverted from supply sources within the DWU water system. All untreated water diversions or conveyances to the City of Dallas's Water Treatment Plants (WTPs) are metered. In the Eastern System, DWU has flow metering cap

at each of the raw water pump stations and at the outlet of the Tawakoni Balancing Reservoir. The East Side WTP utilizes raw water flow meters. In the Western System, water flows to the Bachman and Elm Fork WTPs by gravity, from the intake to the plants' respective low lift pump stations. Raw water is metered entering each plant. DWU contracts require that wholesale customers (treated and untreated water) use a meter that conforms to American Water Works Association (AWWA) standards with review and approval by DWU. The meters are calibrated in accordance with those standards to an accuracy of plus or minus 1.5 percent. This is well within the TCEQ requirement of 5 percent accuracy. All untreated water diverted from supply sources is compiled in an annual Surface Water Report, which shows diversions on a monthly basis.

### **5.2 Universal Metering, Meter Testing and Repair, and Periodic Meter Replacement**

**Universal Metering** – The current City of Dallas ordinance requires metering of all connections, except closed fire systems with alarms. Individual metering is required at all single-family residential locations. Most multifamily residential locations, such as apartments and condominiums, have master meters for each building. However, multifamily units are individually metered at the discretion of the owner or management company. Most commercial businesses are individually metered, although some are combined on a master meter. Irrigation metering is provided to some customers based on the individual needs of the user. All treated water pumped from the WTPs is compiled in an annual Pumped Water Report, which shows water pumped on a monthly basis.

Most of the treated water used by wholesale customers is metered by DWU using Venturi meters with rate-of-flow controllers (ROFCs). The remaining treated water usage by wholesale customers is metered by volumetric meters. All treated water pumped from the WTPs to treated water wholesale customers is included in the Annual Pumped Water Report.

***Meter Testing and Repair*** – All production meters are tested and calibrated in accordance with Dallas Water Utilities ISO standards. The city maintains a program to pull, test, and replace any meters determined to be functioning outside of these parameters.

***Periodic Meter Replacement*** – Most residential meters in the City of Dallas are replaced at 10- or 15-year intervals depending on meter size and accuracy life of the meter. Most large and high capacity general service meters are tested on an annual basis. DWU will also repair or replace any meter reported as inaccurate by a water customer.

### **5.3 Leak Detection, Repair, and Control of Unaccounted-for Water**

DWU has an extensive leak detection and repair program and is committed to maintaining a rate of less than 10 percent for unaccounted-for water losses in its water system. Annual unaccounted-for water, based on the difference between treated water pumped and sold, averaged 5.21 percent in 2018.

Currently, DWU has an annual budget of \$34 million for maintenance and upkeep of the distribution system. The majority of the budget is used for personnel, equipment, and materials. DWU operates 23 four-person repair crews. Most leaks, illegal connections, or abandoned services are discovered through the visual observation of field crews or are reported by the public.

DWU also has fourteen staff members to detect hard-to-find leaks. The Leak Detection Program has the goal of surveying the entire water system and improving the integrity of the water system by identifying weaknesses in water pipelines before breaks develop. The goal is to survey all pipelines every 2.5 years. Leak detection staff members utilize state-of-the-art leak detection equipment, including leak listening devices, leak noise loggers, and a leak noise correlator. The DWU leak detection program continues to meet and exceed its annual goal and in FY 2018 surveyed approximately 3,300 miles of the water system.

### **5.4 Monitoring and Record Management of Water Deliveries, Sales and Losses**

DWU regularly monitors all water deliveries and sales to both treated and untreated water customers. All critical data, such as raw water conveyances to WTPs or wholesale customers, treated water pumped, and unaccounted-for water losses are available on a regular basis, as needed. All water sources and service connection accounts are individually metered and read on a regular basis to facilitate accurate comparisons and analysis.

