WATER CONSERVATION AND DROUGHT CONTINGENCY AND EMERGENCY WATER MANAGEMENT PLAN

MAY 2024

Tarrant Regional Water District
800 East Northside Drive
Fort Worth, TX 76102

ACKNOWLEDGEMENTS

Tarrant Regional Water District (TRWD) has modified this plan to maintain a consistent and regional approach to water conservation, drought response and emergency water management strategies. Certain sections of the plan were customized to meet the needs of TRWD customers. The plan was prepared pursuant to Texas Commission on Environmental Quality rules.

This document was originally approved by the TRWD Board of Directors on April 16, 2024. Questions regarding this Water Conservation and Drought Contingency and Emergency Water Management Plan can be directed to the Governmental Affairs Department at conservation@trwd.com.

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TARRANT REGIONALWATER DISTRICT

Water Conservation and Drought Contingency and Emergency Water Management Plan

MAY 2024

1. INTRODUCTION AND OBJECTIVES

The water supplies upon which we depend on are not endless resources. For one thing, drought conditions are a part of life here in North Texas. Droughts are unpredictable and have a direct impact on our water resources. Without rainfall and runoff, water supply reservoirs are depleted faster than they are replenished. In addition, the number of people living in our region is expected to almost double in the next 50 years. That means the demand for water will certainly rise – and meeting that need will be a challenge.

Growing population and economic development in North Texas has led to an increase in demands for water supplies. At the same time, local and less expensive sources of water supply are largely developed. In planning and developing new water supplies, water conservation strategies play a vital role in meeting TRWD's projected water needs. The 2022 State Water Plan reports that 20 percent of future water needs in Region C will be met through municipal conservation. Water conservation is the most cost-effective alternative for meeting new water demands. Therefore it is important that we use the water we already have more efficiently.

Over time, conserving water on a daily basis:

- extends the life of existing supplies to meet new water demands
- slows the drain on reservoirs making more water available during times of drought
- reduces peak supply requirements, which reduces wear and tear on existing infrastructure
- defers increases in capital and operating costs for existing systems, and
- delays the need for developing expensive, new water supplies.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has issued guidelines and requirements governing the development of water conservation and drought contingency plans for wholesale water suppliers. TCEQ guidelines and requirements for wholesale suppliers are included in Appendix B.

TRWD is a regional wholesale public water supplier serving four primary customers, the cities of Arlington, Fort Worth, Mansfield and the Trinity River Authority, and numerous

other customers across eleven counties. The service area includes Jack, Wise, Denton, Parker, Tarrant, Johnson, Ellis, Kaufman, Henderson, Navarro and Freestone counties. TRWD currently provides water to more than 2.4 million people. This plan replaces the plan dated May 2019.

The water conservation sections of this plan include measures that are intended to result in ongoing, long-term water savings. The TRWD drought contingency and water emergency response sections of this plan address strategies designed to temporarily reduce water use in response to specific conditions.

The objectives of this water management 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.
- 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.

This plan includes all the elements required by TCEQ. Some elements go beyond TCEQ requirements. Customers of TRWD wishing to add elements of this plan into their individual plan should coordinate with TRWD. The final adopted versions of customer water conservation and drought contingency plans including appendices, rules, resolutions and ordinances should be provided to TRWD and, if applicable, to TCEQ and the Texas Water Development Board (TWDB).

There are additional water saving measures not specifically mentioned in this plan. TRWD urges all water users to implement the highest level of water saving measures that are feasible. It also encourages all institutional, commercial and industrial entities to further their conservation and reuse efforts to the maximum extent practicable.

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

2.1 Conservation Plans

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. 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. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s)." [1] The elements in the TCEQ water conservation rules covered in this conservation plan are listed below.

Minimum Conservation Plan Requirements for Wholesale Water Suppliers

TRWD is a wholesale water supplier to cities and other customers in North Central Texas. In addition to municipalities, TRWD serves utility districts, water supply corporations, and smaller entities, such as schools and golf courses. The minimum requirements in the Texas Administrative Code for water conservation plans for wholesale water suppliers are covered in this report as follows:

- 288.5(1)(A) – Description of Service Area – Section 3 and Appendix C
- 288.5(1)(B) – Specific, Quantified Five and Ten year Goals – Section 4
- 288.5(1)(C) – Measure and Account Water Diverted – Section 5.1
- 288.5(1)(D) – Monitoring and Record Management System – Sections 5.2 and 7.4
- 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 6.1
- 288.5(1)(G) – Reservoir System Operation Plan – Section 6.2
- 288.5(1)(H) – Means of Implementation and Enforcement – Section 9
- 288.5(1)(I) – Documentation of Coordination with Regional Water Planning Groups – Section 6.3
- 288.5(3) – Review and Update of Plan – Section 10

Additional Conservation Strategies

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 Tarrant Regional Water District include the following:

- 288.5(2)(B) – Program to Assist Customers – Section 7

- 288.5(2)(C) – Program for Reuse and/or Recycling – Section 8.1
- 288.5(2)(D) – Other measures – Sections 8.2 (public education) and 8.3 (in-house conservation measures)

2.2 Drought Contingency Plans

The TCEQ rules governing development of drought contingency plans for wholesale water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.22 of the Texas Administrative Code, which is included in Appendix B.

For the purpose of these rules, a drought contingency plan is defined as, "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)." The drought contingency plan for TRWD is contained in Section 11 of this water management plan.

3. DESCRIPTION OF TRWD SERVICE AREA

The Tarrant Regional Water District (TRWD) was established in 1924 as a political subdivision of the State of Texas. TRWD is a regional wholesale water supplier located in North Central Texas. It provides untreated surface water to four primary customers in Tarrant County: the cities of Arlington, Fort Worth and Mansfield, and the Trinity River Authority (TRA). TRWD also provides water to some smaller utilities and other water user groups located near its reservoirs and infrastructure.

In addition to providing their own citizens with clean drinking water, Arlington, Fort Worth, Mansfield and TRA supply neighboring municipalities and/or utility districts with treated water and wastewater services. Tables 3.1 and 3.2 lists TRWD's direct customers (direct and indirect). An indirect customer refers to any successive wholesale customers of TRWD's primary customers.

TRWD has a total service area population of over 2.4 million. It is ultimately responsible for serving more than 70 cities across an 11-county area; however, several of those cities are not currently taking water. Figure 3.1 shows the TRWD service area and supply system, which covers 6,028 square miles in Jack, Wise, Denton, Parker, Tarrant, Johnson, Ellis, Kaufman, Henderson, Navarro and Freestone counties. All but one of these counties is located within the Region C Water Planning Group – one of 16 water planning groups established by the Texas Water Development Board (TWDB) to develop and revise comprehensive water plans for the state. Johnson County is part of the Region G Water Planning Group.

TRWD uses a system of reservoirs to meet the water needs of its customers. Most of its raw water supplies originate from reservoirs constructed and managed by TRWD. They include Lake Bridgeport, Eagle Mountain Lake, Cedar Creek Reservoir and Richland-Chambers Reservoir. Two smaller reservoirs in Tarrant County – Lakes Benbrook and Arlington – are used for terminal storage. The total permitted supply currently available to TRWD is 986,800 acre-feet. However, the firm yield of the reservoir system is lower and stands at 658,965 acre-feet. The permitted totals include 100,465 acre-feet from an indirect reuse project at Richland-Chambers Reservoir. The George W. Shannon Wetlands Water Recycling Facility began operation in October 2013. A future similar reuse project at Cedar Creek Reservoir will add 88,059 acre-feet to the system's supply. Additional information on TRWD's reuse and recycling efforts can be found in Section 8.1.

TRWD uses pump stations and approximately 267 miles of pipelines to transport water into Tarrant County from Cedar Creek and Richland-Chambers Reservoirs in East Texas. Total pumping capacity from the East Texas Reservoirs is currently approximately 640 million gallons per day (MGD). The water from Lake Bridgeport and Eagle Mountain Lake on the West Fork of the Trinity River is gravity fed into Lake Worth.

Further details of TRWD's reservoir operations can be found in Section 6.2. Table 3.3 summarizes key facts from the wholesale supplier profile.

Table 3.1

TRWD Direct Customers

Arlington, City of	Mansfield, City of
Azle, City of	Martin Marietta Materials Southwest
Benbrook Water Authority	McNarosa Ranch
Benbrook, City of	Midlothian, City of
Bridgeport Country Club	Mira Vista Country Club
Bridgeport, City of	Pinnacle Golf Club
Burnco	Resort Golf Club (Eagle Mountain)
Cedar Creek Country Club	Ridglea Country Club
Clearfork Association, Inc.	River Oaks, City of
Community Water Supply Corporation	Rockett Special Utility District
Constellation	Runaway Bay Golf Club
East Cedar Creek Fresh Water Supply District	Runaway Bay, City of
Elite at Whitestone Golf Club	Shady Oaks Country Club
Ennis, City of	Springtown, City of
Fort Worth, City of	Star Harbor, City of
Fort Worth Country Day School	Texas Water Utilities
Freestone/Calpine	Trinity River Authority
Hawks Creek Golf Club (City of Westworth Village)	Walnut Creek Special Utility District
Heidelberg Materials	Waxahachie, City of (TRA Ellis Co Project)
Jack Power LLC	Weatherford, City of
Jacksboro, City of	West Cedar Creek MUD
Kemp, City of	West Wise Special Utility District
Ke'Ohana Properties, Ltd.	Winkler Water Supply Corp.
Long Cove Development, Inc.	Wise County Power Company, LP
Mabank, City of	Wise County Water Supply District (City of Decatur)
Malakoff, City of	

Table 3.2

Wholesale Water Customers Served by TRWD's Primary Customers: the cities of Arlington, Fort Worth, Mansfield and the Trinity River Authority

Arlington	
Bethesda Water Supply Corporation	City of Grand Prairie
City of Dalworthington Gardens	City of Kennedale
Fort Worth (List includes current and future customers)	
City of Aledo	City of Lake Worth
Bethesda Water Supply Corporation	City of Northlake
City of Burleson	City of North Richland Hills
City of Crowley	City of Richland Hills
City of Dalworthington Gardens	City of River Oaks
City of Edgecliff Village	City of Roanoke
City of Everman	City of Saginaw
City of Forest Hill	City of Southlake
City of Grand Prairie	City of Westlake
City of Haltom City	City of Westover Hills
City of Haslet	City of Westworth Village
City of Hudson Oaks	City of White Settlement
City of Hurst	City of Willow Park
City of Keller	Dallas-Fort Worth International Airport
City of Kennedale	Trophy Club Municipal Utility District
Mansfield	
City of Grand Prairie	Mountain Peak SUD
Johnson County Special Utility District	
Trinity River Authority	
Cities served through Tarrant County Water Supply Project:	Buena Vista-Bethel Special Utility District
City of Bedford	City of Ferris

City of Colleyville City of Euless City of Grapevine City of North Richland Hills <u>Cities and entities served under the Ellis County contract:</u> Avalon Water and Sewer Service Corporation	City of Italy City of Maypearl City of Palmer Ellis County Water Control and Improvement District (City of Waxahachie)

Figure 3-1

Tarrant Regional Water District Service Area and Supply System Map

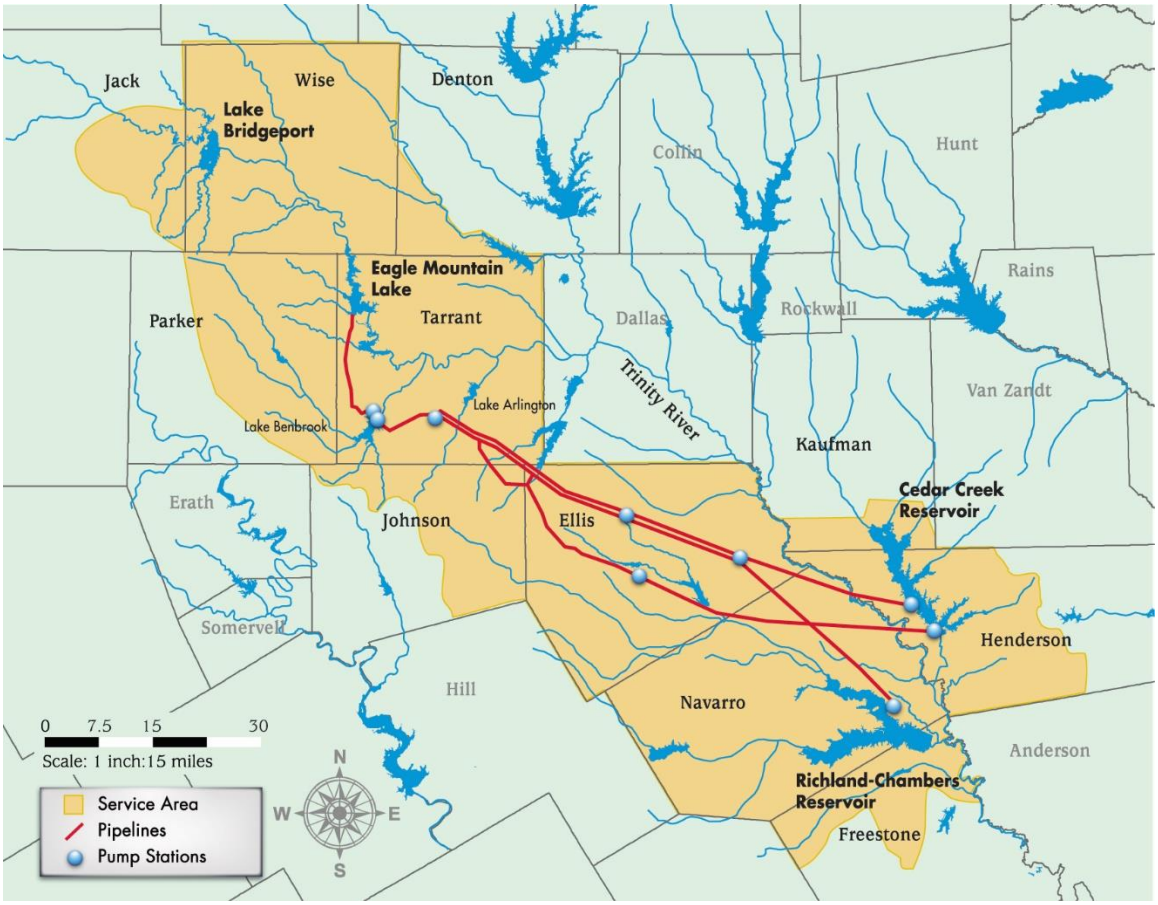

Table 3.3

Summary of Wholesale Public Water Supplier Profile for TRWD

TRWD Service Area:	6,028 square miles
Water Supply Sources (Year Impounded):	Lake Bridgeport (1931) Eagle Mountain Lake (1932) Lake Benbrook (1952) Cedar Creek Reservoir (1965) Richland-Chambers Reservoir (1987) George W. Shannon Wetlands (2013)
Distribution System:	Cedar Creek Pump Station & Pipeline: Year completed: 1972 Length: 74.0 miles Diameter: 72-inches and 84-inches Maximum capacity: 120 mgd Richland-Chambers Pump Station & Pipeline: Year completed: 1989 Length: 78.7 miles Diameter: 90-inches and 108-inches Maximum capacity: 240 mgd Benbrook Pipeline: Year completed: 1998 Length: 11.3 miles Diameter: 90-inches Maximum capacity: 200 mgd Eagle Mountain Connection Pipeline: Year completed: 2008 Length: 19.7 miles Diameter: 78, 84, and 96-inches Maximum capacity: 230 mgd Integrated Pipeline: Year completed: Ongoing with significant operations by 2020 Length: 80.6 miles Diameter: 84 and 108-inches Maximum capacity: 130 mgd
Population (2019 plan): Estimated Population in 2018: Projected Population in 2060:	 1,997,976 (*actual was 2,137,452) 4,238,822 (*update is 3,907,391)
Population (2024 plan): Estimated Population in 2023: Projected Population in 2070:	 2,439,797 4,230,629

*Since publishing the 2019 plan, a significant population correction occurred to more accurately account for the total number of people that were relying on TRWD water supplies currently and in the future. The estimated current population published in the previous plan underestimated the amount by 140,000 people. In addition, the service area population has grown by approximately 300,000 people over the last five years for an estimated current total of 2,439,797.

The projected population in the future was also reevaluated after the 2019 plan was published. A water demand study now projects the 2060 baseline scenario population to be approximately 330,000 people less than what was previously reported. The projected population served by TRWD in 2070 is estimated to be 4,230,629.

4. SPECIFICATION OF WATER CONSERVATION GOALS

TCEQ rules require the adoption of specific water conservation goals to be included in this water conservation plan. The goals must include five and ten year targets for water savings, including, where appropriate, target goals for total use in gallons per capita per day across the TRWD service area. However, as a wholesale water supplier, TRWD does not directly control the water use of its customers nor does it have a direct relationship with retail customers who are the consumers of water.

TRWD does control the operation of its water supply and delivery system and takes action to maximize water and energy efficiency. In areas under its direct control, TRWD adopts the following goals for water conservation and efficiency:

- Keep the level of unaccounted water in the system below 5%, as discussed in Section 5.2.
- Maintain universal metering of customers, meter calibration, and meter replacement and repair, as discussed in Section 5.2.
- Maintain a program of leak detection and repair, as discussed on Section 5.3.
- Continue to use indirect reuse as a major source of water supply, as discussed in Section 8.1.
- Continue to implement in-house water conservation efforts, as discussed in Section 8.4.
- Raise public awareness of water conservation and encourage responsible public behavior by a public education program, as discussed in Section 8.2.

As a wholesale provider, TRWD will assist its customers with water conservation. TRWD has developed programs and resources that its customers can use to create their own water conservation and drought contingency plans.

TRWD requests water utility customers to provide annual water conservation reports, modeled after the Utility Profile developed by TWDB. A copy of the report is included in Appendix F. TRWD will review these reports, compile the information and use it to inform water conservation program decisions.

In calculating target goals for per capita water savings among its users, TRWD focuses primarily on water use among its four primary customers in Tarrant County. The cities of Arlington, Fort Worth, Mansfield and the Trinity River Authority and their successive customers (listed in Table 3.2) receive an average of 92 percent of all water deliveries. Table 4.1 summarizes annual water use of all customers from 2019 to 2023. The data shown in the table reflect the following:

- Population estimates (Table 4.2) are based on information provided by the North Central Texas Council of Governments (NCTCOG). The art of estimating population is by no means an exact science. The NCTCOG methodology for

determining population is based on building permits, occupancy factors and household size factors. The figures are reviewed at a regional level for consistency with other indicators of regional population such as labor force estimates and vital statistics.[4]

- Populations of some TRA customers were adjusted to reflect the percentage of water needs it meets within those cities, (Grapevine: 74%; North Richland Hills: 33%). Populations were also adjusted for communities that rely on groundwater to supplement water supplies, (Bedford: 94%; Euless: 78%).
- The TRWD service area covers approximately 98% of Tarrant County. Its four primary customers and the customers they serve represent approximately 94% of the total Tarrant County population.
- The total gallons per capita per day (gpcd) figures represent all water uses among customers and are calculated by dividing total amount of water diverted for potable use by total population. Water use categories include residential, commercial, institutional, and industrial, as well as process-related and municipal system water losses.
- Rainfall data and number of 100-degree days recorded at DFW International Airport is also included to show the correlation between water use and precipitation. Higher water use is usually observed during periods of below average rainfall. This is predominantly due to an increase in the amount of water used for irrigation.

Table 4.1

Water Use among TRWD's Customers and their Successive Customers 2019-2023, including Rainfall, Number of Days Greater than 100 °F, Total Water Supplied, Estimated Population, and Total Gallons per Capita per Day

Year	Rainfall at DFW Airport (inches)	# of 100 °F days at DFW Airport	Total Water Supplied (acre-feet)	Estimated Population	Total Gallons per Capita per Day
2019	34.52	14	350,198	2,178,570	144
2020	43.70	9	364,666	2,230,171	146
2021	33.59	8	370,743	2,275,605	145
2022	36.64	47	428,121	2,383,709	160
2023	29.31	55	438,924	2,439,797	161
Current 5-Year Average Per Capita Use among TRWD's Customers without Credit for Reuse.					151

Total gpcd = [(total acre-feet supplied x 325,851 gallons/acre-foot) / population] / 365 days per year]

Table 4.2

Estimated Population Served by TRWD's Primary Customers and their Successive Customers 2019-2023 based on data from the North Central Texas Council of Governments

Year	Arlington	Fort Worth	Mansfield	Trinity River Authority
2019	386,180	1,271,542	68,520	183,189
2020	390,540	1,300,829	68,520	185,469
2021	393,420	1,328,437	73,510	188,232
2022	399,560	1,422,165	77,040	190,998
2023	405,420	1,444,733	82,285	192,235
Percent increase 2019-2023	4.98%	13.62%	20.09%	4.94%

In a special report to the 79th Legislature, the TWDB recommends a minimum annual reduction of one percent total gpcd, based upon a five-year rolling average until at such time as the entity achieves a total gpcd of 140 or less.[5] Table 4.3 shows projected total per capita water use for TRWD. Table 4.3 also includes TRWD's targets for reduction to total per capita use due to the implementation of this water conservation and drought contingency plan and the plans developed by its customers. The information shown in the table reflects the following:

- The target five and ten-year gpcd goals presented in the 2019 TRWD Water Conservation Plan were 158 for the five-year average in 2023 and 150 for the ten-year average in 2028. The goals represented a minimum annual reduction of one percent total gpcd based on a five-year average.
- The current five-year gpcd average from 2019-2023 is 151. During this period, mild summers and population growth helped impact a low gpcd from 2019 through 2021. Hot and dry summer conditions were experienced in 2022 and 2023 but mandatory watering restrictions were not activated per the Drought Contingency Plan.
- Looking back further, the 10-year gpcd average from 2014-2023 is 157 and just meets the previous 5-year goal set in 2019. This 10-year average may represent a more accurate gpcd to consider for long-term goals.
- Because of variability in weather, population growth, and customer water use patterns, five-year goals for this plan are a continuation of the goals presented in the 2019 plan through 2028. However, it will likely be a challenge to consistently reduce gpcd by 1% each year for the ten-year goal. A measured approach of reducing gpcd by half-a-percent each year after the next five years is proposed for the ten-year goal.

- The target for the five-year (2028) total per capita water use for TRWD customers and their successive customers is 150 gallons per capita per day in an average climatic year, as shown in Table 4.3.
- The target for the ten-year (2033) total per capita water use for TRWD customers and their successive customers is 146 gallons per capita per day in an average climatic year, as shown in Table 4.3.
- Projected total per capita water use figures are based on average climate conditions. Per capita water use in years with less precipitation, especially during the summer, may be more than projected here. Future goals will include realistic consideration for hotter and drier than average conditions.
- Indirect reuse diversion volumes may be credited against total diversion volumes for the purpose of calculating gpcd for targets and goals. TRWD has averaged 35,618 acre-feet per year of supplies from indirect reuse over the last 5 years. A conservative estimate of 13 gallons per capita per day credit from indirect reuse is presented for future 5 and 10-year goal calculations.

Table 4.3

Five-Year and Ten-Year Total Per Capita Water Use Goals for TRWD's Primary Customers and their Successive Customers (Total GPCD)

Description	Year	Target Per Capita	Per Capita with Reuse
Current 5-Year Average	2019-2023	151	138
Current 10-Year Average	2014-2023	157	
Previous 5-Year Goal	2023	158	149
5-Year Goal	2028	150	137
10-Year Goal	2033	146	133

Verification of annual water savings are from a model of TRWD's annual water use developed originally in 2013 and updated in 2020. The model was calibrated using water demands among the TRWD's primary customers prior to 2002 and before water conservation measures were put in place. The model is used to calculate what TRWD annual demands would be without conservation efforts and allows for a comparison with actual demands. The difference between the model's projected demands and actual consumption is assumed to be water savings. It is important to note that all of the highlighted savings cannot be completely attributed to TRWD conservation programs. Many factors such as inclining water rates, customer city conservation efforts, impact of rainfall amounts, number of days above 100 degrees Fahrenheit, natural toilet replacement, etc. are part of the estimated savings calculation.

Here are some highlights of the savings achieved from ongoing conservation efforts from 2002 through 2023 in Table 4.4:

- A cumulative savings of almost 246 billion gallons or 755,385 acre-feet.
- Over 22 billion gallons in annual average savings over the last five years. Representing an average conservation savings of approximately 61 mgd or almost 69,000 acre-feet per year.

Table 4.4

Estimated Annual Savings Due to Ongoing Water Conservation Efforts and, when activated, Drought Contingency Measures, 2007-2023

Year	Billion Gallons	Acre-Feet
2007	3.53	10,835
2008	4.76	14,604
2009	5.92	18,180
2010	7.52	23,066
2011	9.35	28,701
2012	10.14	31,113
2013	11.78	36,166
2014	11.96	36,707
2015	14.63	44,907
2016	17.41	53,434
2017	18.45	56,624
2018	18.81	57,739
2019	19.24	59,032
2020	19.55	60,009
2021	20.83	63,928
2022	25.05	76,883
2023	27.19	83,457
Total Savings	**246.12**	**755,385**

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5. METERING, WATER USE RECORDS, CONTROL OF UNACCOUNTED WATER, AND LEAK DETECTION AND REPAIR

One of the key elements in water conservation is careful tracking of water use and control of losses. Accurate metering of water deliveries and detection and repair of leaks in the raw water delivery system are essential elements of TRWD's program to control losses.

5.1 Practices to Measure and Account for the Amount of Water Diverted

TRWD uses two different methods to measure raw water diversions from its reservoirs. Water supply releases from Lake Bridgeport are made using either a 48-inch gate valve or a 42-inch gate valve. Releases from Eagle Mountain Lake are made using one of two 48-inch diameter gate valves. A discharge rating curve has been developed for each valve at the lakes. This allows for the volumetric flow rate to be calculated based on the size of the valve opening. Periodic calibration of the rating curves occur as additional discharge data is collected. TRWD measures its raw water diversions from Cedar Creek and Richland-Chambers Reservoirs by meters with accuracy ±5%. The master meters are calibrated and repaired or replaced as needed.

5.2 Monitoring and Record Management Program for Determining Deliveries, Sales, and Losses

As a wholesale water supplier, TRWD has instituted a monitoring and record management program to assure that its customers are charged appropriately for their water use. The program includes the following elements:

- TRWD performs both scheduled and random readings of customer meters. A minimum of one reading is taken during each of the first three quarters of the year (January through March, April through June, and July through September). One additional reading is taken between September 20 and October 10. In addition, one random reading is performed annually between June 1st and September 30th.
- All meters are documented and the serial number is verified and recorded at each reading.
- Customers with annual demands less than 7,500 acre-feet are required to document their usage in a monthly raw water report. In addition to usage, the report also includes initiation dates, usage dates, customer name changes and meter status changes.
- Customers with a demand of 7,500 acre-feet or more, or those diverting directly from the pipeline, must provide TRWD with a daily usage total and a monthly reconciliation of usage. Usage volumes are monitored and recorded daily. These data are also verified monthly and annually.
- Customers are required to provide, operate, maintain, and read meters. By contract, meters must have a minimum accuracy of ±5%. TRWD can access the meters at all reasonable times and, upon written request, can have the meters calibrated once per month. In the event that a meter is not functioning properly, the customer is required to either install a new meter or repair the existing meter within 180 days.

- TRWD has the authority to replace or repair any meter.
- Methods to verify water deliveries include calibration tests, mathematical calculations, and estimations based on historical meter data under similar conditions.
- There are flowmeters located at various pump stations in the TRWD system. There are also full port insertion mag meters at the vertical turbine pumps at Benbrook Lake, Richland-Chambers Reservoir and Cedar Creek Lake. There are 26 thermodynamic sensors at horizontal centrifugal pumps. The thermodynamic flowmeters have proven to be extremely accurate, require much less infrastructure than conventional Venturi meters, and have resulted in reduced costs.
- TRWD reconciles the water deliveries and reservoir diversions into daily hydrologic mass balances. All of TRWD's reservoir levels and local precipitation are monitored from USGS recording stations. Evaporation rates based on data from NOAA are calculated daily with a script that queries real-time data published to the internet. This practice was instituted in 2017. Using all of the above data, daily mass balances of each reservoir are performed to calculate natural inflows.

5.3 Metering and Leak Detection and Repair

The TRWD metering program for raw water is described in Sections 5.1 and 5.2. The following information details TRWD's program to control, detect and repair leaks of its pipeline system:

- All TRWD water transmission pipelines are pre-stressed concrete cylinder pipe or welded steel cylinder pipe with an internal protective liner and an external protective coating. TRWD's commitment to properly operating a cathodic protection system, pressure transient reduction measures, and a pipeline integrity program have greatly extended the useful life of our pipelines, and have reduced the chance of failure.
- Most joints in TRWD pipelines are designed with bell and spigot joint construction including rubber gasket. Some joints are welded. For larger lines, each joint is also sealed with concrete.
- All TRWD water pipelines are constructed within legally defined and identified rights-of-way, properly registered with authorities in each county.
- TRWD conducts annual inspections of prioritized areas of the Cedar Creek and Richland-Chambers pipelines using an advanced technology to assess the condition of pipe segments. The method, which uses remote field eddy current transformer coupling technology (RFEC/TC), is a non-destructive way of detecting broken wires in pre-stressed concrete pipe. Using GIS tools, TRWD updates the risk of the failure of distressed pipes based on these condition assessments, and prioritizes the most critical pipes for replacements and repairs. Most pipeline repairs are conducted during the winter when demands are typically at their lowest. In addition to the internal pipe inspections, TRWD personnel also routinely inspect pumping equipment, facilities, and pipelines for leaks or mechanical problems. Aerial surveillance and ground observations are used to regularly inspect pipeline routes

for breaks and leaks. Repairs are undertaken as soon as practicable in order to minimize waste.

- TRWD operates a program for right-of-way identification for construction projects adjacent to facilities and pipelines in order to minimize leaks caused by pipeline damage during construction.

TRWD conducts annual water loss audits of its pipeline system using AWWA's Water Loss Control Committee's Free Water Audit Software v4.2. The program compares total pumped volumes to billed metered diversions. The results indicate that TRWD losses do not exceed an accepted standard of meter error of five percent, which is one of the goals of TRWD's water conservation program.

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6. OTHER REQUIRED MEASURES

6.1 Requirement for Water Conservation Plans by Wholesale Customers

Every new, renewed or extended contract for the wholesale sale of water by TRWD includes a requirement that the primary wholesale customer, and any wholesale customers of the primary wholesale customer, develop and implement a water conservation plan meeting the requirements of Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code. This requirement extends to each successive wholesale customer in the resale of water.

6.2 Reservoir System Operation

Water rights granted to TRWD by the TCEQ allow annual diversions from each reservoir as follows:

Lake Bridgeport (local)	15,000 acre-feet per year
Lake Bridgeport (local & downstream releases)*	78,000 acre-feet per year
Eagle Mountain Lake	159,600 acre-feet per year
Eagle Mountain Lake – ExFlo**	63,899 acre-feet per year
Lake Benbrook	72,500 acre-feet per year
Lake Benbrook – ExFlo**	78,653 acre-feet per year
Cedar Creek Reservoir	175,000 acre-feet per year
Cedar Creek Reuse***	88,059 acre-feet per year
Richland-Chambers Reservoir	210,000 acre-feet per year
Richland-Chambers Reuse	100,465 acre-feet per year

* 78,000 acre-feet per year can be released to Eagle Mountain Lake, of which 12,000 can be used in Jack and Wise County.

** ExFlo permits allow for additional diversions when certain conditions are met, including the reservoir being above conservation storage elevation and Lake Livingston being at or above conservation storage elevation.

*** The Cedar Creek indirect reuse project represents future water supplies. The wetlands facility associated with this reuse water right is currently under design and is anticipated to be in operation by 2032.

Permitted annual diversions do not reflect the amount of water TRWD can safely deliver to its customers. The following list of sources depicts the 2020 firm yield of TRWD's reservoir system based on the 2021 Region C Water Plan. Firm yield of a reservoir is typically defined as the maximum water volume that could be delivered without failure during a repeat of the historical drought of record. TRWD currently uses safe yield to depict its supplies in Region C Regional Water Supply Planning. Safe yield is a more conservative calculation of supply than either permitted or firm yield.

West Fork Reservoirs (includes Lake Bridgeport and Eagle Mountain Lake)	115,908 acre-feet per year

Cedar Creek Reservoir	204,587 acre-feet per year
Richland-Chambers Reservoir	221,565 acre-feet per year
Lake Benbrook	6,740 acre-feet per year
Lake Arlington	9,700 acre-feet per year
Reuse – Richland-Chambers	100,465 acre-feet per year
TOTAL	**658,965 acre feet per year**

TRWD's water supply network includes 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 for its various sources of supply seeks to maximize efficiency of water withdrawals within the constraints of existing water rights. Other priorities include providing flood control benefits, maintaining water quality and minimizing potential impacts to recreational users, fish, and wildlife. Each reservoir is operated based on a policy of flood release above the conservation elevation. Due to the geographic locations of the reservoirs, TRWD's reservoirs are often referred to as the "West Fork Reservoirs" (Lake Bridgeport and Eagle Mountain Lake), and the "East Texas Reservoirs" (Cedar Creek Reservoir and Richland-Chambers Reservoir).

Lake Bridgeport, Eagle Mountain Lake and Lake Worth are located on the West Fork of the Trinity River; Lake Bridgeport is located in Wise and Jack counties; Eagle Mountain Lake sits downstream in northwest Tarrant County; and Lake Worth is further downstream in Tarrant County. In addition to water supply, these reservoirs are used to regulate floodwaters on the West Fork. Lake Worth is owned and operated by the City of Fort Worth, but is integral to the TRWD water supply system, as some water treatment plants divert water directly out of Lake Worth.

TRWD may divert 93,000 acre-feet per year from Lake Bridgeport: 15,000 ac-ft/yr to Jack & Wise County; 78,000 ac-ft/yr to Eagle Mountain Lake, of which 12,000 can be used in Jack and Wise County. TRWD may divert a maximum of 159,600 acre-feet per year from Eagle Mountain. The combined estimated firm yield of Lake Bridgeport and Eagle Mountain Lake is 115,908 acre-feet per year.

Water is gravity fed from Lake Bridgeport to Eagle Mountain Lake, and from Eagle Mountain to Lake Worth. The City of Fort Worth operates water treatment plants that divert water from Eagle Mountain Lake and Lake Worth, and distribute treated water within the City of Fort Worth, as well as to neighboring cities and industries. One of the objectives of TRWD's operation of the West Fork reservoirs is to maintain the elevation of Lake Worth to support the intake of Fort Worth's Holly Water Treatment Plant. TRWD follows a series of operational rules to minimize spills and evaporation, and regulate the elevation in Lake Worth. The TRWD system operation plan calls for a shift in water supply deliveries from the East Texas reservoirs if the combined storage capacity in Lake Bridgeport and Eagle Mountain Lake falls below 50 percent.

In 2008, the Eagle Mountain Connection Project was constructed, which included a 20.5-mile pipeline extension from an existing pipeline at Lake Benbrook to Eagle Mountain

Lake, a booster pump station, and balancing reservoir. The Eagle Mountain Connection allows for water from East Texas Reservoirs to be delivered into Eagle Mountain Lake for terminal storage. The additional water helps to meet the water needs of a rapidly growing northwest Tarrant County, and reduces demand on the West Fork during periods of peak demand (summer) and drought. It also supplies the expanded capacity of the City of Fort Worth's Eagle Mountain and Westside Water Treatment Plants.

Cedar Creek Reservoir is located in Kaufman and Henderson counties; Richland-Chambers Reservoir is located in Navarro and Freestone counties; Lake Arlington is located on Village Creek in Tarrant County; and Lake Benbrook is a U.S. Army Corps of Engineers project in southwest Tarrant County. Lake Arlington is owned and operated by the City of Arlington, and is used primarily for terminal storage by TRWD. The City of Arlington and TRA both have plants that divert water directly from Lake Arlington, and provide treated water to their various customers. Lake Benbrook is also used as terminal storage by TRWD. Water can be released from Lake Benbrook into the Clear Fork of the Trinity River to supply Fort Worth's Holly Water Treatment Plant. Water can be pumped from Lake Benbrook back east to Rolling Hills Water Treatment Plant and several other plants that divert directly off the pipeline. Water is pumped from Lake Benbrook westward to supply Westside Water Treatment Plant. Benbrook Water Authority and the City of Weatherford are also supplied directly from Lake Benbrook.

The permitted use from Cedar Creek Reservoir is 175,000 acre-feet per year. A 70-mile pipeline is used to transport water from Cedar Creek into Tarrant County. An outlet on the Cedar Creek pipeline allows TRWD to discharge water into Village Creek which flows into Lake Arlington. Richland-Chambers Reservoir has a permitted use of 210,000 acre-feet per year. TRWD constructed a 78-mile pipeline to carry water from Richland-Chambers into Tarrant County. Both East Texas pipelines terminate at the City of Fort Worth's Rolling Hills Water Treatment Plant. A pipeline extension from Rolling Hills to Lake Benbrook was completed in 1998. In 2018, the first phases of a new 108" transmission pipeline and large-scale pump station system were completed. This project is known as the Integrated Pipeline (IPL) and is constructed in partnership with City of Dallas (Dallas). Significant operation began in 2020, and TRWD's portion of the completed IPL is anticipated to be complete around 2040. This pipeline provides additional supply capacity from existing East Texas Reservoirs, future connection capability with Dallas reservoir supply, and improved technological and online storage functions that greatly increase the versatility and reliability of the water supply system.

TRWD manages deliveries from its East Texas reservoirs to meet customer needs and to supplement lake volumes in Eagle Mountain Lake, Lake Arlington, and Lake Benbrook during off-peak periods. The yields from the latter two lakes are less than 10,000 acre-feet per year, so most of the supply is by pipeline delivery. Under normal operating conditions, TRWD diverts water in excess of demands into Lake Arlington and Lake Benbrook. The goal is to supplement the reservoirs in conjunction with natural hydrologic inflow to maximize terminal storage and meet peak demands during the summer. Using Lake Arlington and Lake Benbrook to provide summertime water deliveries to customers minimizes energy costs.

TRWD has permits for two indirect reuse projects at Richland-Chambers and Cedar Creek Reservoirs. The projects involve diverting return flows in the Trinity River through constructed wetland systems to remove nutrients and sediment. The water is then routed into the reservoirs to supplement yields by nearly 50 percent. The wetland water reuse facility at Richland-Chambers began full operations in Fall 2013. The wetland facility at Cedar Creek is currently under design with plans to be operational around 2032. Additional details about the water recycling projects can be found in Section 8.1.

6.3 Water Conservation Implementation Report

Appendix D includes the TCEQ required water conservation implementation report. The report is due to the TCEQ by May 1, 2024, and every five years after that date. This report tracks water demands over a five-year period, and provides an overview of TRWD's water conservation programs. The report also calls for the five and ten-year per capita water use goals from the previous water conservation plan. The reporting entity must answer whether or not these goals have been met, and if not, why not. The amount of water savings is also reported.

6.4 Coordination with Regional Water Planning Groups

Appendix I includes a copy of a letter sent to the Chair of Region C water planning group with this water conservation and drought contingency plan.

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7. TRWD WATER CONSERVATION MEASURES TO ASSIST CUSTOMERS

TRWD will implement a number of water conservation measures intended to help direct and indirect customers with their water conservation planning, including:

- Holding water conservation workshops for the staff of customers within its service area.
- Provide water conservation and drought contingency plan support for customers developing their own plans.
- Requiring an annual report on water conservation efforts from customers and developing a TRWD water conservation report.

These measures will allow TRWD to serve as a regional resource for water conservation efforts in its service area.

7.1 Water Conservation Workshops

TRWD will continue to coordinate water conservation workshops for staff of customer cities (direct and indirect) that receive water from TRWD. Past workshops have covered topics related to automated metering infrastructure, leak detection, water loss audits, and effective communication. TRWD will continue to collaborate with customer cities for workshop topic requests.

In 2007, TRWD held the first water conservation symposium for its customer cities and it has been an annual event ever since. Speakers from across the nation are invited to share their experience and expertise. Discussions center on key elements of successful water conservation programs. The symposium's success attracted the attention of other water suppliers. Since 2019, the symposium has been jointly coordinated by the region's four major water providers – TRWD, North Texas Municipal Water District, City of Dallas and Upper Trinity Regional Water District. Last year, the 17th Annual North Texas Regional Water Conservation Symposium was held in Coppell, Texas and had over 100 water conservation professionals in attendance.

7.2 TRWD *Model Water Conservation Plan for TRWD Customers* and *Model Drought Contingency Plan for TRWD Customers*

In order to assist its cities in the development of their own water conservation and drought contingency plans, TRWD will develop a *Model Water Conservation Plan for TRWD Customers* and a *Model Drought Contingency Plan for TRWD Customers*. The model water conservation plan will address the TCEQ requirements for water conservation plans for municipal use by public water suppliers and include several provisions that go beyond TCEQ requirements. TRWD will work with its customers to develop water conservation and drought contingency plans using the model plan as a guide.

The model water conservation plan will include the following elements addressing TCEQ requirements for water conservation plans for public water suppliers:

- 288.2(a)(1)(A) – Utility Profile
- 288.2(a)(1)(B) – Record Management, Customer Classification
- 288.2(a)(1)(C) – Specification of Goals
- 288.2(a)(1)(D) – Accurate Metering
- 288.2(a)(1)(E) – Universal Metering
- 288.2(a)(1)(F) – Determination and Control of Unaccounted Water
- 288.2(a)(1)(G) – Public Education and Information Program
- 288.2(a)(1)(H) – Non-promotional Water Rate Structure
- 288.2(a)(1)(I) – Reservoir System Operation Plan
- 288.2(a)(1)(J) – Means of Implementation and Enforcement
- 288.2(a)(1)(K) – Coordination with Regional Water Planning Group
- 288.2(a)(2)(A) – Leak Detection, Repair, and Water Loss Accounting
- 288.2(a)(2)(B) – Record Management System
- 288.2(a)(2)(C) – Requirement for Water Conservation Plans by Wholesale Customers

TRWD's model water conservation plan will also include water conservation strategies that go beyond TCEQ's requirements such as:

- 288.2(a)(3)(A) – Conservation Oriented Water Rates
- 288.2(a)(3)(B) – Ordinances, Plumbing Codes or Rules on Water-Conserving Fixtures
- 288.2(a)(3)(D) – Reuse and Recycling of Wastewater
- 288.2(a)(3)(F) – Landscape Water Management Ordinance
- 288.2(a)(3)(G) – Monitoring Method

7.3 Annual Reports

One element of tracking conservation progress is a requirement that all water supply customers (direct and indirect) produce annual conservation reports (Appendix F) by May 1 of the following year and submit them to TRWD. TRWD will compile these reports and use them to help generate its own annual water conservation report. TRWD's report will be used to review the effectiveness of its water conservation program.