### **5.5 Continuing Public Education Program**

The City of Dallas' public education program is considered one of the best information and education programs in the State of Texas. DWU's program has received recognition from the Texas Water Development Board, the Texas Section of the American Water Works Association (TAWWA), the Texas Water Conservation Association, the American Advertising Federation, the U.S. Environmental Protection Agency (EPA), and the Obama Administration's 2011 Clean Water Framework Report. Specifically, the school program has received awards from the TAWWA, Keep Texas Beautiful, and the Oak Cliff Chamber of Commerce.

DWU has implemented a number of public education and outreach strategies, including an expanded public awareness campaign that incorporates both local and regional conservation messaging; the Environmental Education Initiative, focusing on K-12 students; a water conservation mascot; a revamped SaveDallasWater.com website; free irrigation system evaluations; free Industrial, Commercial and Institutional (ICI) Water Efficiency Assessments and Rebates; year-round water-wise landscape seminars and events, and a robust social media presence.

#### **5.5.1 Public Awareness Campaign**

Launched in the summer of 2002, the now regional public awareness campaign promotes water conservation using a well-diversified approach that includes broadcast and digital television ads, broadcast and digital radio ads, and social media advertising. The regional campaign is also featured on billboards on



heavily traveled thoroughfares, in messaging placed both inside and outside Dallas Area Rapid Transit (DART) buses and trains, and in print ads in a variety of community publications. The SaveDallasWater.com website contains information about water conservation programs for Dallas ratepayers, City of Dallas water conservation ordinance restrictions, and various sustainability events year-round. On August 1, 2018, a revamped version of the SaveDallasWater.com website was launched. The new website offers a curated selection of informative tiles and images focused around the many facets of conservation and programs available, providing the public with a more user-friendly, interactive experience.

Although the Dallas-Fort Worth area has four primary water providers, it is a single media market. As a result, the broadcast portion of the DWU public awareness media buy c delivers messages to customer of other water service providers, and any broadcast media purchase made by other water providers would reach DWU customers. In 2009, DWU formed a partnership with the Tarrant Regional Water District (TRWD) to minimize the potential for customer confusion by providing uniform regional water conservation messaging. This also resulted in campaign development savings and leveraged the media buy budget for both entities.

Since 2002, Dallas has spent nearly \$20 million on its public awareness campaign, thus demonstrating its continuing commitment to water conservation for the entire North Texas region.

### **5.5.2 Environmental Education Initiative K-12**

In FY 2006, DWU expanded its existing school education programs with an Environmental Education Initiative (EEI) to provide programs for grades kindergarten through twelve in the Dallas school district and in other area schools and private schools that serve City of Dallas residents. The EEI web site<sup>1</sup> is an online resource for teachers with links to videos on outdoor water use, indoor water use, watersheds, the power of many conserving, and surface-groundwater interactions. The web site also has a description of water lessons for kindergarten through fifth grade children. Teachers can register for a free in-class presentation through this web site. To date, the EEI program has reached more than 140,000 students, 376,000 City of Dallas citizens and trained more than 12,000 teachers, in a total of 272 public schools.

### **5.5.3 Water Conservation Mascot**

In 2005, DISD students elected Dallas' official water conservation mascot "Dew". Through frequent public appearances and community outreach, Dew helps to educate kids and adults alike about the importance of using water wisely. Dew has reached thousands of Dallas residents and businesses since his 2006 inauguration. More information on Dew's efforts can be accessed through the "Conservation for Kids" link on the city's water conservation webpage, [www.savedallaswater.com](http://www.savedallaswater.com).

### **5.5.4 Free Irrigation System Evaluations**

In 2007 DWU added two TCEQ-licensed irrigators to its water conservation staff and began providing free irrigation system evaluations. These inspectors serve residential and commercial retail customers and assist City of Dallas departments with proper irrigation system maintenance and operations. The evaluations include identification of potential system leaks, diagnosis of equipment malfunctions, recommended irrigation controller scheduling and recommendations for equipment upgrades to enhance efficiency. More than 7,000 inspections have been performed since the program was launched. Projected water savings based on implemented recommendations for FY 2018 is 16 MG/year. The irrigators also respond to high-bill concerns from DWU customers by evaluating their automatic irrigation systems for potential water loss and suggesting other areas of potential water savings.