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8. ADDITIONAL TRWD WATER CONSERVATION MEASURES

8.1 Indirect Reuse and Recycling of Water

Indirect and/or direct reuse is a major part of future water supply plans for North Texas. TRWD is taking a lead role in water reuse by recycling return flows in the Trinity River. Return flows are a renewable resource as they are made up of water discharged by area wastewater treatment plants. A large portion of those flows originated from reservoirs managed by TRWD.

Here's how indirect reuse projects work:

A) Treated water from area lakes is consumed in homes and business.

B) Water that flows down the drain ends up at a wastewater treatment plant.

C) Wastewater treatment plants clean the water and release it into the Trinity River. However, discharges from wastewater treatment plants can contain elevated levels of nutrients, such as nitrogen and phosphorus.

D) As the water flows downstream, it picks up sediments, more nutrients, and other pollutants along the way.

E) The return flows are captured and pumped into constructed wetlands. The wetlands provide a natural way to remove sediments and nutrients from the river water.

F) With most of the sediments and nutrients removed, the naturally treated water is returned to area lakes to supplement drinking water supplies.

G) Water from lakes is pumped to drinking water treatment plants, then back into homes and businesses and reused.

The first of TRWD's two planned indirect reuse projects began supplementing water supplies in fall 2013. The George Shannon Wetlands Water Recycling Facility is a 2,000-acre constructed wetland system adjacent to Richland-Chambers Reservoir. The project is permitted to supply 100,465 acre-feet of treated river water to the reservoir annually, which averages out to more than 89 million gallons per day (MGD).

Another 2,000-acre facility is planned for Cedar Creek Reservoir, as water demands increase. When completed, the second wetland project will add 88,059 acre-feet to the reservoir. These unique projects will ultimately supplement current yields in each reservoir by nearly 50 percent.

8.2 Public Outreach Programs

TRWD will work closely with its customers (direct and indirect) to inform consumers on ways to use water more efficiently. TRWD's public outreach programs are intended to assist and supplement the public outreach efforts of its customers. TRWD's public outreach programs include the following:

Regional Water Conservation Public Awareness Campaign

TRWD participates in the regional water conservation public awareness campaign with the City of Dallas and North Texas Municipal Water District. The current campaign, "Water is Awesome. Use It. Enjoy It. Just Don't Waste It," is entering its 9th year and includes television, radio, print and digital media. Media outreach is used to increase public awareness on the value of water and encourage adoption of outdoor water efficient behaviors.

Twice-per-Week Watering Best Management Practices

Outdoor water use, particularly lawn watering, can account for half or more of annual residential water use – and much more than that during the hot, dry Texas summers. Many homeowners have a tendency to overwater by as much as 2-3 times the amount needed by landscapes. Adopting twice-per-week best management practices on outdoor watering with sprinklers is an effective way to reduce excessive water use and stretch existing supplies.

TRWD fully supports the efforts of its customer cities to adopt year-round twice-per-week watering schedules and strives for participation from all customers. The City of Fort Worth took a lead in this effort by adopting an ordinance in spring 2014. As a result, many of their customer cities have also adopted a similar ordinance.

Regional Landscape Initiatives Evaluation

In 2021, the North Texas Regional Water Providers published the "Regional Landscape Initiatives – Best Management Practices for North Texas Water Conservation Programs" document. As a guide of proven programs and ordinances that reduce water waste and improve efficiency, customer cities of TRWD are encouraged to review the resource and adopt the measures to advance long-term water conservation goals. This document can be reviewed in Appendix G.

TRWD Strategic Water Conservation Plan Update

TRWD adopted its first Strategic Water Conservation Plan in 2013. The document included a review of conservation programs throughout the country, evaluation of different conservation measures, selection of effective programs and an implementation plan. TRWD will begin an update of the plan in 2024, anticipates it will take approximately one year to complete and requests that customer cities participate in the process.

Residential Sprinkler System Evaluation Program

The Residential Sprinkler System Evaluation Program uses trained licensed irrigators to assess residential sprinkler systems. Upon inspection they make recommendations for improving system performance, identify repair needs, and instruct users on how to schedule controllers to eliminate unnecessary outdoor watering. The evaluation also includes an opportunity to educate residents about their sprinkler systems and offers guidance on how much and how long to water throughout the year. In 2023, over 2,000 evaluations were provided throughout Tarrant County.

Demonstration Gardens

In 2015, TRWD installed a demonstration landscape garden at its main office location. It has since been incorporated into the "TRWD Rainscapes" project. Landscape features for the project include native and adapted plants, natural materials, a rain garden, pervious surfaces, efficient sprinkler system components, rainwater harvesting cisterns and a constructed wetland. In conjunction with the 2017 creation of the Airfield Falls Trailhead on a tributary of the West Fork of the Trinity River, TRWD built a destination water conservation garden with easy public access. Both gardens are used to educate homeowners, developers, civic groups and landscapers about the benefits of water efficient landscaping practices that conserves and protects water quality.

Conservation Treasures Program

TRWD created the Conservation Treasures Program in 2020 to promote environmentally responsible landscape features that inspire our community to appreciate and conserve water. The program assists in the creation and development of outdoor spaces that encourage public interest in water conservation, sustainable landscaping practices and local native, drought tolerant plants. Assistance is available for school and community gardens and outdoor features that demonstrate conservation strategies.

ET Weather Station Support and Weather-based Weekly Watering Advice

TRWD owns and operates four weather stations in Tarrant County. The stations are integrated into the Texas ET Network. Texas ET Network and National Weather Service data is used to calculate accurate weekly watering advice across North Central Texas and the service is map based. Users can sign up to receive weekly emails and/or text messages every Monday for that week's watering advice. The advice is also shared through social media channels and WaterIsAwesome.com. The program gives residents information to water only when needed and to reduce overwatering. It is a regional program and funded by City of Dallas and TRWD. Across the region, over 17,000 residents have signed up for the weekly watering advice service.

Drought Outreach and Customer Assistance

With drought potentially looming on the horizon in any given year, TRWD offers regional support to customer cities. The support mainly consists of developing media messages for use on television, radio, web, and in print outlets. The media effort focuses on educating water users on drought stage restrictions and mandatory outdoor watering schedules. In the past, TRWD has covered the cost of printing sign materials for customer use throughout its service area.

Save Tarrant Water Online Presence

TRWD manages SaveTarrantWater.com as a resource to consumers. Program information, do-it-yourself videos, and Green Pros listing can be found on the website. Save Tarrant Water is also active on social media as a way to promote new information, provide tips,

and support customer efforts. An electronic newsletter, called "Save Tarrant Water Monthly Drop", was created in 2021 as another means to reach the public.

Youth Education Program

Educating future water users about water and water conservation is a key responsibility of providers. Since starting a new direction in 2020, TRWD has developed high-quality and effective youth education programs to increase the awareness, knowledge and appreciation of water and their ability and motivation to conserve and protect it. With a mix of contracted and TRWD-led lessons, the program aims to empower our youth to become water champions. Customer cities are encouraged to work with TRWD to participate and promote youth education programs for their community. In 2023 alone, TRWD youth programs participated in over 400 activities and reached 21,145 students.

Learn and Grow Program

Since 2017, TRWD has had an agreement with the Tarrant County Master Gardener Association to provide education and outreach. Services include community presentations, workshops, event participation and innovative projects. Tarrant County customer cities can request presentations from a pre-approved topic list. Example topics include: basic landscape design, native and adapted plants, vegetable gardening, and rainwater harvesting. At every program presentation, the speaker provides information about TRWD, local water supplies and the importance of water conservation. TRWD outreach materials are also provided at community events. In 2023, the program produced over 200 activities with over 13,000 participants.

Conservation Coordinators Collaboration

TRWD holds monthly meetings to discuss programs and collaboration opportunities to implement conservation outreach initiatives. The goal is to increase communications, partnerships and program implementation with all customer cities.

Water Efficient Recognized Green Professional Program

The Water Efficient Recognized Green Professional Program (Green Pros) was developed in 2016 with the Texas A&M AgriLife Extension Service in Tarrant County and TRWD. In 2020, Upper Trinity Regional Water District became a program partner. Held annually during winter, participants attend 5 half-day courses over 5 weeks. Topics include water conservation, low impact design, turfgrass, irrigation and low water-use plants. The target audience of the program are green industry professionals such as landscapers, designers, and irrigators. Completing the program provides the participant the opportunity to be listed on SaveTarrantWater.com as a Green Pro. Over 200 Green Pros have participated in the program since it began.

8.3 In-House Water Conservation Efforts

TRWD has and will continue to implement an in-house water conservation program with the following efforts:

- Wherever possible, landscapes will use native or adapted drought tolerant plants, trees and shrubs.
- Irrigation at TRWD facilities will occur before 10 a.m. and after 6 p.m. year-round in order to lower losses due to evaporation.
- Irrigation will be limited to the amount needed to promote survival and health of plants and lawns.
- Irrigation will be done with untreated source water wherever feasible and reasonable.

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9. ADOPTION AND AUTHORIZATION TO ENFORCE THE WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

Appendix H contains a copy of the resolution approved by the TRWD Board of Directors adopting the amended water conservation and drought contingency plan. The General Manager of TRWD is authorized to implement and enforce, to the extent provided herein, the water conservation and drought contingency plan. As discussed in Section 7.3 TRWD will prepare a water conservation report every year, incorporating the reports required from direct and indirect customers. This report will be used to review the effectiveness of TRWD's water conservation program, and results will be reported to the TRWD Board of Directors.

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10. REVIEW AND UPDATE OF WATER CONSERVATION PLAN

TCEQ requires that water conservation plans be updated prior to May 1, 2009, and every five years thereafter. TRWD will review and update this plan as required and as appropriate based on new or updated information.

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11. DROUGHT CONTINGENCY AND EMERGENCY WATER MANAGEMENT PLAN

11.1 Introduction

The purpose of this drought contingency and emergency water management plan is as follows:

- To conserve the available water supply in times of drought and emergency
- To maintain supplies for domestic water use, sanitation, and fire protection
- To protect and preserve public health, welfare, and safety
- To minimize the adverse impacts of water supply shortages
- To minimize the adverse impacts of emergency water supply conditions.

Tarrant Regional Water District (TRWD) and its customer cities experienced Stage 1 drought restrictions from 2011-2012 and 2013-2015. Fortunately, water supply reservoirs have not dropped below 75% capacity since. With that experience, TRWD has taken a more active role in educating the public about the importance of reducing water waste and being prepared for the next drought.

11.2 State Requirements for Drought Contingency Plans

This drought contingency and emergency water management plan is consistent with the Texas Commission on Environmental Quality (TCEQ) guidelines and requirements for the development of drought contingency plans by wholesale water suppliers, contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.22 of the Texas Administrative Code. This rule is included in Appendix B.

Minimum Requirements

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

- 288.22(a)(1) – Provisions to Inform the Public and Provide Opportunity for Public Input – Section 11.3
- 288.22(a)(2) – Coordination with the Regional Water Planning Group – Section 11.9
- 288.22(a)(3) – Criteria for Initiation and Termination of Drought Stages – Section 11.4
- 288.22(a)(4) – Drought and Emergency Response Stages – Section 11.5
- 288.22(a)(5) – Procedures for Initiation and Termination of Drought Stages – Section 11.5
- 288.22(a)(6) – Specific, Quantified Targets for Water Use Reductions – Section 11.5

- 288.22(a)(7) – Specific Measures to Be Implemented during Each Drought Stage – Section 11.5
- 288.22(a)(8) – Provision for Wholesale Contracts to Require Water Distribution According to Texas Water Code §11.039 – Sections 11.5 and 11.6.
- 288.22(a)(9) – Procedures for Granting Variances to the Plan – Section 11.7
- 288.22(a)(10) – Procedures for Enforcement of Mandatory Restrictions – Section 11.8
- 288.22(b) – Notification of Implementation of Mandatory Measures – Section 11.4
- 288.22(c) – Review and Update of Plan – Section 11.10

11.3 Provisions to Inform the Public and Opportunity for Public Input

TRWD provided opportunity for public input in the development of this drought contingency and emergency water management plan by the following means:

- Several meetings with customer representatives were held to discuss and coordinate the development of this plan.
- TRWD will provide the draft plan to anyone requesting a copy.
- The proposed plan was posted to SaveTarrantWater.com web site (April 2024) providing the public an opportunity to review and comment on the plan in writing.
- Public comment was available at the Tarrant Regional Water District board meeting held at in Fort Worth at 9:00 a.m. on Tuesday, April 16, 2024.

11.4 Initiation and Termination of Drought Response Stages

Initiation of Drought Response Stage

The General Manager may order the implementation of a drought response stage or water emergency when one or more water supply trigger conditions is met. The following actions will be taken when a drought stage is initiated:

- The designated representative(s) of primary wholesale customers will be notified by email, mail, telephone, or fax that provides details of the reasons for initiation of the drought stage.
- The public will be notified through local media following the notification of primary wholesale customers.
- If any mandatory provisions of the drought contingency plan are activated, TRWD will notify TCEQ within five business days.

Notwithstanding the foregoing, the General Manager may decide, under special circumstances, not to order the implementation of a drought response stage or water emergency even though one or more of the trigger criteria for the stage are met. Factors

which could influence such a decision include, but are not limited to, the time of year, weather conditions, the anticipation of replenished water supplies, or the anticipation that additional facilities will become available to meet needs.

The trigger conditions in this plan pertaining to TRWD's system volume were established following an intensive study of the North Texas climate and its impact on water supplies by Hydros Consulting, Inc. (Hydros), an engineering firm based in Boulder, Colorado. The 2007 study projected the effects of simulated weather patterns on the combined storage capacity of TRWD reservoirs. Using computer simulations, Hydros compared the water savings that would be achieved at various trigger points with and without outdoor watering restrictions in place. Under severe drought conditions, the estimated water savings that would be achieved by implementing this plan would extend water supplies by several weeks. In late 2023/early 2024, Hydros completed a sensitivity analysis of TRWD's water supply system to variations in the existing drought triggers. The sensitivity analysis included updated infrastructure, operations, permitting, supplies and demands, and evaluated whether adjusting the existing drought triggers would have a meaningful impact on water supply availability. Based on the results of the analysis, staff has determined the best decision for the system and TRWD water customers at this time is to maintain the same drought trigger conditions as the previous plan.

Termination of a Drought Stage

The General Manager will order the termination of a drought response stage or water emergency when the conditions for termination are met. The following actions will be taken when a drought stage is terminated:

- The designated representative(s) of primary wholesale customers will be notified by email, mail, telephone, or fax that provides details of the reasons for termination of the drought stage.
- The public will be notified through local media following the notification of primary wholesale customers.
- When mandatory provisions of the drought contingency plan that have been activated are terminated, TRWD will notify the Executive Director of the TCEQ within five business days.

Notwithstanding the foregoing, the General Manager may decide, under special circumstances, not to order the termination of a drought response stage or water emergency even though conditions for termination of the stage are met. Factors which could influence such a decision include, but are not limited to, the time of year, weather conditions, or the anticipation of potential changes in conditions that warrant the continuation of the drought stage.

11.5 Drought and Emergency Response Stages and Measures

Stage 1, Water Watch

Triggering and Terminating Conditions

- Total combined raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 75% (25% depleted) of conservation storage capacity.
- Water demand has exceeded or is expected to exceed 80% of maximum sustainable production of delivery capacity for an extended period.
- One or more of TRWD's water supply sources has become limited in availability.
- Water demand is projected to approach the limit of permitted supply.
- Supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species).
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- The General Manager finds that conditions warrant the declaration of a Stage 1 drought.

Subject to preceding paragraphs regarding the Termination of a Drought Response stage, Stage 1, Water Watch, will be terminated when the total combined raw water supply in TRWD's West Fork and East Texas reservoirs exceeds 95% of conservation storage or remains above 85% for 90 consecutive days, whichever occurs first.

Goal for Use Reduction

The goal for water use reduction under Stage 1, Water Watch, is to decrease use by five percent. If circumstances warrant, the General Manager can set a goal for greater water use reduction.

Water Use Reduction Actions under Stage 1, Water Watch

The General Manager may order the implementation of any of the actions listed below, as deemed necessary. Measures imposing mandatory requirements on customers require notification to TCEQ. TRWD must notify TCEQ within five business days if any mandatory measures are implemented.

- Require customers (including indirect customers) to initiate Stage 1 in their drought contingency plans. Indirect customers include any successive wholesale customers of TRWD's primary wholesale customers to the extent provided for in water sales contracts.

All Water Users

- Maximum of twice per week watering for hose-end sprinklers and automatic irrigation systems based on odd/even addresses and day of week schedule.

Stage 1, Water Watch, Outdoor Watering Schedules		
Monday	No Outdoor Watering	Water System Recovery Day
Tuesday and Friday	Non-Residential Sites	Apartments, Parks, Common Areas, HOA's, Businesses
Wednesday and Saturday	Residential Addresses Ending in Even Numbers	0,2,4,6,8
Thursday and Sunday	Residential Addresses Ending in Odd Numbers	1,3,5,7,9

Exceptions:

- Watering with a handheld hose, soaker hose or drip irrigation may occur any day and any time.
- Watering of trees and structural foundations may occur any day and any time by means of handheld hose, soaker hose, or drip irrigation.
- The use of water necessary to protect the health, safety, or welfare of the public.
- Water use necessary for the repair of an irrigation system, plumbing line, fountain, etc. in the presence of person making repair.
- Variances may be available for the following:
    - Establishing new turfgrass and/or landscaping. Variances granted for establishing new turfgrass or landscaping will be for a maximum of 30 days from the date of approval then maximum of twice per week watering schedule applies.
    - Variances do not apply to the installation (over seeding) of cool season grasses.
    - Outdoor watering at addresses with large multi-station irrigation systems may take place in accordance with a variance granted by TRWD, if TRWD determines that a property cannot be completely irrigated under the twice per week schedule. Under such variance, no irrigation station will be allowed to water more than twice per week.
    - Areas open to the public and have high-impact from frequent use may be allowed additional watering with a variance granted by TRWD if it is deemed to be beneficial to serve and protect the community facility or amenity.
    - Restrictions do not apply to locations using well water, reclaimed water, or other alternative water sources.
- No watering with hose-end sprinklers and/or automatic spray irrigation systems between the hours of 10 a.m. and 6 p.m.
- Prohibit using water in such a manner as to allow runoff or other waste, including:

  - failure to repair a controllable leak, including, broken sprinkler heads, leaking valves, leaking or broken pipes or faucets;
  - operating an irrigation system with: (a) a broken head; (b) a head that is out of adjustment and spraying into the street, parking area, or sidewalk; or (c) a system that is misting/fogging due to excessive water pressure; or
  - allowing any water to: (a) run off property forming a stream of water for a distance of 50 feet or greater; (b) run into a storm drain; or (c) pond to a depth of ¼ inch or greater; or
  - allowing or causing an irrigation system or other lawn watering device to operate during any form of precipitation or when temperatures are at or below 32 degrees Fahrenheit.

- All users are encouraged to use native and adapted drought tolerant plants in landscaping.
- Discourage hosing of paved areas.
- Discourage hosing of buildings or other structures for purposes other than fire protection or surface preparation prior to painting or maintenance.
- Washing of any motor vehicle, motorbike, boat, trailer, airplane, or other vehicle shall be limited to the use of a hand-held bucket or a hand-held hose equipped with a positive-pressure shutoff nozzle for quick rinses. Vehicle washing may be done at any time on the premises of a commercial car wash or commercial service station. Companies with automated on-site vehicle washing facilities may wash its vehicles at any time.
- Discourage the filling, draining, or refilling of swimming pools, wading pools, hot tubs and Jacuzzi type pools except to maintain adequate water levels for structural integrity, proper operation and maintenance, and/or to alleviate an issue that poses a public safety risk.

<u>City and Local Governments</u>

- Review conditions and problems that caused Stage 1. Take corrective action.
- Increase public education efforts on ways to reduce water use.
- Increase enforcement efforts.
- Intensify leak detection and repair efforts.
- Audit all city and local government irrigation systems to ensure proper condition, settings, and operation.
- Identify and encourage voluntary reduction measures by high-volume water users through water use audits.
- Landscape watering of municipal parks, golf courses and athletic fields is restricted to a twice per week watering schedule; or twice per week per irrigation station if a variance is granted by TRWD. (See exceptions to outdoor watering restrictions in

all water users category above for facilities with large multi-station irrigation systems.)

Exceptions:

- Golf courses may water greens and tee boxes as necessary, however, use of spray irrigation may not be done between 10 a.m. and 6 p.m. Encouraged to reduce water use by five percent.
- Watering of athletic fields (field only, does not include surrounding landscaped areas) used for organized sports practice, competition, or exhibition events may occur as necessary to protect the health and safety of the players, staff, or officials present for athletic events. Encouraged to reduce water use by five percent.

- Reduce non-essential water use. As used herein, non-essential water uses are those that do not have a health or safety impact and are not needed to meet the core function of the agency.
- Notify wholesale customers of actions being taken and request them to implement the same drought stage and measures.