DWU's licensed irrigators also work with Dallas departments on proper maintenance, operation of city irrigation systems and new system design. Over 200 irrigation system evaluations have been performed at Dallas parks facilities to date.

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<sup>1</sup> URL: <http://dallaseei.org/>.

### **5.5.5 Water Wise Landscape Events**

FY 2018 marked the 24<sup>th</sup> anniversary of the city’s Water-wise Landscape Tour of Homes and Public Gardens program. This initiative is designed to raise public awareness and save water by publicizing demonstration gardens, recognizing water-wise award winners, and promoting the replacement of water-thirsty yards with landscaping that requires minimal water and maintenance.

The City of Dallas has “water-wise” demonstration gardens at the historic White Rock Lake Pump Station and Texas Discovery Gardens at Fair Park. The use of water-wise landscaping is also promoted through year-round water-wise seminars and the city’s water conservation ([savedallaswater.com](http://savedallaswater.com)) web site which includes a list of water-wise landscape locations, photos and virtual tours.

It is difficult to quantify water savings achieved specifically from water-wise events. However, these programs heighten awareness of the beauty and reduced need for water and maintenance in the use of native and adapted plantings, as well as providing tools for landscape conversion and proper maintenance.

### **5.5.6 Other Public Education**

The City of Dallas also uses other approaches to public outreach, including water bill inserts, brochures, speaking engagements, special events and promotions, and conservation-oriented signage in City facilities. Since its inception in 2001, Dallas Water Conservation has hosted hundreds of free water-wise seminars, workshops and events year-round, promoting a variety of relevant conservation topics.

The City of Dallas has partnered with regional North Texas water providers Tarrant Regional Water District and North Texas Municipal Water District for the past several years, to host the Annual North Texas Regional Water Conservation Symposium. This collaborative event provides an opportunity for water conservation experts to present best management practices on a number of related topics. In 2018, the 12<sup>th</sup> Annual Regional Water Conservation Symposium hosted 130 water professionals from across the state. Other regions of the state, including the Central and Gulf Coast regions, host similar symposiums.

The City also recognizes that an important component of public education includes educating City of Dallas employees on the value of water. To that end, City of Dallas Water Conservation hosts a ‘Conservation on the Plaza’ event each Spring, in coordination with National Drinking Water Week. This event is an opportunity to provide in-reach to city employees in a fun, interactive way while collaborating with other City departments such as Dallas Fire and Rescue and Dallas Animal Services. Nearly 500 city employees attended the 2nd Annual Conservation on the Plaza event in 2018.

### **5.5.7 Industrial, Commercial, and Institutional (ICI) Free Water Efficiency Surveys**

In 2012, the Dallas City Council authorized an ICI Water Efficiency Survey Program to help ICI customers save water and money by identifying opportunities to increase water use efficiency and to reduce water, wastewater and energy costs. Those free assessments continue and include a full examination of:

- Cooling Towers, Boilers & Other Thermodynamic Operations
- Plumbing Fixtures, Fittings & Equipment
- Landscape Irrigation
- Food Service Operations
- Laundry Operations
- Laboratory & Medical Facilities
- Swimming Pools, Spas & Fountains
- Vehicle Washes
- Alternate Sources of Water

Over 400 water efficiency assessments have been performed since the program was launched, with an estimated water savings of over 400 million gallons per year if recommended process and equipment improvements are implemented.

### **5.5.8 ICI Hospitality Program**

In 2011, the Dallas City Council authorized a program to encourage hotels/motels and restaurants to expand their efforts to save water by participating in the city's Water Conservation Hospitality Program. The initiative was voluntary. Participating hotels and motels urged guests to embrace fewer linen and towel changes, as well as serving water on request only in their dining areas. In support, the City provided free public service announcements to participating lodging facilities to educate their guests about the program. Dallas area restaurants were also encouraged to serve water on request only. This simple measure not only saves our water resources but also provides energy savings through less frequent dishwasher and heated water use. Free marketing and promotional materials were provided for participating establishments. In total, 79 hotels and restaurants participated in the ICI Hospitality Program. In FY 2016/17, it was determined that the ICI Hospitality Program would merge with the Industrial, Commercial, and Institutional (ICI) Free Water Efficiency Assessments, where it remains as of FY 2017-18.