Commercial or Industrial

- All actions listed above for all water users apply to commercial and industrial users.
- Landscape watering of parks, golf courses and athletic fields is restricted to the twice per week watering schedule; or twice per week per irrigation station if a variance is granted by the water provider. (See exceptions to outdoor watering restrictions in all water users category above for facilities with large multi-station irrigation systems.)

  Exceptions:

  - Golf courses may water greens and tee boxes as necessary, however, use of spray irrigation may not be done between 10 a.m. and 6 p.m. Encouraged to reduce water use by five percent.
  - Watering of athletic fields (field only, does not include surrounding landscaped areas) used for organized sports practice, competition, or exhibition events may occur as necessary to protect the health and safety of the players, staff, or officials present for athletic events. Encouraged to reduce water use by 5 five percent.
- Stock at commercial plant nurseries is exempt from Stage 1 watering restrictions.
- Hotels, restaurants, and bars are encouraged to serve drinking water to patrons per request only.
- Hotels are encouraged to implement laundry conservation measures by encouraging patrons to reuse linens and towels.

- Car wash facilities must keep equipment in good working order, which should include regular inspections to be sure there are no leaks, broken or misdirected nozzles, and that all equipment is operating efficiently.
- All commercial and industrial customers are encouraged to audit irrigation systems to ensure proper condition, settings, and operation. If irrigation audit or repair occurs during restricted watering times or days, a sign indicating such work is taking place must be placed in public view until job is completed.

Stage 2, Water Warning

Triggering and Terminating Conditions

- Total raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 60% (40% depleted) of conservation storage capacity.
- Water demand has exceeded or is expected to exceed 85% of maximum sustainable production of delivery capacity for an extended period.
- One or more of TRWD's water supply sources has become limited in availability.
- Water demand is projected to approach the limit of permitted supply.
- Supply source becomes contaminated or unusable for other regulatory reasons (i.e. invasive species).
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- The General Manager finds that conditions warrant the declaration of a Stage 2 drought.

Subject to preceding paragraphs regarding the Termination of a Drought Response stage, Stage 2, Water Warning, will be terminated when the Total combined raw water supply in TRWD's West Fork and East Texas reservoirs exceeds 75% of conservation storage or remains at or above 70% for 30 consecutive days, whichever occurs first.

Goal for Use Reduction

The goal for water use reduction under Stage 2, Water Warning, is to decrease use by 10 percent. If circumstances warrant, the General Manager can set a goal for greater water use reduction.

Water Use Reduction Actions under Stage 2, Water Warning

The General Manager may order the implementation of any of the actions listed below, as deemed necessary. The General Manager may order the implementation of additional actions not listed below, as deemed necessary. Measures imposing mandatory requirements on customers require notification to TCEQ. TRWD must notify TCEQ within five business days if any mandatory measures are implemented.

- Continue actions under Stage 1.
- Require customers (including indirect customers) to initiate Stage 2 in their drought contingency plans. Indirect customers include any wholesale customer of TRWD's primary wholesale customers to the extent provided for in water sales contracts.
- Initiate engineering studies to evaluate water supply alternatives should conditions worsen.

All Water Users

- Maximum of once per week watering for hose-end sprinklers and automatic irrigation systems at each service address.
- An effort will be made by TRWD and its primary customers to coordinate once per week watering schedules to simplify messages passed to customers through the news media. However, due to the variation in water storage and delivery systems of TRWD customers, specific watering days per address may vary across TRWD's service area.

  Exceptions:

  - Watering with a handheld hose, soaker hose or drip irrigation may occur any day and any time.
  - Watering of trees and structural foundations may occur any day and any time by means of handheld hose, soaker hose, or drip irrigation.
  - Variances may be available through TRWD for the following:
    - All users are encouraged to wait until the current drought or emergency situation has passed before establishing new landscaping. Variances granted for establishing new turfgrass or landscaping will be for a maximum of 30 days from the date of approval then maximum of once-per-week watering schedule applies.
    - Variances do not apply to the installation (over seeding) of cool season grasses.
    - Outdoor watering at addresses with large multi-station irrigation systems may take place in accordance with a variance granted by TRWD, if TRWD determines that a property cannot be completely irrigated under the once per week schedule. Under such variance, no irrigation station will be allowed to water more than once per week.
    - Areas open to the public and have high-impact from frequent use may be allowed additional watering with a variance granted by TRWD if it is deemed to be beneficial to serve and protect the community facility or amenity.
    - Restrictions do not apply to well water, reclaimed water, or other alternative water sources.

- Encourage the use of covers for all types of pools, hot tubs, and Jacuzzi type pools when not in use.

City and Local Governments

In addition to the actions listed above:

- Continue actions under Stage 1.
- Review conditions or problems that caused Stage 2. Take corrective action.
- Increase frequency of media releases on water supply conditions.
- Further accelerate public education efforts on ways to reduce water use.
- Landscape watering of municipal parks, golf courses and athletic fields is restricted to a once-per-week schedule; or once-per-week per irrigation station if a variance is granted by the water provider. (See Stage 1 exceptions to outdoor watering restrictions in all water users category for facilities with large multi-station irrigation systems.)

  Exceptions:

  - Golf courses may water greens and tee boxes as necessary, however, use of spray irrigation may not be done between 10 a.m. and 6 p.m. Encouraged to reduce water use by ten percent.
  - Watering of athletic fields (field only, does not include surrounding landscaped areas) used for organized sports practice, competition, or exhibition events may occur as necessary to protect the health and safety of the players, staff, or officials present for athletic events. Encouraged to reduce water use by ten percent.

- Eliminate non-essential water use. As used herein, non-essential water uses are those that do not have any health or safety impact and are not needed to meet the core function of the agency.
- Notify wholesale customers of actions being taken and request them to implement the same drought stage and measures.

Commercial or Industrial

- All actions listed above for all water users apply to commercial and industrial users.
- Landscape watering of municipal parks, golf courses and athletic fields is restricted to a once-per-week schedule; or once-per-week per irrigation station if a variance is granted by the water provider. (See Stage 1 exceptions to outdoor watering restrictions in all water users category for rules that apply to facilities with large multi-station irrigation systems.)

  Exceptions:

- Golf courses may water greens and tee boxes as necessary, however, use of spray irrigation may not be done between 10 a.m. and 6 p.m. Encouraged to reduce water use by ten percent.
- Watering of athletic fields (field only, does not include surrounding landscaped areas) used for organized sports practice, competition, or exhibition events may occur as necessary to protect the health and safety of the players, staff, or officials present for athletic events. Encouraged to reduce water use by ten percent.

Stage 3, Water Emergency

Triggering and Terminating Conditions

- Total raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 45% (55% depleted) of conservation storage capacity.
- Water demand has exceeded or is expected to exceed 90% of maximum sustainable production of delivery capacity for an extended period.
- Water demand for all or part of the TRWD delivery system approaches delivery capacity because delivery capacity is inadequate.
- One or more of TRWD's water supply sources has become limited in availability.
- Water demand is projected to approach the limit of permitted supply.
- Supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species).
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- The General Manager finds that conditions warrant the declaration of a Stage 3 drought.

Subject to preceding paragraphs regarding the Termination of a Drought Response stage, Stage 3, Water Emergency, will be terminated when the total combined raw water supply in TRWD's West Fork and East Texas reservoirs exceeds 60% of conservation storage or remains at or above 55% for 30 consecutive days, whichever occurs first.

Goal for Use Reduction

The goal for water use reduction under Stage 3, Water Emergency, is to decrease use by 20 percent. If circumstances warrant, the General Manager can set a goal for greater water use reduction.

Actions Available under Stage 3, Water Emergency

The General Manager can order the implementation of any of the actions listed below, as deemed necessary. The General Manager may order the implementation of additional

actions not listed below, as deemed necessary. Measures imposing mandatory requirements on customers require notification to TCEQ. TRWD must notify TCEQ within five business days if these measures are implemented.

- Continue actions under Stages 1 and 2.
- Require customers (including indirect customers) to initiate Stage 3 in their drought contingency plans. Indirect customers include any wholesale customer of TRWD's primary wholesale customers to the extent provided for in water sales contracts.

All Water Users

- Prohibit all outdoor watering with hose-end sprinklers and automatic irrigation systems, including at parks, golf courses, and sports fields.

  Exceptions:

  - Watering with hand-held hose, soaker hose or drip irrigation system may occur any day and any time.
  - Watering of trees and structural foundations may occur any day and any time by means of handheld hose, soaker hose, or drip irrigation.
  - Restrictions do not apply to well water, reclaimed water, or other alternative water sources.
  - Irrigation of new landscapes and/or turfgrass installations is prohibited by means of automatic irrigation system or hose-end sprinkler. Variances may be granted for those landscape projects started prior to the initiation of stage 3 drought restrictions. However, variances will not be granted for the irrigation of new landscape and/or turfgrass installations after the initiation of Stage 3 drought restrictions.
  - Prohibit washing of paved areas by any means except where a variance is granted to alleviate a possible public health and safety risk. Any pressure/power washing activities must be performed by a professional pressure/power washing service provider utilizing high efficiency equipment and a vacuum recovery system where possible.
  - Prohibit hosing of buildings or other structures for purposes other than fire protection or surface preparation prior to painting with high-pressure equipment. Services must be performed by a professional pressure/power washing service provider utilizing high efficiency equipment and a vacuum recovery system where possible.
  - Vehicle washing is restricted to commercial car washes, commercial service stations, or professional washing services only. This includes home and charity car washing. The washing of garbage trucks and vehicles used to transport food and/or other perishables may take place as necessary for health, sanitation, or public safety reasons.

- Prohibit permitting of private pools. Pools already permitted may be completed and filled. Existing private and public pools may add water to maintain pool levels, but may not be drained and refilled.
- Prohibit the operation of ornamental fountains or ponds that use potable water except where necessary to support aquatic life or water quality.

City and Local Governments

- Continue actions under Stages 1 and 2.
- Review conditions or problems that caused Stage 3. Take corrective action.
- Increase frequency of media releases explaining emergency situation and/or water supply conditions.
- Landscape watering at municipal parks, golf courses, and sports fields is prohibited. Variances may be granted by the water provider under special circumstances.

  Exceptions:

  - Golf course greens and tee boxes may be watered by hand as necessary.
  - Variances may be available for watering of athletic fields (field only, does not include surrounding landscaped areas) used for organized sports practice, competition, or exhibition events to protect the health and safety of the players, staff, or officials present for the athletic event. If granted, encouraged to reduce water use by twenty percent.
  - Professional and college sports fields (playing fields with a stadium only – not surrounding landscaping) may be watered as necessary to maintain league standards. Encouraged to reduce water use by twenty percent.
- Institute a mandated reduction in deliveries to all wholesale customers. Such a reduction will be distributed as required by Texas Water Code §11.039.
- If TRWD has imposed a reduction in water available to customers, impose the same percent reduction on wholesale customers.

Commercial or Industrial

- All actions listed above for all water users apply to commercial and industrial users. Landscape watering of municipal parks, golf courses and athletic fields is prohibited. Variances may be granted by the water provider under special circumstances.

  Exceptions:

  - Golf course greens and tee boxes may be watered by hand, as necessary.
  - Variances may be available for watering of athletic fields (field only, does not include surrounding landscaped areas) used for organized sports practice,

competition, or exhibition events to protect the health and safety of the players, staff, or officials present for the athletic event. If granted, encouraged to reduce water use by twenty percent.

- Professional and college sports fields (playing fields with a stadium only – not surrounding landscaping) may be watered as necessary to maintain league standards. Encouraged to reduce water use by twenty percent.

- Require hotels, restaurant, and bars to serve drinking water to patrons on an "on demand" basis.
- Require hotels to implement laundry conservation measures by encouraging patrons to reuse linens and towels.
- Stock at commercial plant nursery may be watered by hand only with a handheld hose, hand-held watering can, soaker hose, or drip irrigation system.
- Commercial and industrial water users may be required to reduce water use by a set percentage as determined by TRWD.

11.6 Procedure for Curtailment of Water Supplies

Any mandatory reduction to deliveries from TRWD to its customers shall be distributed as required by Texas Water Code §11.039, which is attached as Appendix J. In addition, every wholesale water supply contract entered into or renewed after adoption of this plan, including contract extensions, shall include a provision that water will be distributed in accordance with the Texas Water Code §11.039 in case of a water shortage resulting from drought.

To the extent not prevented by enforcement of provisions in TRWD's wholesale contracts in effect before November 28, 1999, TRWD will implement pro rata curtailment of water deliveries pursuant to Texas Water Code §11.039.

11.7 Procedure for Granting Variances to the Plan

The General Manager may grant temporary variances for existing water uses otherwise prohibited under this drought contingency and emergency water management plan to a customer if one or more of the following conditions are met:

- Failure to grant such a variance would cause an emergency condition adversely affecting health, sanitation, or fire safety for the public or the person requesting the variance.
- Compliance with this plan cannot be accomplished due to technical or other limitations.
- Alternative methods that achieve the same level of reduction in water use can be implemented.

Variances shall be granted or denied at the discretion of the General Manager. All petitions for variances should be in writing and should include the following information:

- Name and address of petitioner(s)
- Purpose of water use
- Specific provisions from which relief is requested
- Detailed statement of the adverse effect of the provision from which relief is requested
- Description of the relief requested
- Period of time for which the variance is sought
- Alternative measures that will be taken to reduce water use
- Other pertinent information.

11.8 Procedure for Enforcing Mandatory Water Restrictions

TRWD customers (direct and indirect) shall provide TRWD with an order, ordinance, or resolution to demonstrate adequate enforcement provisions for the customer's own drought contingency plan.

Mandatory water use restrictions may be imposed in Stage 1, Stage 2, and Stage 3 drought stages. These mandatory water use restrictions will be enforced by warnings and penalties as follows:

- On the first violation, the customer will be given a written warning that they have violated one or more of the mandatory water use restrictions.
- After a second violation, TRWD will require the customer to implement a more comprehensive public education and outreach program in a manner that increases the public's awareness about mandatory water use restrictions and the current drought status. The customer will also be required to submit documentation to TRWD of the steps it has taken to ensure compliance with the drought contingency and emergency water management plan within 30 days after receiving the second notice of violation.
- TRWD may petition the Texas Commission on Environmental Quality to initiate formal enforcement action against customers that repeatedly fail to comply with the mandatory water use restrictions implemented during any stage of the drought contingency and emergency water management plan.

11.9 Coordination with the Regional Water Planning Groups

Appendix I includes a copy of a letter sent to the Chair of the Region C water planning group with this water conservation and drought contingency plan.

11.10 Review and Update of Drought Contingency Plan

As required by TCEQ rules, TRWD reviewed this drought contingency and emergency water management plan in 2024 and will do so every five years thereafter. The plan will also be updated as appropriate based on new or updated information.

11.11 Drought Contingency Plan Definitions

Term	Definition
Aesthetic Water Use	Water use for ornamental or decorative features, such as fountains, reflecting pools, and water gardens.
Alternative Water Source	Water produced by a source other than a water treatment plant and is not considered potable. These sources can include, but are not limited to: reclaimed/recycled water, collected rain water, collected grey water, private well water.
Athletic field	A sports playing field, the essential feature of which is turf grass, used primarily for organized sports for schools, professional sports, or sanctioned league play.
Automatic Irrigation System	A site specific system of delivering water generally for landscaping via a system of pipes or other conduits installed below ground that automatically cycles water use through water emitters to a preset program, whether on a designated timer or through manual operation.
Aquatic Life	A vertebrate organism dependent upon an aquatic environment to sustain its life.
Conservation	Those practices, techniques, and technologies that reduce water consumption; reduce the loss or waste of water; improve the efficiency in water use; and increase the recycling and reuse of water so that supply is conserved and made available for other or future uses.
Customer	Any person, company, or organization using water supplied by TRWD or through an entity supplied by TRWD.
Drip irrigation	An irrigation system (drip, porous pipe, etc.) that applies water at a predetermined controlled low-flow levels directly to the roots of the plant
Drought Contingency Plan	A strategy or combination of strategies for temporary supply management and demand management responses to temporary or potentially recurring water supply shortages and other water supply emergencies.

Term	**Definition**
Fountain	An artificially created jet, stream or flow of water, a structure, often decorative, from which a jet, stream or flow of water issues.
Golf Course	An irrigated and landscaped playing area made up of greens, tees, fairways, roughs and related areas used for the playing of golf.
Hand-held hose	A hose physically held by one person, fitted with a manual or automatic shutoff nozzle.
Hose-end Sprinkler	A device through which water flows from a hose to a sprinkler to water any lawn or landscape.
Hosing	To spray, water, or wash with a water hose.
Irrigation system	A system of fixed pipes and water emitters that apply water to landscape plants or turfgrass, including, but not limited to: in-ground and permanent irrigation systems.
Lake, lagoon, or pond	Artificially created body of fresh or salt water.
Landscape irrigation use	Water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, right-of-ways, medians and entry ways.
"New landscape"	A landscape: a. Installed during construction of a new house, multi-family dwelling, or commercial building; b. Installed as part of a governmental entity's capital improvement project; or Alters more than one-third the area of an existing landscape.

Term	**Definition**
Non-essential water use	Water uses that are not required for the protection of public health, safety and welfare, such as: a. Irrigating landscape areas, including parks, athletic fields, and golf courses, except as otherwise provided under this plan; b. Washing any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas; except to alleviate a public health and safety issue; c. Washing any automobile, motorbike, boat (and/or trailer), airplane, or other vehicle except where required by law for safety and sanitary purposes. d. Washing buildings or structures for purposes other than immediate fire protection, or other uses provided under this plan; e. Filling, refilling, or adding to any swimming pools or Jacuzzi-type pools, except to maintain safe operating levels; f. Filling or operation of a fountain or pond for aesthetic or scenic purposes except when necessary to support aquatic life; g. Failure to repair a controllable leak within a reasonable time period after being directed to do so by formal notice; and h. Drawing from hydrants for construction purposes or any other purpose other than firefighting or protection of public drinking water supplies.
Park	A non-residential or multifamily tract of land, other than a golf course, maintained by a city, private organization, or individual, as a place of beauty or public recreation and available for use to the general public.
Power/Pressure washer	A machine that uses water or a water-based product applied at high pressure to clean impervious surfaces.
Power/Pressure washer (High-Efficiency)	A machine that uses water or a water-based product applied at 1500 pounds per square inch (PSI) or greater.

Term	**Definition**
Reclaimed Water	Municipal wastewater effluent that is given additional treatment and distributed for reuse in certain applications. Also referred to as recycled water.
Soaker hose	A flexible hose that is designed to slowly emit water across the entire length and connect directly to a flexible hose or spigot. Does not include hose that by design or use sends a fine spray in the air. It is not considered drip irrigation.
Structural Foundation	The lowest and supporting layer of a structure.
Swimming pool	Any structure, basin, chamber, or tank including hot tubs, containing an artificial body of water for swimming, diving, or recreational bathing, and having a depth of two (2) feet or more at any point.
Well Water	Water that has been, or is, obtained from the ground by digging, boring, or drilling to access an underground aquifer.

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, 288.2 and 288.5, downloaded from https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=288&sch=A&rl=Y

(2) Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter B, Rule 288.20 and 288.22, downloaded from https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=288&sch=B&rl=Y

(3) Texas Water Development Board, Report 362, "Water Conservation Best Management Practices Guide," Water Conservation Implementation Task Force, available online at: http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R362_BMPGuide.pdf

(4) North Central Texas Council of Governments, Regional Data Center, http://data-nctcoggis.opendata.arcgis.com, March 2024.

(5) Texas Water Development Board Special Report and Water Conservation Implementation Task Force, Report to the 79th Legislature, http://www.twdb.texas.gov/conservation/resources/doc/WCITF_Leg_Report.pdf

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APPENDIX B

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES ON WATER CONSERVATION AND DROUGHT CONTINGENCY PLANS FOR MUNICIPAL AND WHOLESALE WATER PROVIDERS

APPENDIX B

Texas Commission on Environmental Quality Rules on Water Conservation and Drought Contingency Plans for Wholesale Water Suppliers

Texas Administrative Code

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

Texas Administrative Code

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

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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

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CHAPTER 288	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
SUBCHAPTER B	DROUGHT CONTINGENCY PLANS
RULE §288.20	**Drought Contingency Plans for Municipal Uses by Public Water Suppliers**

(a) A drought contingency plan for a retail public water supplier, where applicable, must include the following minimum elements.

(1) Minimum requirements. Drought contingency plans must include the following minimum elements.

(A) Preparation of the plan shall include provisions to actively inform the public and affirmatively provide opportunity for public input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

(B) Provisions shall be made for a program of continuing public education and information regarding the drought contingency plan.

(C) The drought contingency plan must document coordination with the Regional Water Planning Groups for the service area of the retail public water supplier to insure consistency with the appropriate approved regional water plans.

(D) The drought contingency plan must include a description of the information to be monitored by the water supplier, and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

(E) The drought contingency plan must include drought or emergency response stages providing for the implementation of measures in response to at least the following situations:

(i) reduction in available water supply up to a repeat of the drought of record;

(ii) water production or distribution system limitations;

(iii) supply source contamination; or

(iv) system outage due to the failure or damage of major water system components (e.g., pumps).

(F) The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and

drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

(G) The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

(i) curtailment of non-essential water uses; and

(ii) utilization of alternative water sources and/or alternative delivery mechanisms with the prior approval of the executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.).