### **5.5.9 Planned Public Education Measures**

#### **ICI Training Programs (FY 2019)**

DWU plans to develop, lead, and manage ongoing water efficiency training programs for ICI facility managers and irrigators, with a focus on the EPA WaterSense programs. Topics will include industrial cooling and process, food processing, irrigation management, and leakage control. Bi-monthly or quarterly training programs will be conducted. As facility managers and irrigators become more aware of available water-efficient technologies and methods, they will begin to implement these measures. DWU will work with local businesses, green building organizations, and energy utilities to seek their input on the curriculum development and certification process.

#### **ICI Business Partnership Program (FY 2019)**

DWU plans to establish an ongoing Business Partnership Task Force or work group for the purpose of engaging the ICI community in DWU's water conservation program, particularly business leaders who represent companies that are top water users. The Task Force will meet four to six times per year for the purpose of discussing water conservation practices, sharing conservation success stories, and discussing DWU ICI water conservation programs.

### **5.6 City Leadership and Commitment Measures**

City leadership and commitment strategies are intended to demonstrate a strong commitment to water conservation, with the city "leading by example." To that goal, the City has expanded its water conservation staff, expanded its leak detection program, revised its water conservation ordinance, and conducted retrofits at City-owned facilities. In addition, the City uses its web site to publicize its leadership, commitment, and conservation practices. Moreover, in 2012 Dallas was the first municipality in North Texas to adopt a permanent ordinance limiting outdoor landscape watering to a maximum of twice weekly by implementation of a mandatory schedule. The ordinance served as a model for many cities across the region, the state and the nation.

#### **5.6.1 Water Conservation Division Staff**

DWU currently maintains 12 staff positions in the Water Conservation Division, up from 7 fulltime employees in 2005. Staff members are tasked with analyzing and tracking Best Management Practices (BMPs), providing customer water assessments, administering education programs, and facilitating retrofit programs. It is anticipated that additional staff may be added in the years to come, as new Conservation programs are introduced and current programs expanded further.

### **5.6.2 Retrofit of City Owned Facilities**

Retrofits of city facilities have included replacement of plumbing fixtures and irrigation audits and corresponding irrigation system improvements. Between the years 2016-2018, DWU partnered with the City departments of Economic Development, Housing/ Community Service, Planning and Urban Design and Park and Recreation to implement a water conservation and beautification project concentrated on the South Dallas/ Fair Park Community in Dallas. The project focused on the local area fire stations and the Martin Luther King Jr. Center and Library. Over a three year period the project achieved the following:

- 103 new trees and 2,150 native plants planted
- Traditional turf landscapes replaced with water-wise landscapes created, incorporating more than 30 tons of stone
- Retention basins added for the capture and re-use of storm water
- Plumbing upgrades in all buildings including:
  - Replacement and/ or retrofit of 65 toilets
  - Replacement of 67 lavatory sinks
  - Installation or retrofit of 75 lavatory faucets
  - Replacement of 67 urinals
  - Replacement of 6 water fountains
  - Replacement of 12 kitchen faucets

In all, the project resulted in an estimated water savings of 1.39 MG/Y. These improvements were made possible through the City Leadership and Commitment Grant Program which provides funding to City departments for water conservation activities. Grants are awarded on a competitive basis annually. Since FY 2009, grants totaling more than \$1.3M have been awarded, with a total estimated water savings of 3.95 MG/Y. For FY2019-20, grant funds have been awarded to the Office of Cultural Affairs and the Dallas Park and Recreation Department. The office of Cultural Affairs will use awarded grant funds to make indoor plumbing upgrades and retrofits to The Majestic Theater and The Kalita Humphreys Theater. Dallas Park and Recreation Department will use awarded grant funds to continue the Dallas City Hall median renovation design project, focusing on the Akard and Ervay medians, to demonstrate regionally suitable low water usage landscape design around Dallas City Hall.

### **5.6.3 Planned City Leadership and Commitment Measures**

#### **Water-Wise Landscape Design Requirements (Under Review FY 2020)**

DWU will collaborate with the city's Building Inspection Office to revise, upon City Council approval and adoption, its landscape ordinance to limit turf areas in all new landscapes and require low-water-use landscaping in other areas. Other requirements could include minimum soil depths, soil amendments, and turf grass dormancy capability. Turf grass requires more water than native grasses and low-water-use plants. Reducing the turf grass area in new landscapes will reduce irrigation water use.

#### **ICI Commercial Equipment Rule**

With the adoption of the International Green Building Construction Code (Section 5.14), the city has put into place requirements for certain water efficiency standards for newly constructed and newly-occupied ICI establishments.

## **5.7 Rebate and Incentive Programs**

DWU has implemented the following rebate and incentive programs: residential and multi-family toilet vouchers (*New Throne for Your Home*); Minor Plumbing Repair program; and the ICI rebate program. Each of these programs is described below.

### **5.7.1 Toilet Voucher Program**

The *New Throne for Your Home* program, initiated in July 2007, offers vouchers and rebates of up to \$90 for replacement of older, inefficient toilets with high efficiency (HET) models. Applicants must be DWU customers whose toilets were installed prior to January 1, 1994 and who do not already have water-efficient toilets. Single-family vouchers are limited to two per household. A rebate option is also available for \$90 per toilet. Multi-family requests are handled on a first-come, first-served basis, as funding is limited. The program is promoted in print, social media and on the savedallswater.com website.

To date, more than 110,000 toilets have been replaced through the *New Throne for Your Home* program. These efficient toilets are projected to save over 392 MG annually.

### **5.7.2 Minor Plumbing Repair Program**

In 2005, the Minor Plumbing Repair (MPR) program began with the goal of assisting low-to-moderate income water customers reduce water waste and increase water efficiency. The program replaces inefficient water use fixtures such as toilets (up to 2 per household), faucet aerators, and showerheads with efficient water use fixtures for qualified homeowners. The program also includes minor repairs to leaking faucets, hose bib leaks, easily accessible pipe joint leaks, and water heaters. To date, over 4,300 families have participated. Measures implemented through the MPR program are projected to save over 26 MG annually.

### **5.7.3 Industrial, Commercial and Institutional Rebate Program (Currently Undergoing Restructuring FY 2019)**

In FY 2011/12, the Dallas City Council authorized funding for ICI rebates in an effort to help industrial, commercial and institutional customers defray the costs for large water conservation projects. Up to \$100,000 (per project) in site-specific rebates are available to ICI customers towards the cost of new equipment and processes that conserve water at existing facilities. All ICI water users served by the City of Dallas Water Utilities, in good-standing, are eligible to apply. Five customers have received rebates to date, resulting in savings of 17.50 MG annually.

### **5.7.4 Planned Rebate and Incentive Measures**

#### **Residential Irrigation System Incentive (FY 2020)**

DWU plans to offer a rebate or other incentive to all single- and multi-family residential customers that retrofit their existing irrigation systems with water-conserving equipment. Qualifying equipment may include:

- Drip irrigation equipment
- Spray heads with greater distribution uniformity
- Smart irrigation controllers
- Other devices

## **Residential Clothes Washer Incentive (FY 2020)**

DWU plans to offer a rebate to single- and multi-family residential customers for replacing older, inefficient clothes washers with water-efficient models (modified energy factor of at least 1.8 and water factor of no more than 7.5). Efficient clothes washers use up to sixty percent less energy and up to forty percent less water than conventional machines.