(H) The drought contingency plan must include the procedures to be followed for the initiation or termination of each drought response stage, including procedures for notification of the public.

(I) The drought contingency plan must include procedures for granting variances to the plan.

(J) The drought contingency plan must include procedures for the enforcement of any mandatory water use restrictions, including specification of penalties (e.g., fines, water rate surcharges, discontinuation of service) for violations of such restrictions.

(2) Privately-owned water utilities. Privately-owned water utilities shall prepare a drought contingency plan in accordance with this section and incorporate such plan into their tariff.

(3) Wholesale water customers. Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply.

(b) A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan.

(c) The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan.

Source Note: The provisions of this §288.20 adopted 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

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SUBCHAPTER B	DROUGHT CONTINGENCY PLANS
RULE §288.22	**Drought Contingency Plans for Wholesale Water Suppliers**

(a) A drought contingency plan for a wholesale water supplier must include the following minimum elements.

(1) Preparation of the plan shall include provisions to actively inform the public and to affirmatively provide opportunity for user input in the preparation of the plan and for informing wholesale customers about the plan. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

(2) The drought contingency plan must document coordination with the regional water planning groups for the service area of the wholesale public water supplier to insure consistency with the appropriate approved regional water plans.

(3) The drought contingency plan must include a description of the information to be monitored by the water supplier and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

(4) The drought contingency plan must include a minimum of three drought or emergency response stages providing for the implementation of measures in response to water supply conditions during a repeat of the drought-of-record.

(5) The drought contingency plan must include the procedures to be followed for the initiation or termination of drought response stages, including procedures for notification of wholesale customers regarding the initiation or termination of drought response stages.

(6) The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this paragraph are not enforceable.

(7) The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

(A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and

(B) utilization of alternative water sources with the prior approval of the executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.).

(8) The drought contingency plan must include a provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code, §11.039.

(9) The drought contingency plan must include procedures for granting variances to the plan.

(10) The drought contingency plan must include procedures for the enforcement of any mandatory water use restrictions including specification of penalties (e.g., liquidated damages, water rate surcharges, discontinuation of service) for violations of such restrictions.

(b) The wholesale public water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan.

(c) The wholesale public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as adoption or revision of the regional water plan.

Source Note: The provisions of this §288.22 adopted 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

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APPENDIX C

TARRANT REGIONAL WATER DISTRICT WHOLESALE PUBLIC WATER SUPPLIER UTILITY PROFILE

Texas Water Development Board

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

CONTACT INFORMATION

Name of Utility: TARRANT REGIONAL WD

Public Water Supply Identification Number (PWS ID): TX2200367

Certificate of Convenience and Necessity (CCN) Number:

Surface Water Right ID Number: 3375-A, 3379, 3808-B, 3809-C, 3810-A, 3811, 3812, 3813, 4976-D, 5035-D, 5157-A, 5589, 5688, 5806, 12735

Wastewater ID Number:

Contact: First Name: Dustan Last Name: Compton

Title: Conservation Manager

Address: 800 East Northside Dr. City: Fort Worth State: TX

Zip Code: 76102 Zip+4: Email: dustan.compton@trwd.com

Telephone Number: 8177204358 Date: 5/1/2024

Is this person the designated Conservation Coordinator? (•) Yes ( ) No

Regional Water Planning Group: C

Groundwater Conservation District:

Our records indicate that you:

☑ Received financial assistance of $500,000 or more from TWDB

☑ Have a surface water right with TCEQ

A. Population and Service Area Data

1. Current service area size in square miles: 6,028

Attached file(s):

File Name	File Description
Tarrant Regional Water District Service Area and Supply System Map.docx	Tarrant Regional Water District Service Area and Supply System Map

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

2. Historical service area population for the previous five years, starting with the most current year.

Year	Historical Population Served By Wholesale Water Service
2023	2,439,797
2022	2,383,709
2021	2,275,605
2020	2,230,171
2019	2,178,570

3. Projected service area population for the following decades.

Year	Projected Population Served By Wholesale Water Service
2030	2,720,220
2040	3,262,287
2050	3,586,427
2060	3,907,391
2070	4,230,629

4. Described source(s)/method(s) for estimating current and projected populations.

Population served for the previous five years was estimated based on data published by the North Central Texas Council of Governments (NCTCOG). NCTCOG provides estimated population by city for each year. Some of the communities within TRWD's service area do not purchase 100% of their water from TRWD, as they have supplemental water supply sources (i.e., groundwater). In these cases, only that portion of the population which is supplied by TRWD was included in the total population served. One example of this is North Richland Hills, which purchased approximately 63% of its raw water from TRWD in 2023, and obtained the remaining 37% from supplemental sources. In this case, only 63% of the total population for North Richland Hills listed in the NCTCOG report was included in the calculated population served for 2023.

Projected decadal populations for 2030 through 2070 were obtained from projections developed for TRWD by CDM Smith in 2020 as part of TRWD's Water Demand Study.

Texas Water Development Board

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

B. System Input

System input data for the previous five years.

Total System Input = Self-supplied + Imported

Year	Water Produced in Gallons	Purchased/Imported Water in Gallons	Total System Input	Total GPD
2023	196,251,018,193	0	196,251,018,193	537,674,022
2022	192,314,979,243	0	192,314,979,243	526,890,354
2021	164,775,030,276	0	164,775,030,276	451,438,439
2020	154,711,451,251	0	154,711,451,251	423,866,990
2019	120,599,520,995	0	120,599,520,995	330,409,647
Historic Average	165,730,399,992	0	165,730,399,992	454,055,890

C. Water Supply System

Attached file(s):

File Name	File Description
Tarrant Regional Water District Water Supply System Description.docx	TRWD Water Supply System Description

1. Designed daily capacity of system in gallons

2. Storage Capacity

   2a. Elevated storage in gallons:

   2b. Ground storage in gallons:

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

D. Projected Demands

1. The estimated water supply requirements for the next ten years using population trends, historical water use, economic growth, etc.

Year	Population	Water Demand (gallons)
2025	2,519,918	152,761,416,351
2026	2,559,978	157,632,199,780
2027	2,600,039	162,502,983,209
2028	2,640,099	167,373,766,638
2029	2,680,160	172,244,550,068
2030	2,720,220	177,115,333,497
2031	2,774,427	178,803,372,017
2032	2,828,633	180,491,410,538
2033	2,882,840	182,179,449,058
2034	2,929,687	186,403,325,520

2. Description of source data and how projected water demands were determined.

The population projections were calculated from the actual 2023 population determined based on NCTCOG data, as well as the population projections for 2020 and 2030 from the TRWD Water Demand Study Update. The population for each year was linearly interpolated between these three years of known data.

The water demand projections were calculated using the same methodology.

E. High Volume Customers

1. The annual water use for the five highest volume **RETAIL customers.**

Customer	Water Use Category	Annual Water Use	Treated or Raw

2. The annual water use for the five highest volume **WHOLESALE customers.**

Customer	Water Use Category	Annual Water Use	Treated or Raw
City of Fort Worth	Municipal	83,480,093,541	Raw
City of Arlington	Municipal	20,778,866,568	Raw
Trinity River Authority of Texas	Municipal	13,752,867,306	Raw
City of Mansfield	Municipal	6,504,311,811	Raw
City of Weatherford	Municipal	2,206,011,270	Raw

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

F. Utility Data Comment Section

Additional comments about utility data.

The previous annual water use for the five highest volume of wholesale customers is based on sales in 2023 only.

Section II: System Data

A. Wholesale Water Supplier Connections

1. List of active wholesale connections by major water use category.

Water Use Category Type	Total Wholesale Connections (Active + Inactive)	Percent of Total Connections
Municipal	43	59.72 %
Industrial	9	12.50 %
Commercial	0	0.00 %
Institutional	0	0.00 %
Agricultural	20	27.78 %
Total	72	100.00 %

2. Net number of new wholesale connections by water use category for the previous five years.

	Net Number of New Wholesale Connections					
Year	**Municipal**	**Industrial**	**Commercial**	**Institutional**	**Agricultural**	**Total**
2023	0	0	0	0	3	3
2022	0	0	0	0	0	0
2021	0	0	0	0	0	0
2020	0	0	0	0	0	0
2019	0	0	0	0	0	0

Texas Water Development Board

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

B. Accounting Data

For the previous five years, the number of gallons of WHOLESALE water exported (sold or transferred) to each major water use category.

Year	Municipal	Industrial	Commercial	Institutional	Agricultural	Total
2023	137,503,843,764	4,935,990,948	0	0	580,014,780	143,019,849,492
2022	134,555,536,791	3,991,345,221	0	0	601,239,337	139,148,121,349
2021	116,941,262,094	3,255,694,067	0	0	314,715,649	120,511,671,810
2020	114,532,305,138	3,637,876,182	0	0	431,022,102	118,601,203,422
2019	109,506,793,047	4,056,354,649	0	0	290,946,108	113,854,093,804

C. Annual and Seasonal Water Use

1. The previous five years' gallons of treated water provided to WHOLESALE customers.

Month	Total Gallons of Treated Water				
	2023	2022	2021	2020	2019
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	0	0	0	0	0
May	0	0	0	0	0
June	0	0	0	0	0
July	0	0	0	0	0
August	0	0	0	0	0
September	0	0	0	0	0
October	0	0	0	0	0
November	0	0	0	0	0
December	0	0	0	0	0
Total	0	0	0	0	0

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

2. The previous five years' gallons of raw water provided to WHOLESALE customers.

Month	Total Gallons of Raw Water				
	2023	2022	2021	2020	2019
January	8,201,954,314	8,000,044,702	7,362,389,662	7,158,890,217	6,949,426,053
February	6,832,480,601	7,172,138,707	8,820,312,275	6,550,748,362	6,287,900,502
March	8,165,248,865	8,619,363,801	8,344,053,474	7,095,134,095	7,440,948,758
April	9,760,562,817	9,723,683,654	9,016,480,017	6,990,969,462	7,863,571,069
May	10,992,559,455	11,792,083,752	8,193,890,014	9,823,299,977	8,216,372,833
June	12,539,908,506	14,128,939,020	10,286,796,108	12,108,161,717	9,379,578,634
July	18,446,773,998	19,354,360,105	13,224,034,066	14,222,193,415	12,940,454,577
August	20,589,342,877	16,719,554,168	13,387,472,017	15,957,296,622	14,762,890,757
September	15,806,769,317	13,803,750,976	13,455,005,875	10,897,677,813	14,130,253,914
October	12,941,098,245	13,045,321,142	11,035,461,628	11,280,018,015	11,105,162,867
November	9,839,179,990	8,490,051,872	8,898,387,261	8,762,046,798	7,460,988,511
December	8,903,970,507	8,298,829,450	8,487,389,413	7,754,766,929	7,316,545,329
Total	143,019,849,492	139,148,121,349	120,511,671,810	118,601,203,422	113,854,093,804

3. Summary of seasonal and annual water use.

	Summer WHOLESALE (Treated + Raw)	Total WHOLESALE (Treated + Raw)
2023	51,576,025,381	143,019,849,492
2022	50,202,853,293	139,148,121,349
2021	36,898,302,191	120,511,671,810
2020	42,287,651,754	118,601,203,422
2019	37,082,923,968	113,854,093,804
Average in Gallons	43,609,551,317.40	127,026,987,975.40

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

D. Water Loss

Water Loss data for the previous five years.

Year	Total Water Loss in Gallons	Water Loss in GPCD	Water Loss as a Percentage
2023	53,231,168,701	59	27.12 %
2022	53,166,857,894	61	27.65 %
2021	44,263,358,466	53	26.86 %
2020	36,110,247,829	44	23.34 %
2019	6,745,427,191	8	5.59 %
Average	38,703,412,016	45	22.11 %

E. Peak Day Use

Average Daily Water Use and Peak Day Water Use for the previous five years.

Year	Average Daily Use (gal)	Peak Day Use (gal)	Ratio (peak/avg)
2023	391,835,204	560608971	1.4307
2022	381,227,729	545683187	1.4314
2021	330,168,963	401068502	1.2147
2020	324,934,803	459648388	1.4146
2019	311,929,024	403075260	1.2922

F. Summary of Historic Water Use

Water Use Category	Historic Average	Percent of Connections	Percent of Water Use
Municipal	122,607,948,166	59.72 %	96.52 %
Industrial	3,975,452,213	12.50 %	3.13 %
Commercial	0	0.00 %	0.00 %
Institutional	0	0.00 %	0.00 %
Agricultural	443,587,595	27.78 %	0.35 %

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

G. System Data Comment Section

All "Agriculture" water use and customers represents water for our irrigation-only customers.

The Water Loss calculation is not accurate with the automatic calculations. "Water Produced" is water that has been moved throughout our system to other lakes, terminal storage or balancing reservoirs. Subtracting raw water sales from water produced is not our water loss. The water is still in our system and is not "lost". We have used the AWWA Water Audit worksheet to estimate water losses in the TRWD system. Due to the enclosed nature of the system, and the limited points of connection, water losses typically seen by municipalities do not regularly occur. Because of this, when completing the AWWA form, the water losses calculated are largely influenced by the estimated meter error entered as part of the input data. The approximate meter error typically assumed for the TRWD system is +/- 5%.

The Peak Day use automatic calculation is close but not exact. We did have a peak day of 661,708,0

Section III: Wastewater System Data

A. Wastewater System Data

1. Design capacity of wastewater treatment plant(s) in gallons per day: 0

2. List of active wastewater connections by major water use category.

Water Use Category	Metered	Unmetered	Total Connections	Percent of Total Connections
Municipal	0	0	0	0.00 %
Industrial	0	0	0	0.00 %
Commercial	0	0	0	0.00 %
Institutional	0	0	0	0.00 %
Agricultural	0	0	0	0.00 %
Total	0	0	0	100.00 %

3. Percentage of water serviced by the wastewater system: 0.00 %

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

4. Number of gallons of wastewater that was treated by the utility for the previous five years.

Month	Total Gallons of Treated Water				
	2023	2022	2021	2020	2019
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	0	0	0	0	0
May	0	0	0	0	0
June	0	0	0	0	0
July	0	0	0	0	0
August	0	0	0	0	0
September	0	0	0	0	0
October	0	0	0	0	0
November	0	0	0	0	0
December	0	0	0	0	0
Total	0	0	0	0	0

5. Could treated wastewater be substituted for potable water?

( ) Yes ( ) No

B. Reuse Data

1. Data by type of recycling and reuse activities implemented during the current reporting period.

Type of Reuse	Total Annual Volume (in gallons)
On-site Irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (park,golf courses)	
Agricultural	
Discharge to surface water	
Evaporation Pond	
Other	16,003,194,312
Total	16,003,194,312

UTILITY PROFILE FOR WHOLESALE WATER SUPPLIER

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APPENDIX D

TCEQ WATER CONSERVATION IMPLEMENTATION REPORT

Texas Commission on Environmental Quality

Water Availability Division
MC-160, P.O. Box 13087 Austin, Texas 78711-3087
Telephone (512) 239-4600, FAX (512) 239-2214

WATER CONSERVATION IMPLEMENTATION REPORT FORM AND SUMMARY OF UPDATES/REVISIONS TO WATER CONSERVATION PLAN

(Texas Water Code §11.1271(b) and Title 30 Texas Administrative Code §288.30(1) to (4))

Please note, this form replaces the following forms: TCEQ-20645 (Non-Public Water Suppliers) and TCEQ-20646 (Public Water Suppliers)

This Form is applicable to the following entities:

1. **Water Right Holders of 1,000 acre-feet or more for municipal, industrial, and other non-irrigation uses.**
2. **Water Right Holders of 10,000 acre-feet or more for irrigation uses.**

The above noted entities are required by rule to submit updates to their water conservation plan(s) and water conservation implementation report(s) every five years beginning May 1, 2009. See 30 Texas Administrative Code (TAC) §288.30(1) to (4). Entities must also submit any revisions to their water conservation plan within 90 days of adoption when the plans are revised in between the five-year submittal deadlines. This form may be used for the five-year submittal or when revisions are made to the water conservation plans in the interim periods between five-year submittals. Please complete the form as directed below.

1. Water Right Holder Name: Tarrant Regional Water District
2. Water Right Permit or Certificate Nos. Certificates of Adjudication Nos. 08-3808 (Lake Bridgeport), 08-3809 (Eagle Mountain Lake) 08-4976 (Cedar Creek Reservoir) and 08-5035 (Richland Chambers Reservoir) as well as Permit 5157 (Lake Benbrook)
3. Please Indicate by placing an 'X' next to all that Apply to your Entity:

Water Right Holder of 1,000 acre-feet or more for non-irrigation uses

_____Municipal Water Use by Public Water Supplier

X_____Wholesale Public Water Supplier

_____Industrial Use

_____Mining Use

_____Agriculture Non-Irrigation

Water Right Holder of 10,000 acre-feet or more for irrigation uses

_____Individually-Operated Irrigation System

_____Agricultural Water Suppliers Providing Water to More Than One User

Water Conservation Implementation Reports/Annual Reports

4. Water Conservation Annual Reports for the previous five years were submitted to the Texas Water Development Board (TWDB) for each of the uses indicated above as required by 30 TAC §288.30(10)(C)? Yes x____ No_____

TCEQ no longer requires submittal of the information contained in the detailed implementation report previously required in Forms TCEQ-20645 (Non-Public Water Suppliers) and TCEQ-20646 (Public Water Suppliers). However, the Entity must be up-to-date on its Annual Report Submittals to the TWDB.

Water Conservation Plans

5. For the five-year submittal (or for revisions between the five-year submittals), attach your updated or revised Water Conservation Plan for each of the uses indicated in Section 3, above. Every updated or revised water conservation plan submitted must contain each of the minimum requirements found in the TCEQ rules and must be duly adopted by the entity submitting the water conservation plan. Please include evidence that each water conservation plan submitted has been adopted.

   - Rules on minimum requirements for Water Conservation Plans can be found in 30 TAC Chapter 288. http://texreg.sos.state.tx.us/public/readtac%24ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=288
   - Forms which include the minimum requirements and other useful information are also available to assist you. Visit the TCEQ webpage for Water Conservation Plans and Reports. https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/conserve.html

*Call **512-239-4600** or email to **wcp@tceq.texas.gov** for assistance with the requirements for your water conservation plan(s) and report(s).*

6. For each Water Conservation Plan submitted, list dates and descriptions of the conservation measures implemented, and the actual amount of water saved.

Tarrant Regional Water District has a wide-ranging wholesale provider water conservation program that includes specific actions such as residential sprinkler system evaluations, classes and event support and general education and outreach through promotion of Water is Awesome and Save Tarrant Water resources. We also strive to work together with our customer cities to advance efforts. Verification of annual water savings are from a model of TRWD's annual water use developed originally in 2013 and updated in 2020. the model was calibrated using water demands among the TRWD's primary customers prior to 2002 and before water conservation measures were put in place. The model is used to calculate what TRWD annual demands would be without conservation efforts and allows for a comparison with actual demands. It is estimated that over 27 billion gallons were saved in 2023 but all of this is not attributed to TRWD's actions alone. Many factors such as inclining water rates, customer city conservation efforts, and natural toilet replacement, etc. are part of the estimated savings calculation.

7. For each Water Conservation Plan submitted, state whether the five and ten-year targets for water savings and water loss were met in your *previous* water conservation plan.

   Yes _x_____ No _____

   If the targets were not met, please provide an explanation as to why any of the targets were not met, including any progress on that particular target.

8. For each five-year submittal, does each water conservation plan submitted contain *updated* five and ten-year targets for water savings and water loss?
Yes X No_____

If yes, please identify where in the water conservation plan the updated targets are located (page, section).

Chapter 4, page 4-4

9. In the box below (or in an attachment titled "Summary of Updates or Revisions to Water Conservation Plans), please identify any other revisions/updates made to each water conservation plan that is being updated or revised. Please specify the water conservation plan being updated and the location within the plan of the newly adopted updates or revisions.

Minor updates are provided in Chapter 3 "Description of TRWD Service Area" to reflect current pumping capacity and customers and Chapter 6 "Other Required Measures" related to reservoir system operations.

Chapter 8 "Additional TRWD Water Conservation Measures" includes revisions and inclusions of previous and new public outreach programs.

10. *Form Completed by (Point of Contact):* Dustan Compton
(If different than name listed above, owner and contact may be different individual(s)/entities)

Contact Person Title/Position: Conservation Manager

Contact Address: 800 E. Northside Dr., Fort Worth, TX 76102

Contact Phone Number: 817-720-4358 Contact Email Address: dustan.compton@trwd.com

Signature: Dustan Compton Date: 4/30/2024

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APPENDIX E

ANNUAL WATER CONSERVATION REPORTS SUBMITTED TO TEXAS WATER DEVELOPMENT BOARD

Texas Water Development Board

Water Conservation Plan Annual Report
Wholesale Water Supplier

CONTACT INFORMATION

Name of Utility: TARRANT REGIONAL WD

Public Water Supply Identification Number (PWS ID): TX2200367

Certification of Convenience and Necessity (CCN) Number:

Surface Water Right ID Number: 3375-A, 3379, 3808-B, 3809-C, 3810-A, 3811, 3812, 3813, 4976-D, 5035-D, 5157-A, 5589, 5688, 5806, 12735

Wastewater ID Number:

Check all that apply:

- ☐ Retail Water Supplier
- ☑ Wholesale Water Supplier
- ☐ Wastewater Treatment Utility

Address: 800 E. Northside Dr. City: Fort Worth Zip Code: 76102

Email: dustan.compton@trwd.com Telephone Number: 8177204358

Regional Water Planning Group: C

Groundwater Conservation District:

Contact: First Name: Dustan Last Name: Compton

Title: Conservation Manager

Is this person the designated Conservation Coordinator? ◉ Yes ○ No

Regional Water Planning Group: C

Groundwater Conservation District:

Reporting Period (Calendar year):

Period Begin (mm/yyyy): 01/2023 Period End (mm/yyyy): 12/2023

Check all that apply:

- ☑ Received financial assistance of $500,000 or more from TWDB
- ☑ Have a surface water right with TCEQ

SYSTEM DATA

1. For this reporting period, provide the total volume of wholesale water exported (transfered or sold): 143,019,849,492

2. For this reporting period, does your billing/accounting system have the capability to classify customer into the Wholesale Customer Categories?

(●) Yes ( ) No

Wholesale Customers Categories*

- Municipal
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

3. For this reporting period, select the category(s) used to calculate wholesale customer water usage:

- [x] Municipal
- [x] Industrial
- [ ] Commercial
- [ ] Institutional
- [x] Agricultural

4. For this reporting period, enter the gallons of **WHOLESALE water exported** (transfered or sold). Enter zero if a Customer Category does not apply.

Wholesale Customer Category	Gallons Exported[1] (transfered or sold)	Number of Customers
Municipal	137,503,843,764	43
Industrial	4,935,990,948	9
Commercial	0	0
Institutional	0	0
Agricultural	580,014,780	20
Total Gallons[1]	**143019849492**	**72**

[1]Municipal + Industrial + Commercial + Institutional + Agricultural = Wholesale Water Exported

Water Use Accounting

	Total Gallons During the Reporting Period
Water Produced: Water from permitted sources such as rivers, lakes, streams, and wells	**196,251,018,193**
Wholesale Water Imported: Purchased wholesale water transferred into the system.	
System Input: Total water supplied to system and available for use. Produced + Imported = System Input	**196,251,018,193**
Wholesale Water Exported: Wholesale water sold or transferred out of the system.	**143,019,849,492**
Gallons Per Day: Wholesale Water Exported / 365 = Gallons Per Day	**391,835,204**
Population: Estimated total population for municipal customers.	**2,439,797**
Gallons Per Capita Per Day: Wholesale Exported / Population / 365 = Gallons Per Capita Per Day	**161**

Provide the breakdown of Wholesale Water Exported into Raw and Treated water volumes.

	Gallons
Raw Wholesale Water Exported	**143,019,849,492**
Treated Wholesale Water Exported	

Provide the specific and quantified five and ten-year targets as listed in your most current Water Conservation Plan.

	Date to Achieve Target	Specified and Quantified Targets
Five-year target	**2024**	**158**
Ten-year target	**2029**	**150**

Texas Water Development Board

Water Conservation Programs and Activities

1. Water Conservation Plan.
What year did your entity adopt or revise their most recent Water Conservation Plan? **2019**

Does The Plan incorporate **Best Management Practices**? (•) Yes ( ) No

2. Water Conservation Programs
Has your entity implemented any type of water conservation activity or program?

(•) Yes ( ) No

If yes, select the type(s) of Best Management Practices or water conservation strategies implemented during this reporting period. Estimate the gallons saved from wholesale supplier conservation strategies implemented. Do not include volume reused. Please include reuse in 3 below.

	Wholesale Supplier Best Management Practices
	Conservation Planning
☑	Customer Contract Requirements to Develop and Implement Water Conservation and Drought Contingency Plans
☑	Technical Assistance and Outreach
	Resource Sharing
☐	Cost Share Program
☐	Wholesale Supplier Collective Purchase and Direct Distribution of Water Conservation Equipment

Wholesale Supplier Activities and Practices	Check if Implemented	Estimated Gallons Saved
Agricultural Conservation Programs	☐	
Conservation Analysis & Planning	☑	
Conservation Rate Structures	☐	
Conservation Technology	☐	
Education & Public Awareness	☑	
Industrial Conservation Programs	☐	
Leak Detection/Water Loss Program	☐	
Rebate, Retrofit, and Incentive Programs	☐	

Regulatory & Enforcement	☐	
System Operations	☑	
Water Efficient Landscape Programs	☑	
Water Use Audits	☑	
Other	☑	27194567527
Totals		27194567527

Describe any additional type(s) of water conservation strategies implemented during this reporting period. Files to support or explain this may be attached below.

The "Other" estimated gallons saved is a total of all indoor and outdoor water conservation activities within the TRWD service area for the year 2023. The estimate comes from a conservation savings model that was developed around 2013 and updated in 2019/2020. We have aggressive adult and youth outreach and education programs, sprinkler evaluation program, regional advertising and Weekly Watering Advice service. We have also implemented new demonstration garden grants, landscape consultations, new classes and workshops, etc. TRWD also strives to work with other water providers for a regional approach and more locally with our customer cities and other partners to advance conservation efforts.

3. Recycle/Reuse (Water or Wastewater Effluent)
For this reporting period, provide direct and indirect reuse activities.

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other	16,003,194,312
Estimated Volume of Reuse	16,003,194,312

The total indirect reuse for wetlands diversion to Richland-Chambers Reservoir was 16,003,194,312 gallons in 2023.

4. Water Savings

For this reporting period, estimate the savings that resulted from water conversation activities and programs.

Estimated Gallons Saved/Conserved	Estimated Gallons Recycled/Reused	Total Volume of Water Saved[1]	Dollar Value of Water Saved[2]
27,194,567,527	16,003,194,312	43,197,761,839	46,148,168

[1]Estimated Gallons Saved + Estimated Gallons Recycled/Reused = Total Volume Saved

[2]Estimated this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital cost due to conservation.

5. Program Effectiveness

In your opinion, how would you rank the overall effectiveness of your conservation programs and activities?

Less Than Effective	Somewhat Effective	Hightly Effective	Does Not Apply
○	○	◉	○

6. What might your entity do to improve the effectiveness of your water conservation program?

Continue to expand public/youth education and outreach, coordinate with wholesale customers in promoting conservation programs and adopting water use related ordinances, and assist customers in developing programs for their communities.

Note: Agricultural water use consists of water use of our irrigation customers, primarily golf courses.

Conservation savings based on updated conservation model of TRWD's annual water use. It compares estimated demands that would have occurred without conservation versus anticipated model demands. Dollar value of water saved does not take into account deferred capital costs. It represents the value of the estimated gallons conserved - if it were to be pumped, sold and consumed at a settle-up rate of $1.06830 per 1,000 gallons sold.

7. Select the areas for which you would like to receive more technical assistance.

	Technical Assitance Areas
☐	Agricultural Best Management Practices
☐	Wholesale Best Management Practices
☐	Industrial Best Management Practices
☐	Drought Contingency Plans
☐	Landscape Efficient Systems
☐	Leak Detection and Equipment
☐	Educational Resources
☐	Water Conservation Plans
☐	Water IQ: Know Your Water
☐	Water Loss Audits
☐	Rainwater Harvesting
☐	Recycling and Reuse

Texas Water Development Board

Water Conservation Plan Annual Report
Wholesale Water Supplier

CONTACT INFORMATION

Name of Utility: TARRANT REGIONAL WD

Public Water Supply Identification Number (PWS ID): TX2200367

Certification of Convenience and Necessity (CCN) Number:

Surface Water Right ID Number: 3375-A, 3379, 3808-B, 3809-C, 3810-A, 3811, 3812, 3813, 4976-D, 5035-D, 5157-A, 5589, 5688, 5806, 12735

Wastewater ID Number:

Check all that apply:

- ☐ Retail Water Supplier
- ☑ Wholesale Water Supplier
- ☐ Wastewater Treatment Utility

Address: 800 E. Northside Dr. City: Fort Worth Zip Code: 76102

Email: dustan.compton@trwd.com Telephone Number: 8177204358

Regional Water Planning Group: C

Groundwater Conservation District:

Contact: First Name: Dustan Last Name: Compton

Title: Conservation Manager

Is this person the designated Conservation Coordinator? ◉ Yes ○ No

Regional Water Planning Group: C

Groundwater Conservation District:

Reporting Period (Calendar year):

Period Begin (mm/yyyy): 01/2022 Period End (mm/yyyy): 12/2022

Check all that apply:

- ☑ Received financial assistance of $500,000 or more from TWDB
- ☑ Have a surface water right with TCEQ

SYSTEM DATA

1. For this reporting period, provide the total volume of wholesale water exported (transfered or sold): 139,148,121,349

2. For this reporting period, does your billing/accounting system have the capability to classify customer into the Wholesale Customer Categories?

(●) Yes ( ) No

Wholesale Customers Categories*

- Municipal
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

3. For this reporting period, select the category(s) used to calculate wholesale customer water usage:

- [x] Municipal
- [x] Industrial
- [ ] Commercial
- [ ] Institutional
- [x] Agricultural

4. For this reporting period, enter the gallons of **WHOLESALE water exported** (transfered or sold). Enter zero if a Customer Category does not apply.

Wholesale Customer Category	Gallons Exported[1] (transfered or sold)	Number of Customers
Municipal	134,555,536,791	27
Industrial	3,991,345,221	8
Commercial	0	0
Institutional	0	0
Agricultural	601,239,337	22
Total Gallons[1]	**139148121349**	**57**

[1]Municipal + Industrial + Commercial + Institutional + Agricultural = Wholesale Water Exported

Water Use Accounting

	Total Gallons During the Reporting Period
Water Produced: Water from permitted sources such as rivers, lakes, streams, and wells	**192,314,979,243**
Wholesale Water Imported: Purchased wholesale water transferred into the system.	**0**
System Input: Total water supplied to system and available for use. Produced + Imported = System Input	**192,314,979,243**
Wholesale Water Exported: Wholesale water sold or transferred out of the system.	**139,148,121,349**
Gallons Per Day: Wholesale Water Exported / 365 = Gallons Per Day	**381,227,730**
Population: Estimated total population for municipal customers.	**2,383,709**
Gallons Per Capita Per Day: Wholesale Exported / Population / 365 = Gallons Per Capita Per Day	**160**

Provide the breakdown of Wholesale Water Exported into Raw and Treated water volumes.

	Gallons
Raw Wholesale Water Exported	**139,148,121,349**
Treated Wholesale Water Exported	**0**

Provide the specific and quantified five and ten-year targets as listed in your most current Water Conservation Plan.

	Date to Achieve Target	Specified and Quantified Targets
Five-year target	**2024**	**158**
Ten-year target	**2029**	**150**

Texas Water Development Board

Water Conservation Programs and Activities

1. Water Conservation Plan.
What year did your entity adopt or revise their most recent Water Conservation Plan? **2019**

Does The Plan incorporate **Best Management Practices**? (•) Yes ( ) No

2. Water Conservation Programs
Has your entity implemented any type of water conservation activity or program?

(•) Yes ( ) No

If yes, select the type(s) of Best Management Practices or water conservation strategies implemented during this reporting period. Estimate the gallons saved from wholesale supplier conservation strategies implemented. Do not include volume reused. Please include reuse in 3 below.

	Wholesale Supplier Best Management Practices
	Conservation Planning
☑	Customer Contract Requirements to Develop and Implement Water Conservation and Drought Contingency Plans
☑	Technical Assistance and Outreach
	Resource Sharing
☐	Cost Share Program
☐	Wholesale Supplier Collective Purchase and Direct Distribution of Water Conservation Equipment

Wholesale Supplier Activities and Practices	Check if Implemented	Estimated Gallons Saved
Agricultural Conservation Programs	☐	
Conservation Analysis & Planning	☑	
Conservation Rate Structures	☐	
Conservation Technology	☐	
Education & Public Awareness	☑	
Industrial Conservation Programs	☐	
Leak Detection/Water Loss Program	☐	
Rebate, Retrofit, and Incentive Programs	☐	

Regulatory & Enforcement	☐	
System Operations	☑	
Water Efficient Landscape Programs	☑	
Water Use Audits	☑	
Other	☑	24781800356
Totals		24781800356

Describe any additional type(s) of water conservation strategies implemented during this reporting period. Files to support or explain this may be attached below.

The "Other" estimated gallons saved is a total of all indoor and outdoor water conservation activities within the TRWD service area for the year 2022. The estimate comes from a conservation savings model that was updated in 2019.

We have aggressive adult and youth outreach and education programs, sprinkler evaluation program, regional advertising and Weekly Watering Advice service.

3. Recycle/Reuse (Water or Wastewater Effluent)
For this reporting period, provide direct and indirect reuse activities.

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	0
Plant wash down	0
Chlorination/de-chlorination	0
Industrial	0
Landscape irrigation (parks, golf courses)	0
Agricultural	0
Other	23,399,450,000
Estimated Volume of Reuse	23,399,450,000

The total indirect reuse for wetlands diversion to Richland-Chambers Reservoir was 23,399,450,000 gallons in 2022.

4.

Water Savings
For this reporting period, estimate the savings that resulted from water conversation activities and programs.

Estimated Gallons Saved/Conserved	Estimated Gallons Recycled/Reused	Total Volume of Water Saved[1]	Dollar Value of Water Saved[2]
24,781,800,356	23,399,450,000	48,181,250,356	49,882,048

[1]Estimated Gallons Saved + Estimated Gallons Recycled/Reused = Total Volume Saved
[2]Estimated this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital cost due to conservation.

5. Program Effectiveness
In your opinion, how would you rank the overall effectiveness of your conservation programs and activities?

Less Than Effective	Somewhat Effective	Hightly Effective	Does Not Apply
○	○	◉	○

6. What might your entity do to improve the effectiveness of your water conservation program?

Continue to expand public/youth education and outreach, coordinate with wholesale customers in promoting conservation programs and adopting water use related ordinances, and assist customers in developing programs for their communities.

Note: Agricultural water use consists of water use of our irrigation customers, primarily golf courses.

Conservation savings based on updated conservation model of TRWD's annual water use. It compares estimated demands that would have occurred without conservation versus anticipated model demands. Dollar value of water saved does not take into account deferred capital costs. It represents the value of the estimated gallons conserved - if it were to be pumped, sold and consumed at a settle-up rate of $1.0353 per 1,000 gallons sold.

7. Select the areas for which you would like to receive more technical assistance.

	Technical Assitance Areas
☐	Agricultural Best Management Practices
☐	Wholesale Best Management Practices
☐	Industrial Best Management Practices
☐	Drought Contingency Plans
☐	Landscape Efficient Systems
☐	Leak Detection and Equipment
☐	Educational Resources
☐	Water Conservation Plans
☐	Water IQ: Know Your Water
☐	Water Loss Audits
☐	Rainwater Harvesting
☐	Recycling and Reuse

Texas Water Development Board

Water Conservation Plan Annual Report
Wholesale Water Supplier

CONTACT INFORMATION

Name of Utility: TARRANT REGIONAL WD

Public Water Supply Identification Number (PWS ID): TX2200367

Certification of Convenience and Necessity (CCN) Number:

Surface Water Right ID Number: 3375-A, 3379, 3808-B, 3809-C, 3810-A, 3811, 3812, 3813, 4976-D, 5035-D, 5157-A, 5589, 5688, 5806, 12735

Wastewater ID Number:

Check all that apply:

- ☐ Retail Water Supplier
- ☑ Wholesale Water Supplier
- ☐ Wastewater Treatment Utility

Address: 800 E. Northside Dr. City: Fort Worth Zip Code: 76102

Email: dustan.compton@trwd.com Telephone Number: 8177204358

Regional Water Planning Group: C

Groundwater Conservation District:

Contact: First Name: Dustan Last Name: Compton

Title: Conservation Manager

Is this person the designated Conservation Coordinator? ◉ Yes ○ No

Regional Water Planning Group: C

Groundwater Conservation District:

Reporting Period (Calendar year):

Period Begin (mm/yyyy): 01/2021 Period End (mm/yyyy): 12/2021

Check all that apply:

- ☑ Received financial assistance of $500,000 or more from TWDB
- ☑ Have a surface water right with TCEQ

SYSTEM DATA

1. For this reporting period, provide the total volume of wholesale water exported (transfered or sold): 120,511,671,810

2. For this reporting period, does your billing/accounting system have the capability to classify customer into the Wholesale Customer Categories?

(●) Yes ( ) No

Wholesale Customers Categories*

- Municipal
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

3. For this reporting period, select the category(s) used to calculate wholesale customer water usage:

- [x] Municipal
- [x] Industrial
- [ ] Commercial
- [ ] Institutional
- [x] Agricultural

4. For this reporting period, enter the gallons of **WHOLESALE water exported** (transfered or sold). Enter zero if a Customer Category does not apply.

Wholesale Customer Category	Gallons Exported[1] (transfered or sold)	Number of Customers
Municipal	116,941,262,094	27
Industrial	3,255,694,067	8
Commercial	0	0
Institutional	0	0
Agricultural	314,715,649	16
Total Gallons[1]	**120511671810**	**51**

[1]Municipal + Industrial + Commercial + Institutional + Agricultural = Wholesale Water Exported

Water Use Accounting

	Total Gallons During the Reporting Period
Water Produced: Water from permitted sources such as rivers, lakes, streams, and wells	**164,775,030,276**
Wholesale Water Imported: Purchased wholesale water transferred into the system.	**0**
System Input: Total water supplied to system and available for use. Produced + Imported = System Input	**164,775,030,276**
Wholesale Water Exported: Wholesale water sold or transferred out of the system.	**120,511,671,810**
Gallons Per Day: Wholesale Water Exported / 365 = Gallons Per Day	**330,168,964**
Population: Estimated total population for municipal customers.	**2,275,605**
Gallons Per Capita Per Day: Wholesale Exported / Population / 365 = Gallons Per Capita Per Day	**145**

Provide the breakdown of Wholesale Water Exported into Raw and Treated water volumes.

	Gallons
Raw Wholesale Water Exported	**120,511,671,810**
Treated Wholesale Water Exported	**0**

Provide the specific and quantified five and ten-year targets as listed in your most current Water Conservation Plan.

	Date to Achieve Target	Specified and Quantified Targets
Five-year target	**2024**	**158**
Ten-year target	**2029**	**150**

Texas Water Development Board

Water Conservation Programs and Activities

1. Water Conservation Plan.
What year did your entity adopt or revise their most recent Water Conservation Plan? **2019**

Does The Plan incorporate **Best Management Practices**? (•) Yes ( ) No

2. Water Conservation Programs
Has your entity implemented any type of water conservation activity or program?

(•) Yes ( ) No

If yes, select the type(s) of Best Management Practices or water conservation strategies implemented during this reporting period. Estimate the gallons saved from wholesale supplier conservation strategies implemented. Do not include volume reused. Please include reuse in 3 below.

	Wholesale Supplier Best Management Practices
	Conservation Planning
☑	Customer Contract Requirements to Develop and Implement Water Conservation and Drought Contingency Plans
☑	Technical Assistance and Outreach
	Resource Sharing
☐	Cost Share Program
☐	Wholesale Supplier Collective Purchase and Direct Distribution of Water Conservation Equipment

Wholesale Supplier Activities and Practices	Check if Implemented	Estimated Gallons Saved
Agricultural Conservation Programs	☐	
Conservation Analysis & Planning	☑	
Conservation Rate Structures	☐	
Conservation Technology	☐	
Education & Public Awareness	☑	
Industrial Conservation Programs	☐	
Leak Detection/Water Loss Program	☐	
Rebate, Retrofit, and Incentive Programs	☐	

Regulatory & Enforcement	☐	
System Operations	☑	
Water Efficient Landscape Programs	☑	
Water Use Audits	☑	
Other	☑	20700004775
Totals		20700004775

Describe any additional type(s) of water conservation strategies implemented during this reporting period. Files to support or explain this may be attached below.

The "Other" estimated gallons saved is a total of all indoor and outdoor water conservation activities within the TRWD service area for the year 2021. The estimate comes from a conservation savings model that was updated in 2019.

3. Recycle/Reuse (Water or Wastewater Effluent)
For this reporting period, provide direct and indirect reuse activities.

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	0
Plant wash down	0
Chlorination/de-chlorination	0
Industrial	0
Landscape irrigation (parks, golf courses)	0
Agricultural	0
Other	8,099,560,000
Estimated Volume of Reuse	8,099,560,000

The total indirect reuse for wetlands diversion to Richland-Chambers Reservoir was 8,099,560,000 gallons in 2021.

4.

Water Savings
For this reporting period, estimate the savings that resulted from water conversation activities and programs.

Estimated Gallons Saved/Conserved	Estimated Gallons Recycled/Reused	Total Volume of Water Saved[1]	Dollar Value of Water Saved[2]
20,700,004,775	8,099,560,000	28,799,564,775	25,979,126

[1]Estimated Gallons Saved + Estimated Gallons Recycled/Reused = Total Volume Saved
[2]Estimated this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital cost due to conservation.

5. Program Effectiveness
In your opinion, how would you rank the overall effectiveness of your conservation programs and activities?

Less Than Effective	Somewhat Effective	Hightly Effective	Does Not Apply
○	○	◉	○

6. What might your entity do to improve the effectiveness of your water conservation program?

Continue to expand public/youth education and outreach, coordinate with wholesale customers in promoting conservation programs and adopting water use ordinances, and assist customers in developing programs for their communities.

Note: Agricultural water use consists of water use of our irrigation customers, primarily golf courses.