### **5.8 Non-promotional Water Rate Structure**

DWU has a conservation-oriented rate structure for customers within the City of Dallas. Under the increasing block rate structure, customers are billed a water meter service charge which increases with the size of their meters. Customers are also billed for water usage and increasing usage results in a higher unit cost for water. To that end, DWU has incorporated conservation tiered rates into its structure since 2001. In 2018, DWU added its highest rate in a new fifth tier. Connecting higher rates to increased consumption discourages customers from wasting water. A copy of DWU's rates is provided in [Appendix A](#).

**Wholesale Customer Water Rates** – The rate structure for 98 percent of wholesale treated water customers is two-part, based on demand and volume. The remaining two percent is charged at a flat volume rate. Current wholesale customer contracts include a clause that promotes water conservation by discouraging high one-year water use and then returning to lower demand levels.

Under this provision, wholesale customers pay annual demand charges based on the current water year demand or the highest demand established during the five preceding water years, whichever is greater. Wholesale untreated water customers are charged either a non-interruptible rate or an interruptible rate.

### **5.9 Water Conservation Provisions in Wholesale Water Supply Contracts**

Current contracts between the City of Dallas and wholesale customers contain the following typical provisions related to water conservation: (1) the customer agrees to develop a water conservation plan which incorporates loss-reduction measures and demand management practices designed to ensure that the available supply is used in an economically efficient and environmentally sensitive manner, and (2) if Dallas grants authorization for the customer to sell water purchased from Dallas, then Dallas may establish the terms and conditions of the conveyance.

In accordance with 30 TAC § 288, the City of Dallas will include a requirement in every wholesale water supply contract entered into, 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 Chapter 288. 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 Chapter 288.

### **5.10 Reservoir Systems Operations Plan**

DWU operates the water supply system foremost to assure adequate, good quality available water throughout a drought as severe as the worst drought of record. Secondly, DWU considers operational economy. The Dallas water supply system consists of several surface water reservoirs, transmission facilities, water treatment plants and related infrastructure. Infrastructure maintenance and expansion to meet future water requirements are essential to system operations.

Reservoir water withdrawal procedures are prepared to assure that water supplies are conserved in the event of severe drought conditions. These procedures are periodically reviewed and revised as conditions change.

These operational procedures are tested using computer simulations maintained and operated by DWU staff. These models simulate lake operations over time periods of historical hydrologic records. The modeling includes projected water demands and the constraints of the transmission, water treatment and



distribution systems. Program utilization normally involves the trial operation of a set of lake operation procedures, assuming that the critical drought of record begins at the start time of the simulations.

DWU's computer program chooses monthly drafts from each lake based primarily on lake levels. When lakes are near full, less expensive western sources are drafted heavily. When these lakes drop to defined levels, their drafts are reduced and drafts are switched to more remote sources. Each potential operating rule is tested over the hydrological period of record to ensure the operation would not cause the supply in any reservoir to be exhausted should a drought equal in severity to the worst drought of record recur. The potential operating rules are compared, and from the results a set of operating guidelines for the upcoming year is developed. These guidelines are then modified if conditions warrant.

### **5.11 Means to Implement and Enforce the Water Conservation Plan**

DWU administers and implements various components of the Water Conservation Program within the City of Dallas as authorized by the Dallas City Code, Chapter 49, Water and Wastewater. The enforcement of the water rate structure and metering is automatic. Water conservation lawn and landscape restrictions are enforced by the Department of Code Compliance. The DWU budget includes funding for enforcement activities by the Department of Code Compliance equivalent to two full-time personnel. For wholesale customers, clauses within their water supply contracts require development of water conservation plans to ensure that available supplies are used efficiently.

### **5.12 Coordination with Regional Water Planning Groups**

DWU will provide a copy of this Water Conservation Plan to the Region C Water Planning Group. As the largest water supplier in the region, DWU will provide leadership and work with the Regional Water Planning Group to improve efficient utilization of existing water resources and/or develop new resources which meet the needs of the entire region.