Conservation savings based on updated conservation model of TRWD's annual water use. It compares estimated demands that would have occurred without conservation versus anticipated model demands. Dollar value of water saved does not take into account deferred capital costs. It represents the value of the estimated gallons conserved - if it were to be pumped, sold and consumed at a rate of $1.25503 per 1,000 gallons sold.

7. Select the areas for which you would like to receive more technical assistance.

	Technical Assitance Areas
☐	Agricultural Best Management Practices
☐	Wholesale Best Management Practices
☐	Industrial Best Management Practices
☐	Drought Contingency Plans
☐	Landscape Efficient Systems
☐	Leak Detection and Equipment
☐	Educational Resources
☐	Water Conservation Plans
☐	Water IQ: Know Your Water
☐	Water Loss Audits
☐	Rainwater Harvesting
☐	Recycling and Reuse

Texas Water Development Board

Water Conservation Plan Annual Report
Wholesale Water Supplier

CONTACT INFORMATION

Name of Utility: Tarrant Regional WD

Public Water Supply Identification Number (PWS ID): TX2200367

Certification of Convenience and Necessity (CCN) Number:

Surface Water Right ID Number: 3375-A, 3379, 3808-B, 3809-C, 3810-A, 3811, 3812, 3813, 4976-D, 5035-D, 5157-A, 5589, 5688, 5806, 12735

Wastewater ID Number:

Check all that apply:

- ☐ Retail Water Supplier
- ☑ Wholesale Water Supplier
- ☐ Wastewater Treatment Utility

Address: 800 E. Northside Dr. City: Fort Worth Zip Code: 76102

Email: dustan.compton@trwd.com Telephone Number: 8177204358

Regional Water Planning Group: C

Groundwater Conservation District:

Contact: First Name: Dustan Last Name: Compton

Title: Conservation Manager

Is this person the designated Conservation Coordinator? ◉ Yes ○ No

Regional Water Planning Group: C

Groundwater Conservation District:

Reporting Period (Calendar year):

Period Begin (mm/yyyy): 01/2020 Period End (mm/yyyy): 12/2020

Check all that apply:

- ☑ Received financial assistance of $500,000 or more from TWDB
- ☑ Have a surface water right with TCEQ

SYSTEM DATA

1. For this reporting period, provide the total volume of wholesale water exported (transfered or sold): 118,601,203,422

2. For this reporting period, does your billing/accounting system have the capability to classify customer into the Wholesale Customer Categories?

(●) Yes ( ) No

Wholesale Customers Categories*

- Municipal
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

3. For this reporting period, select the category(s) used to calculate wholesale customer water usage:

- [x] Municipal
- [x] Industrial
- [ ] Commercial
- [ ] Institutional
- [x] Agricultural

4. For this reporting period, enter the gallons of **WHOLESALE water exported** (transfered or sold). Enter zero if a Customer Category does not apply.

Wholesale Customer Category	Gallons Exported[1] (transfered or sold)	Number of Customers
Municipal	114,532,305,138	27
Industrial	3,637,876,182	8
Commercial	0	0
Institutional	0	0
Agricultural	431,022,102	19
Total Gallons[1]	**118601203422**	**54**

[1]Municipal + Industrial + Commercial + Institutional + Agricultural = Wholesale Water Exported

Water Use Accounting

	Total Gallons During the Reporting Period
Water Produced: Water from permitted sources such as rivers, lakes, streams, and wells	**154,711,451,251**
Wholesale Water Imported: Purchased wholesale water transferred into the system.	**0**
System Input: Total water supplied to system and available for use. Produced + Imported = System Input	**154,711,451,251**
Wholesale Water Exported: Wholesale water sold or transferred out of the system.	**118,601,203,422**
Gallons Per Day: Wholesale Water Exported / 365 = Gallons Per Day	**324,934,804**
Population: Estimated total population for municipal customers.	**2,230,171**
Gallons Per Capita Per Day: Wholesale Exported / Population / 365 = Gallons Per Capita Per Day	**146**

Provide the breakdown of Wholesale Water Exported into Raw and Treated water volumes.

	Gallons
Raw Wholesale Water Exported	**118,601,203,422**
Treated Wholesale Water Exported	**0**

Provide the specific and quantified five and ten-year targets as listed in your most current Water Conservation Plan.

	Date to Achieve Target	Specified and Quantified Targets
Five-year target	**2024**	**158**
Ten-year target	**2029**	**150**

Texas Water Development Board

Water Conservation Programs and Activities

1. Water Conservation Plan.
What year did your entity adopt or revise their most recent Water Conservation Plan? **2019**

Does The Plan incorporate **Best Management Practices**? (•) Yes ( ) No

2. Water Conservation Programs
Has your entity implemented any type of water conservation activity or program?

(•) Yes ( ) No

If yes, select the type(s) of Best Management Practices or water conservation strategies implemented during this reporting period. Estimate the gallons saved from wholesale supplier conservation strategies implemented. Do not include volume reused. Please include reuse in 3 below.

	Wholesale Supplier Best Management Practices
	Conservation Planning
☑	Customer Contract Requirements to Develop and Implement Water Conservation and Drought Contingency Plans
☑	Technical Assistance and Outreach
	Resource Sharing
☐	Cost Share Program
☐	Wholesale Supplier Collective Purchase and Direct Distribution of Water Conservation Equipment

Wholesale Supplier Activities and Practices	Check if Implemented	Estimated Gallons Saved
Agricultural Conservation Programs	☐	
Conservation Analysis & Planning	☑	
Conservation Rate Structures	☐	
Conservation Technology	☐	
Education & Public Awareness	☑	
Industrial Conservation Programs	☐	
Leak Detection/Water Loss Program	☐	
Rebate, Retrofit, and Incentive Programs	☐	

Regulatory & Enforcement	☐	
System Operations	☑	
Water Efficient Landscape Programs	☑	
Water Use Audits	☑	
Other	☑	19516120206
Totals		19516120206

Describe any additional type(s) of water conservation strategies implemented during this reporting period. Files to support or explain this may be attached below.

The "Other" estimated gallons saved is a total of all indoor and outdoor water conservation activities within the TRWD service area for the year 2020. The estimate comes from a conservation savings model that was updated in 2019.

3. Recycle/Reuse (Water or Wastewater Effluent)
For this reporting period, provide direct and indirect reuse activities.

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other	7,838,650,000
Estimated Volume of Reuse	7,838,650,000

The total indirect reuse for wetlands diversion to Richland-Chambers Reservoir was 7,838,650,000 gallons in 2020.

4.

Water Savings
For this reporting period, estimate the savings that resulted from water conversation activities and programs.

Estimated Gallons Saved/Conserved	Estimated Gallons Recycled/Reused	Total Volume of Water Saved[1]	Dollar Value of Water Saved[2]
19,516,120,206	7,838,650,000	27,354,770,206	34,316,012

[1]Estimated Gallons Saved + Estimated Gallons Recycled/Reused = Total Volume Saved
[2]Estimated this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital cost due to conservation.

5. Program Effectiveness
In your opinion, how would you rank the overall effectiveness of your conservation programs and activities?

Less Than Effective	Somewhat Effective	Hightly Effective	Does Not Apply
○	○	◉	○

6. What might your entity do to improve the effectiveness of your water conservation program?

Continue to expand public education and outreach, coordinate with wholesale customers in promoting conservation programs and adopting water use ordinances, and assist customers in developing programs for their communities.

Note: Agricultural water use consists of water use of our irrigation customers, primarily golf courses.

Conservation savings based on updated conservation model of TRWD's annual water use. It compares estimated demands that would have occurred without conservation versus anticipated model demands. Dollar value of water saved does not take into account deferred capital costs. It represents the value of the estimated gallons conserved - if it were to be pumped, sold and consumed at a rate of $1.25448 per 1,000 gallons sold.

7. Select the areas for which you would like to receive more technical assistance.

	Technical Assitance Areas
☐	Agricultural Best Management Practices
☐	Wholesale Best Management Practices
☐	Industrial Best Management Practices
☐	Drought Contingency Plans
☐	Landscape Efficient Systems
☐	Leak Detection and Equipment
☐	Educational Resources
☐	Water Conservation Plans
☐	Water IQ: Know Your Water
☐	Water Loss Audits
☐	Rainwater Harvesting
☐	Recycling and Reuse

Texas Water Development Board

Water Conservation Plan Annual Report
Wholesale Water Supplier

CONTACT INFORMATION

Name of Utility: Tarrant Regional WD

Public Water Supply Identification Number (PWS ID): TX2200367

Certification of Convenience and Necessity (CCN) Number:

Surface Water Right ID Number: 3375-A, 3379, 3808-B, 3809-C, 3810-A, 3811, 3812, 3813, 4976-D, 5035-D, 5157-A, 5589, 5688, 5806, 12735

Wastewater ID Number:

Check all that apply:

- ☐ Retail Water Supplier
- ☑ Wholesale Water Supplier
- ☐ Wastewater Treatment Utility

Address: 800 E. Northside Dr. City: Fort Worth Zip Code: 76102

Email: dustan.compton@trwd.com Telephone Number: 8177204358

Regional Water Planning Group: C

Groundwater Conservation District:

Contact: First Name: Dustan Last Name: Compton

Title: Conservation Manager

Is this person the designated Conservation Coordinator? ◉ Yes ○ No

Regional Water Planning Group: C

Groundwater Conservation District:

Reporting Period (Calendar year):

Period Begin (mm/yyyy): 01/2019 Period End (mm/yyyy): 12/2019

Check all that apply:

- ☑ Received financial assistance of $500,000 or more from TWDB
- ☑ Have a surface water right with TCEQ

SYSTEM DATA

1. For this reporting period, provide the total volume of wholesale water exported (transfered or sold): 113,854,093,804

2. For this reporting period, does your billing/accounting system have the capability to classify customer into the Wholesale Customer Categories?

(●) Yes ( ) No

Wholesale Customers Categories*

- Municipal
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

3. For this reporting period, select the category(s) used to calculate wholesale customer water usage:

- [x] Municipal
- [x] Industrial
- [ ] Commercial
- [ ] Institutional
- [x] Agricultural

4. For this reporting period, enter the gallons of **WHOLESALE water exported** (transfered or sold). Enter zero if a Customer Category does not apply.

Wholesale Customer Category	Gallons Exported[1] (transfered or sold)	Number of Customers
Municipal	109,506,793,047	26
Industrial	4,056,354,649	6
Commercial	0	0
Institutional	0	0
Agricultural	290,946,108	18
Total Gallons[1]	**113854093804**	**50**

[1]Municipal + Industrial + Commercial + Institutional + Agricultural = Wholesale Water Exported

Water Use Accounting

	Total Gallons During the Reporting Period
Water Produced: Water from permitted sources such as rivers, lakes, streams, and wells	**120,599,520,995**
Wholesale Water Imported: Purchased wholesale water transferred into the system.	**0**
System Input: Total water supplied to system and available for use. Produced + Imported = System Input	**120,599,520,995**
Wholesale Water Exported: Wholesale water sold or transferred out of the system.	**113,854,093,804**
Gallons Per Day: Wholesale Water Exported / 365 = Gallons Per Day	**311,929,024**
Population: Estimated total population for municipal customers.	**2,178,570**
Gallons Per Capita Per Day: Wholesale Exported / Population / 365 = Gallons Per Capita Per Day	**143**

Provide the breakdown of Wholesale Water Exported into Raw and Treated water volumes.

	Gallons
Raw Wholesale Water Exported	**113,854,093,804**
Treated Wholesale Water Exported	**0**

Provide the specific and quantified five and ten-year targets as listed in your most current Water Conservation Plan.

	Date to Achieve Target	Specified and Quantified Targets
Five-year target	**2024**	**158**
Ten-year target	**2029**	**150**

Texas Water Development Board

Water Conservation Programs and Activities

1. Water Conservation Plan.
What year did your entity adopt or revise their most recent Water Conservation Plan? **2019**

Does The Plan incorporate **Best Management Practices**? (•) Yes ( ) No

2. Water Conservation Programs
Has your entity implemented any type of water conservation activity or program?

(•) Yes ( ) No

If yes, select the type(s) of Best Management Practices or water conservation strategies implemented during this reporting period.

	Wholesale Supplier Activities and Practices
☐	Agricultural Conservation Programs
☑	Conservation Analysis & Planning
☐	Conservation Rate Structures
☐	Conservation Technology
☑	Education & Public Awareness
☐	Industrial Conservation Programs
☐	Leak Detection/Water Loss Program
☐	Rebate, Retrofit, and Incentive Programs
☐	Regulatory & Enforcement
☑	System Operations
☑	Water Efficient Landscape Programs
☑	Water Use Audits
☐	Other

3. Recycle/Reuse (Water or Wastewater Effluent)
For this reporting period, provide direct and indirect reuse activities.

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	0
Plant wash down	0
Chlorination/de-chlorination	0
Industrial	0
Landscape irrigation (parks, golf courses)	0
Agricultural	0
Other	2,747,044,495
Estimated Volume of Reuse	2,747,044,495

The total indirect reuse for wetlands diversion to Richland-Chambers Reservoir was 2,747,044,495 gallons in 2019.

4. Water Savings

For this reporting period, estimate the savings that resulted from water conversation activities and programs.

Estimated Gallons Saved/Conserved	Estimated Gallons Recycled/Reused	Total Volume of Water Saved[1]	Dollar Value of Water Saved[2]
19,219,599,113	2,747,044,495	21,966,643,608	27,677,971

[1]Estimated Gallons Saved + Estimated Gallons Recycled/Reused = Total Volume Saved

[2]Estimated this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital cost due to conservation.

5. Program Effectiveness

In your opinion, how would you rank the overall effectiveness of your conservation programs and activities?

Less Than Effective	Somewhat Effective	Hightly Effective	Does Not Apply
○	○	◉	○

6. What might your entity do to improve the effectiveness of your water conservation program?

Expand public education and outreach, promote weekly watering advice, increase adoption of water use ordinances among our customer cities, and work with customers to develop and support conservation programs for their communities.

Note: Agricultural water use consists of water use of our irrigation customers, primarily golf courses.

Conservation savings based on updated conservation model of TRWD's annual water use. It compares estimated demands that would have occurred without conservation versus anticipated model demands. The new conservation model also updated our population projections and explains the large year over year increase. Dollar value of water saved does not take into account deferred capital costs. It represents the value of the estimated gallons conserved - if it were to be pumped, sold and consumed at a rate of $1.26 per 1,000 gallons sold.

7. Select the areas for which you would like to receive more technical assistance.

	Technical Assitance Areas
☐	Agricultural Best Management Practices
☐	Wholesale Best Management Practices
☐	Industrial Best Management Practices
☐	Drought Contingency Plans
☐	Landscape Efficient Systems
☐	Leak Detection and Equipment
☐	Educational Resources
☐	Water Conservation Plans
☐	Water IQ: Know Your Water
☐	Water Loss Audits
☐	Rainwater Harvesting
☐	Recycling and Reuse

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APPENDIX F

TRWD CUSTOMER WATER CONSERVATION REPORT

APPENDIX F
TRWD Customer Water Conservation Report
Due May 1 of Every Year

Name of Entity: _____

Address & Zip: _____

Telephone Number: _____ **Email:** _____

Form Completed By: _____

Title: _____

Signature: _____ **Date:** _____

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

_____

UTILITY PROFILE

I. POPULATION CUSTOMER DATA

A. Population and Service Area Data

1. Attach a copy of your service area map.
2. Service area size (square miles): _____
3. Current population of service area: _____
4. Current population served by utility:
   a: water _____
   b: wastewater _____

5. Population served by water utility service area for the previous five years:

Year	Population
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

6. Projected population for in the following decades:

Year	Population
2030	_____
2040	_____
2050	_____
2060	_____
2070	_____

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

B. Customers Data

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

Treated water users	**Metered**	**Not-metered**	**Totals**
Residential:			
Single Family			
Multi-Family			
Commercial			
Industrial/mining			
Institutional			
Agriculture			
Other/Wholesale			

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

Year			
Treated water users	**Metered**	**Not-metered**	**Totals**
Residential:			
Single Family			
Multi-Family			
Commercial			
Industrial/mining			
Institutional			
Agriculture			
Other/Wholesale			

3. List annual water use for the five highest volume customers.

	Customer	**Use (1,000 gallons / year)**	**Treated / Raw Water**
(1)			
(2)			
(3)			
(4)			
(5)			

II. WATER USE DATA FOR SERVICE AREA

A. Water Accounting Data

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

   Please indicate: Diverted Water _____

   Treated Water _____

Total Diverted and Treated Water Deliveries and Sales by Month					
Month	**Year**				
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
Total					

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

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

Account Types	**Year**				
Residential					
Single Family					
Multi-Family					
Commercial					
Industrial/Mining					
Institutional					
Agricultural					
Other/Wholesale					

3. List previous records for water loss (the difference between water diverted or treated and water delivered or sold). The goal for percent of unaccounted for water is 12%.

Year	**Amount (gal.)**	**% of Total Water Diverted or Treated**
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4. List previous five years records for water reuse. Reuse is 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.

Year	**Amount (gal.)**	**% of Total Water Diverted or Treated**
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5. Municipal per capita water use (in gallons per day) for previous five years. Municipal per capita water use is the sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by total population served. GPCD includes water losses.

Year	**Population**	**Total Water Diverted (or Treated)(1,000 gal.)**	**Municipal Per Capita Use (GPCD)**
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Source of Population data: _____

_____

B. Projected Water Demands

If applicable, attach or cite projected water supply demands for next ten years using information such as population trends, historical water use, and economic growth in the service area and any additional water supply requirement for such growth.

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APPENDIX G

REGIONAL LANDSCAPE INITIATIVES – BEST MANAGEMENT PRACTICES FOR NORTH TEXAS WATER CONSERVATION PROGRAMS

REGIONAL LANDSCAPE INITIATIVES

BEST MANAGEMENT PRACTICES FOR NORTH TEXAS WATER CONSERVATION PROGRAMS

COLLABORATIVE EFFORT BY:

Dallas Water Utilities
North Texas Municipal Water District
Tarrant Regional Water District
Upper Trinity Regional Water District

March 2021

TABLE OF CONTENTS

This document was made in collaboration with the North Texas Regional Water Providers to be a guide of best management practices to reduce water waste and encourage long-term water conservation.

The North Texas Regional Water Providers are comprised of:
Dallas Water Utilities
North Texas Municipal Water District
Tarrant Regional Water District
Upper Trinity Regional Water District

INTRODUCTION & BACKGROUND

The four major water suppliers in North Texas developed this document as a resource for municipal staff tasked with developing conservation programs in the region.

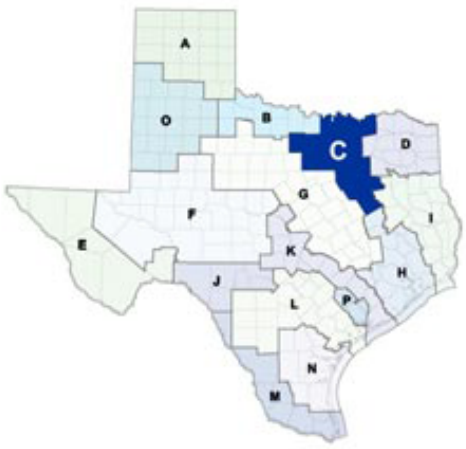
These suppliers cover twelve of the sixteen counties included in Region C of the Texas Water Development Board planning groups. The majority of Region C lies in the upper portion of the Trinity River Basin in the North Texas region. There are 34 major reservoirs in Region C with conservation storage in excess of 5-million acre feet.

In 2020, Region C is expected to account for over 30 percent of Texas' population but only 9.3 percent of the state's projected water use. These figures are attributed to the region's commitment to water conservation as a water supply strategy.

The region's population is expected to nearly double by 2070, with projected growth of 91 percent in the next fifty years. Ninety percent of water supplies derive from surface water resources, and municipal use makes up 90% of the

total water used. These increases in population and water demand require significant new water supplies for the region over the next 50 years. Water conservation efforts continue to serve as the most cost-effective solution for both added supply and the delay of costly new supplies.

This initiative is designed to act as a guide for conservation programs in North Texas. Each best management practice (BMP) includes information specific to the North Texas region. Information consists of the background, importance, and benefits of each BMP and key talking points to consider when implementing the strategy. This document also includes case study examples and additional links and resources for each proposed measure.



Region C (highlighted in dark blue on the map above), image courtesy of Texas Water Development Board.

Region C Water Planning Group, image courtesy of Texas Water Development Board.

THE NORTH TEXAS REGIONAL WATER PROVIDERS BELIEVE:

- Waters of the state are of limited supply and are subject to ever-increasing demands.
- The continuation of Texas's economic prosperity depends on the availability of adequate water supplies for future uses.
- The North Texas Regional Water Providers strategy is to promote the conservation and efficient use of water and to prevent the waste of this valuable resource.
- Landscapes are essential to the quality of life in North Texas by providing areas for active and passive recreation.
- Landscapes enhancing to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development.
- Landscape design, installation, maintenance, and management can and should be water efficient.
- The right to use water is limited to the amount reasonably required for the beneficial use to be served, and the right does not and shall not extend to waste or unreasonable methods of use.

NORTH TEXAS REGIONAL WATER PROVIDERS AGREE TO LANDSCAPE BEST MANAGEMENT PRACTICES THAT:

- Promote the values and benefits of landscaping practices that integrate and go beyond conservation and efficient water use.
- Establish provisions for water management practices and water waste prevention for existing landscapes.
- Promote the benefits of consistent landscape ordinances and BMPs with neighboring local and regional agencies in North Texas.