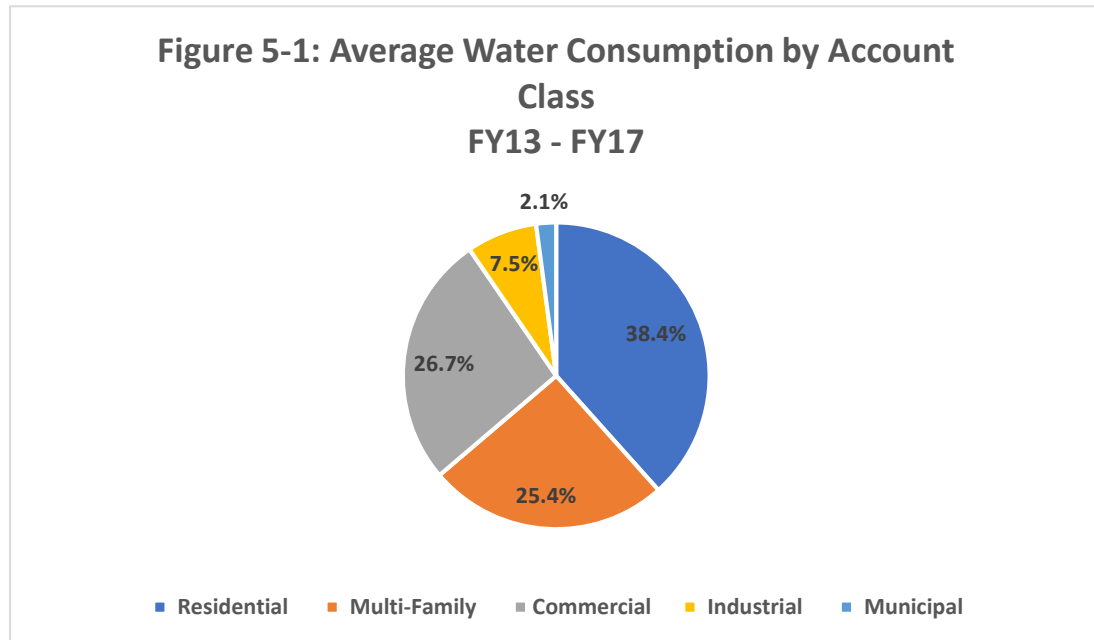
### **5.13 Desegregation of Water Sales by Customer Class**

DWU separates City of Dallas water customers into four general account classes:

- Residential – The Residential class includes single-family residences, individually and master metered duplexes, individually metered apartments, and individually metered mobile homes.
- General Services – The General Service class includes master metered multi-family housing, master metered apartments, and master metered mobile homes, office buildings, restaurants, hotels, churches, and other commercial and light industrial customers.
- Optional General Service – The Optional General Service class mainly consists of large industrial customers, but the data shown also include some master metered apartment complexes.
- Municipal – The Municipal class consists of city buildings, parks, fire stations, libraries, and some hospitals.

Based on the average retail water sold within the City of Dallas from FY 2012-13 through FY 2016-17, General Service and Residential customers account for most of the City's treated water consumption (Figure 5-1). To better illustrate actual water use in Figure 5-1, consumption within the General Service account class has been divided into two categories:

- GS Multi-Family, consisting of master metered multi-family housing, master metered apartments, and master metered mobile homes, and
- GS Commercial, consisting of the remainder of General Service accounts



#### 5.14 Plumbing Code Ordinances

The State of Texas has placed maximum flow rate requirements on plumbing fixtures. As of January 1, 2014, the law requires maximum average flow rates of 1.28 gallons per flush (gpf) for toilets and 0.5 gpf for urinals. Effective October 12, 2013, the City of Dallas amended the plumbing code by adopting the 2012 Edition of the International Green Construction Code of the International Code Council, Inc. with specified exceptions. Dallas's code at a minimum complies with State of Texas requirements.

#### 5.15 Water Waste Prohibition

*Dallas's water and wastewater ordinance prohibits the following wasteful practices:*

- Runoff from irrigation onto a street or other drainage area
- Irrigation of impervious areas
- Operation of an irrigation system with broken or missing sprinkler heads
- Irrigation during a precipitation event
- Irrigation between the hours of 10:00 a.m. and 6:00 p.m. from April 1 through October 31 of any year (except irrigation by hand and the use of soaker hoses)

In addition, the water and wastewater ordinance requires all irrigation systems to be equipped with rain-sensing devices and freeze sensors.

Beginning in April of 2012, additional changes were made to the ordinance allowing a maximum of twice-weekly lawn and landscape watering based on property street address. Provisions were included to allow temporary variances for specific situations that may require more than twice weekly watering.



## 5.16 Wastewater Reuse and Recycling

DWU has developed water recycling projects and plans for additional projects, as described in the following sections: direct reuse projects, indirect reuse projects, and contracts for return flows into Dallas reservoirs. Table 5-1 presents a summary of direct and indirect recycled water projects for DWU along with the projected water supply.

**Table 5-1: Summary of DWU Recycled Water Projects**

<b>Project</b>	<b>Projected 2020 Average Supply (MGD)</b>	<b>Projected 2070 Average Supply (MGD)</b>
<b>Direct Recycle Projects</b>		
Cedar Crest/ Stevens Park Pipeline	1.0	1.0
White Rock Pipeline Alternate/ Cedar Crest Pipeline Extension	2.2	2.2
<b>Indirect Recycle Augmentation</b>		
NTMWD/ DWU Exchange	23.0	31.1
Main Stem Balancing Reservoir	0.0	102
<b>Total</b>	<b>26.2</b>	<b>136.3</b>

### 5.16.1 Direct Reuse Projects

DWU provides recycled water from the Central WWTP to the Cedar Crest and Stevens Park golf courses for irrigation. The golf courses currently use up to 1.0 MGD. DWU plans to add additional customers on this line in the future for non-potable applications, such as irrigation and industrial uses.

DWU also plans to develop the White Rock Pipeline Alternative to provide recycled water for non-potable applications, such as irrigation and industrial uses.

### 5.16.2 Indirect Reuse Projects

DWU has agreed in principle with the North Texas Municipal Water District (NTMWD) to an exchange of recycled water. This planned exchange includes the following elements:

- DWU will use a portion of the recycled water discharged to Lewisville Lake from NTMWD-operated WWTPs in Frisco.
- Upon completion of a Main Stem Pump Station in approximately 2018, recycled water that originates from DWU WWTPs will be diverted from the main stem of the Trinity River to the NTMWD's East Fork Wetlands.
- Upon completion of the Main Stem Pump Station, DWU will use all recycled water discharged to Lake Ray Hubbard from NTMWD-operated WWTPs.

DWU identified in the 2014 Dallas Long Range Water Supply Plan (LRWSP) a Main Stem Balancing Reservoir. The Main Stem Balancing Reservoir is an off-channel reservoir that will store Dallas' permitted

reuse. The Main Stem Balancing Reservoir is anticipated to be constructed and connected by 2050 and has a project yield of 102 MGD.

### **5.16.3 Return Flow Permits**

Dallas has received a State water right permit for the return flows from its Southside and Central wastewater treatment plants as well as the City of Lewisville and Town of Flower Mound wastewater treatment plants.

### **5.17 Method to Monitor the Effectiveness of the Plan**

The effectiveness and efficiency of the water conservation program will be monitored on an ongoing basis by DWU staff. DWU determines the extent of water conservation by compiling implementation data, monitoring water consumption, modeling water demand, and tracking water conservation costs.

*Annual Report on Water Conservation Activities* – 30 TAC § 288 requires that each entity that is required to submit a water conservation plan to the TWDB or the TCEQ shall file an annual report to the TWDB on the entity's progress in implementing each of the minimum requirements in their water conservation plan. The 2019 report will be submitted May 1, 2019, in accordance with the requirement, provided in [Appendix X](#).

*Quantified Marketing Analysis* – DWU conducts surveys at the conclusion of each year's local and regional public awareness campaigns to evaluate and improve their effectiveness. Results are analyzed and used in planning for the subsequent year.