PROMOTION OF ET-BASED WEEKLY WATERING ADVICE AND RECOMMENDATIONS

BACKGROUND, IMPORTANCE AND BENEFITS

This BMP can be useful for cities with a significant percentage of customers using automated landscape irrigation systems. It applies to single and multi-family residences, commercial, industrial, and institutional customers.

A common practice among these user groups is to set the irrigation controller once, forgetting to make adjustments, and allowing water to be applied whether the landscape needs it or not based on recent rainfall and actual water needs. This leads to substantial overwatering and possible diseases that can be detrimental to plant health.

Water providers in the Dallas-Fort Worth area sponsor weather stations to collect daily weather data and provide the most accurate watering recommendations. Many cities in the Dallas-Fort Worth area can already take advantage of these ET-based recommendations and incorporate them into their water conservation programs, at no cost to the city.

Providing evapotranspiration (ET)-based weekly watering recommendations can reduce the amount of water applied for outdoor watering if customers follow the guidance.

A drawback with this BMP is the adoption rate. Since these recommendations may change every week, it requires customers to adjust their controllers more often.

Some customers may prefer to set their sprinkler controller once and follow a regular schedule. In this scenario, it may be better to encourage them to follow the twice-weekly watering recommendation instead.

Evapotranspiration (ET):

The combined amount of water transpired by plants and the water evaporated from the soil.

It is dependent on several factors, including:

- Temperature
- Humidity
- Wind
- Solar radiation
- Type of plant

The purpose of providing ET-based recommendations is to apply the amount of supplemental irrigation necessary to replace the water lost to ET, which was not met by rainfall.

Example: A weekly potential ET value of 1.5 inches with a warm-season turf coefficient of 0.6 and a normal stress quality factor of 0.6 with no rainfall results in a weekly watering recommendation of 0.5” for the lawn.

CASE STUDIES

Water My Yard
The Texas A&M AgriLife Extension Service (AgriLife) and North Texas Municipal Water District (NTMWD) partnered together to create the 'Water My Yard' online tool and app that provides weekly ET-based lawn watering recommendations.

'Water My Yard' is an online platform where homeowners can sign up to receive weekly recommendations based on their location and a few specifications about their sprinkler system. Users can then choose to accept the recommendations by email, text, or both. Local weather data is derived from multiple weather stations that NTMWD sponsors.

Additional sponsors have joined the program to provide 'Water My Yard' to their respective service areas, including the Upper Trinity Regional Water District, Lower Colorado River Authority, and the Cities of Irving, Bryan, and College Station.

Weekly Watering Advice
Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU) also provide weekly watering recommendations for most of North Texas, based on data from weather stations scattered throughout the Dallas-Fort Worth area.

These recommendations are distributed by email and text every week from the 'Water Is Awesome' website. These recommendations are provided in inches of water needed and the number of minutes necessary to apply that amount of water for spray, rotor, and multi-stream sprinklers.

WaterWise Newsletter
The City of Frisco provides weekly lawn watering advice on the city's website and through the WaterWise Newsletter distributed to subscribers every Monday. Frisco has a weather station they use to determine how much water is needed for each particular week.

TALKING POINTS

- Providing ET-based recommendations reduces wasteful watering habits such as overwatering and runoff, and promotes healthy lawn care that reduces diseases from affecting the lawn and plants.
- Weekly watering recommendations are based on the past week's weather conditions and the ET rate of warm-season grass and suggest only applying the amount of water needed to replace what was lost.
- Many local cities already have access to these recommendations through the participation of the major water providers sponsoring local weather stations and programs.
- Weekly recommendations can be distributed through email, text, or Facebook posts.

ADDITIONAL LINKS AND RESOURCES

Texas ET Network

Water My Yard

Water Is Awesome

City of Frisco Water Resources

RECOMMENDED PLANT LIST

BACKGROUND, IMPORTANCE AND BENEFITS

The North Central Texas region has a history of promoting native and adapted plants in the area through the North Central Texas Council Of Government's (NCTCOG) Texas SmartScape program. Many water conservation educators also handle stormwater pollution prevention, and this BMP straddles messaging related to both water conservation and water quality. Many local master gardener associations and extension agents also have recommended plant lists. These lists can be tailored to various audiences—residents, local nurseries, landscapers, parks and recreation staff, etc. However, merely having a plant list is not enough; it needs to be promoted through public outreach and demonstration gardens or used in public landscapes and right-of-ways.

One key strategy is to partner with other organizations that promote native and drought-tolerant plants. The NCTCOG Public Education Task Force oversees the Texas SmartScape program. Texas SmartScape provides customizable promotional materials, and the website promotes regional events, Texas SmartScape Month materials, and educational information. Local cities can partner with nurseries to use the Texas SmartScape stickers on native and drought-tolerant plants. It is best to do this during specific sales events since it can be a challenge to ensure proper use of the Texas SmartScape stickers during regular business year-round.

Another strategy is to collaborate with city facilities and the departments responsible for their landscapes to promote native and drought-tolerant plants. Highlighting these facility landscapes provides residents with the opportunity to view the plants in action. Signage at these locations is another way to raise awareness amongst the foot traffic at city facilities.

Partnering with local master gardeners, garden clubs, and organizations to host native and adapted plant classes is another great way to raise awareness. March is Texas SmartScape Month in North Texas, which gives many opportunities to partner and promote on a local and regional level. Cities across the region conduct awareness campaigns, plant sales, and classes.

TALKING POINTS

- Native and adapted landscapes are more than rocks, cactus, and desert. These plants offer rich diversity and variety for landscapes beyond turf grass.
- Native and adapted plants are suited to the climate and soil conditions of North Texas, making them more drought-tolerant and pest/disease resistant.
- Native and adapted plants attract beneficial animals and insects to landscapes such as birds, bees, and butterflies.
- Native and adapted plants require less water, fertilizer, and pesticides which promotes water conservation and reduces polluted runoff to local waterways.

CASE STUDIES

Newcomer's Guide to Gardening in North Texas
The Dallas-Fort Worth area is one of the fastest-growing regions in the country. Many people moving to the area are not familiar with the plants, soil, wildlife, and water challenges of the region. In 2017, the City of Allen worked with Texas A&M AgriLife Extension in Collin County to create the Newcomer's Guide to Gardening in North Texas. When the City of McKinney took over the program for the region, its popularity grew significantly. Newcomer's Guide to Gardening in North Texas program is targeted to new homeowners moving to North Texas. The popularity of the event has grown every year, with hundreds of people attending each event.

Texas SmartScape
The Texas SmartScape program was created in response to new stormwater regulations in 1999 by a task force within the North Central Texas Council of Governments. The program was one tool cities could use to be in compliance with public education and outreach criteria of the MS4 stormwater permit. The program includes an extensive plant database, a calendar of local plant sales and education events, design tips, and resources staff can use to promote native and drought-tolerant plants to customers. The program is a regional effort, which also helps to amplify reach and foster brand recognition.

ADDITIONAL LINKS AND RESOURCES

Texas SmartScape

North Central Texas Council of Governments' Texas SmartScape Program

Lady Bird Johnson Wildflower Center-North Texas

Native Plant Society of Texas

Texas Superstar

National Wildlife Foundation Native Plant Finder

City of Richardson Drought Tolerant Plant List

City of Irving Guide to Using Native Plants

ADDITIONAL WATER SAVING MEASURES FOR NEW IRRIGATION SYSTEM REQUIREMENTS

BACKGROUND, IMPORTANCE AND BENEFITS

In 2007, The 80th Texas Legislature passed House Bill 1656, Senate Bill 3, and House Bill 4 related to regulating irrigation systems and irrigators by adopting minimum standards and specifications for designing, installing, and operating irrigation systems.

The Texas legislation required cities with a population over 20,000 to develop a landscape irrigation program that includes permitting, inspection, and enforcement of water conservation for new irrigation systems. The landscape irrigation rules must have been adopted to comply with the January 1, 2009, effective date.

In 2008, staff from many area cities participated in a regional committee that provided comments to the Texas Commission on Environmental Quality (TCEQ) rule-making process, reviewed the adopted rules, and drafted a recommended ordinance for North Central Texas municipalities.

The regional committee ordinance recommended additional requirements above the minimum standards to increase water conservation in new irrigation systems.

Participating cities included:

- Arlington
- Bedford
- Burleson
- Carrollton
- Dallas
- Denton
- Fort Worth
- Frisco
- Grand Prairie
- Mansfield
- North Richland Hills
- Southlake

Planning for Growth

The benefit of the irrigation rules is directly related to water conservation and the Region C Water Planning Group Plan.

In the North Central Texas region, the estimated population of 7,504,000 in 2020 will increase to 14,348,000 by 2070.

Region C's long-term water supply strategy states that 27% of the new water supplies will come from conservation and reuse to meet the water demands of 2070.

An estimated 30-60% of treated water is applied to landscapes during the summer months, and up to 50% is wasted due to runoff, overwatering, and evaporation.

CASE STUDIES

Above and Beyond Standards
Many cities within the area have adopted irrigation system standards above the minimum state requirements, including:

- Allen
- Arlington
- Dallas
- Fort Worth
- Frisco
- Mansfield

There are many standards above the minimum state requirements that any city can adopt. Here are a few common standards North Texas cities have adopted:

- Requiring all non-turf landscape areas included in the irrigation plan to be designed with:
  - Subsurface irrigation
  - Drip irrigation
  - Pressure compensating tubing
- Requiring a flow control master valve to be installed on the backflow prevention device's discharge side on all new installations.
- Requiring check valves where elevation differences may result in low head drainage.
- Requiring pop-up heads to be installed at grade level and operated to extend above all landscape turfgrass.
- Requiring an "operational" rain and freeze sensor.

Find these commonly adopted and additional standards in Appendix B.

TALKING POINTS

- State statutes already require minimum irrigation system standards.
- Irrigation efficiency is crucial to meeting long-term water supply goals.
- Irrigation technology has advanced significantly over the last ten years and local ordinances should be reviewed and updated if needed.

ADDITIONAL LINKS AND RESOURCES

TCEQ Landscape Irrigation Standards and Requirements

2017 State Water Plan

YEAR-ROUND TWICE PER WEEK WATERING SCHEDULES

BACKGROUND, IMPORTANCE AND BENEFITS

A mandatory maximum twice-weekly watering schedule as a BMP has been gradually gaining acceptance in the North Texas region and the state. Generally, "day of the week" irrigation schedules are based either on even/odd address numbers, trash/recycling pick-up days, or geographic areas related to distribution pressure zones. The assigned watering schedules apply to all customer types: residential (single-family and multi-family) and industrial, commercial, institutional (ICI). The schedules apply to automatic irrigation systems and hose-end landscape sprinklers but usually do not apply to soaker hoses, drip irrigation, or hand watering.

Some cities have considered the implementation of twice-weekly watering without a mandatory schedule. In this scenario, the provider would leave the schedule up to the customer so a twice-weekly schedule could be on whatever days the customer chooses. However, voluntary twice-weekly watering cannot be affordably verified or enforced. Communities with remote read meters are better equipped to consider a voluntary schedule, provided they can run useful reports and effectively communicate with customers.

The benefit of a mandatory maximum watering schedule is to reduce landscape overwatering, which is common with the use of automatic irrigation systems. Overwatering landscapes can also occur using hose-end sprinklers but is less likely due to the additional effort required.

Cities with mandatory twice-weekly watering schedules find that customer resistance usually ends after one growing season. After that experience, customers see that the two-day schedule is ample for healthy landscapes.

NOTE: This BMP could be improved with the inclusion of BMP 1 (ET-Based Weekly Watering Advice/Recommendations) since landscapes frequently need less than twice-weekly watering.

TALKING POINTS

- Automatic irrigation systems have made watering landscapes much more effortless. The American Water Works Association (AWWA) estimates automated systems use 35% more water than those irrigating with a hose-end sprinkler. If those automatic systems routinely use the automatic timer function, they use an additional 47% more water than those who manually operate their in-ground systems. The amount of water wasted with a "set it and forget it" mindset is not sustainable for future population growth and our finite water resources.
- Twice weekly watering can result in 8-10% savings and may be an effective way to manage peaks in watering throughout the summer months.
- Deep and infrequent watering is best for the development of a healthy turfgrass root system. Deep roots make lawns more resistant to heat and winter freezes and prevent erosion.
- Many North Texas horticulturists have endorsed twice-weekly watering as more than sufficient for landscapes in the region, even in the heat of summer.

CASE STUDIES

Dallas Water Utilities
Dallas Water Utilities (DWU) was the first city in North Texas to adopt a mandatory maximum twice-weekly watering schedule as a conservation measure in 2012. DWU has experienced an average reduction of 13% of their total pumpage (combined retail and wholesale customers) since 2012, with an average 16% reduction on their non-watering days.

North Texas Municipal Water District
Freese and Nichols, Inc. (FNI) performed an analysis on twice per week watering for the North Texas Municipal Water District (NTMWD) from 2015 to 2017. NTMWD serves 1.7 million customers across multiple north Dallas suburbs. The district invests in conservation education and reuse and currently has a mandatory, twice per week watering restriction in April-October and one time per week November-March. FNI built a model to predict water use during periods without drought restrictions. This model was then used during drought conditions to estimate what water use would have been without restrictions. The savings were calculated by finding the difference between modeled water use and observed water use. The model took the average daily pumping with weather-corrected trends, days since last rainfall, maximum temperature, and precipitation. Ultimately, FNI determined that NTMWD's twice-per-week watering schedule attributed to a 2.5-3% water savings.

Texas Water Development Board
In 2015, the Texas Legislature appropriated funds to the Texas Water Development Board (TWDB) to fund a research project principally charged with determining the savings of municipal water conservation activities being implemented in relation to the recommended municipal conservation water management strategy supply volumes in the 2017 State Water Plan. The project was also tasked with identifying activities that participating water utilities could pursue to meet future goals.

TWDB interviewed and collected data from 170 utilities that ultimately participated, measuring and quantifying more than 547 individual conservation activities. Percent reduction for twice per week watering measures was between 2.74 percent and 13.47 percent of total demand based on the percentage of outdoor water use by single-family customers.

Terms to know:

System Impacts:
Some cities are concerned that their distribution systems can't handle the differing demands of twice-weekly watering schedules. But many systems have successfully resolved that concern by assigning irrigation schedules based on trash pick-up schedules, neighborhoods, or other geographic areas.

Variances:
Large properties, site-specific soil conditions, etc., may not be feasible for a twice-weekly schedule, so many communities offer variances that can be requested and granted as appropriate.

Cool Season Grasses:
Allowing variances to grow cool season grasses in winter should be discouraged as an inefficient use of a limited resource. Some cities may allow variances, and some have decided not to. In drought conditions, variances should not be considered for cool-season grasses.

ADDITIONAL LINKS AND RESOURCES

TWDB Statewide Water Conservation Quantification Project

2020 North Texas Outdoor Watering Summit Resources

TIME OF DAY WATERING SCHEDULES

BACKGROUND, IMPORTANCE AND BENEFITS

Although the primary purpose of this best management practice (BMP) is to reduce wind drift and evaporation losses during the active growing season, defined under this BMP as the period from April 1 to October 31, this time of day restriction may apply throughout the year.

Many Texas cities have adopted either year-round time of day watering schedules or period-specific time of day watering schedules tied to growing seasons or drought management stages. Whether year-round or period-specific, these adopted time of day schedules intend to increase efficiencies by eliminating outdoor irrigation use when climatic factors negatively impact irrigation system efficiencies.

In terms of landscape irrigation, midday is not an optimal time to irrigate because evapotranspiration rates are higher, and plants are more susceptible to stress associated with factors such as higher temperatures and lower relative humidity.

Under normal circumstances, landscape watering with an irrigation system or sprinkler is permitted on authorized watering days, before 10 a.m. or after 6 p.m.

TALKING POINTS

- Many cities within the DFW Metroplex adopted a time of date watering schedule over ten years ago, and it has become a community standard for many residents.
- The main reason to consider adopting this BMP is to reduce water waste related to irrigation systems.
- By reducing losses associated with evaporation and wind drift, it is possible to increase irrigation efficiency by 15 percent.
- Evapotranspiration is typically the highest during the hottest hours of the day, generally between 10:00 a.m. and 6:00 p.m.
- The probability of drift from an operating irrigation system is also greater due to typically higher wind speeds during the day.

CASE STUDIES

The following is a sampling of local Texas cities with either adopted year-round or period-specific time of day watering schedules.

Year-Round
Time of Day Watering Schedules

Arlington, TX
Fort Worth, TX
Frisco, TX
Garland, TX
Grapevine, TX
Mansfield, TX
Southlake, TX

Period-Specific
Time of Day Watering Schedules

Apr 1 – Oct 31
Allen, TX
Dallas, TX
Flower Mound, TX
McKinney, TX
Mesquite, TX
Plano, TX
Sachse, TX
University Park, TX

Apr 1 – Sept 30
Irving, TX

May 1 – Sept 30
Lewisville, TX
Highland Village, TX

June 1 – Sept 30
Denton, TX

Terms to know:

Evapotranspiration
Evapotranspiration is the combination of water loss by transpiration of plants and evaporation from soil and plant surfaces.

Preventing Stress
Prevent plant stress by ensuring an adequate supply of water within the root zone to allow the plant to better deal with the day's heat.

Relative Humidity
Relative humidity and evapotranspiration have an inverse relationship. When relative humidity increases, evapotranspiration decreases, and when relative humidity decreases evapotranspiration increases.

Drift
The probability of drift from an operating irrigation system is greater due to typically higher wind speeds during the day.

Drift and Evaporation Losses – Day vs. Night
The best time to begin irrigation is after nightfall and, more specifically, early morning. Night-time temperatures and wind speeds are much lower, which means lower evaporative losses during irrigation. Night-time humidity is higher, which also reduces evaporation. Estimates of water losses attributed to drift and evaporation can range from 20 to 30 percent during the day and five to 15 percent at night, depending on the specific region.

ADDITIONAL LINKS AND RESOURCES

Clemson Cooperative Extension: Irrigation Time of Day

North Texas Outdoor Watering Survey, 2020 North Texas Outdoor Watering Summit Resources

WATER WASTE PROVISIONS

BACKGROUND, IMPORTANCE AND BENEFITS

Outdoor irrigation makes up approximately 35-40% of total water use in most North Texas communities. Poorly maintained sprinkler systems result in significant water waste due to runoff, overspray onto impervious surfaces, and evaporation. Many communities have adopted ordinances to address water waste with enforcement measures. But not all communities or water providers have taken this approach.

Included in the 2004 Texas Water Development Board Report 362 "Water Conservation Best Management Practices Guide", the adoption of a water waste ordinance has been supported for some time. Communities with a water waste ordinance can emphasize the principle of reducing water waste and have the ability to administer long-term efficient use of water supplies.

The main purpose of a water waste ordinance is to mandate that water waste is prevented during lawn and landscape irrigation, that water resources are conserved for their most beneficial and vital uses, and that public health is protected. It provides a defined enforcement mechanism for exceptional neglect related to the proper

maintenance and efficient use of water fixtures, pipes, and irrigation systems.

Many utilities and cities are installing meters with electronic communication capabilities. AMI (automated metering infrastructure) and AMR (automatic meter reading) technology allow multiple readings per day and on-demand access to water use data. These new meters can be accompanied by online portals that enable regular communication with residents and customer engagement. Customers and cities can be notified of continuous usage, can easily access and review water bills, set budgets for water use, and proactively manage indoor/outdoor water use.

Existing water waste ordinance offenses often include:

- Sprinkler runoff from a property greater than 50 feet.
- Operating an irrigation system or other lawn watering device during any form of precipitation or when temperatures are below 32 degrees Fahrenheit.
- Irrigation to pond in a street or parking lot to a depth greater than 1/4 inch.
- Failure to repair a controllable leak, including a broken sprinkler head, a leaking valve, leaking or broken pipes, or a leaking faucet.
- Operating a permanently installed irrigation system with a broken head or a head that is out of adjustment where the arc of the spray head is over a street or parking lot.
- Operating an irrigation system during the hours of 10 am-6 pm either seasonally or year-round when prohibited. Exceptions are provided for testing, auditing, and repair of the system.
- Washing of driveways, sidewalks, parking lots or other impervious surface areas with an open hose or spray nozzle attached to an open hose, except when required to eliminate conditions that threaten public health, safety or welfare.
- Washing vehicles with a hose that lacks an automatic shut-off valve.

CASE STUDIES

City of Dallas
The City of Dallas implemented its outdoor water conservation ordinance in 2002. The ordinance prohibited wasteful water use, required the first time of day restrictions in North Texas, and mandated working rain and freeze sensors on all automatic irrigation systems. In 2012, Dallas adopted twice-weekly watering requirements as part of the ordinance.

In 2013, Dallas modified enforcement of the water conservation ordinance to allow civil penalties for violations. Civil enforcement reduces the burden on code enforcement and municipal court dockets during peak season or periods of drought because it does not require a court appearance.

TALKING POINTS

- The overall purpose is to promote water efficiency, gain compliance in order to reduce water waste, and not to write citations on first notifications of violations.
- The ordinance can provide additional assistance or enforcement actions if no corrective action has been taken after a certain number of correspondences.
- Advancement of AMI systems may allow water providers to notify customers of potential leaks.

City of Allen
The City of Allen has a stringent water waste provision included in the water resource management ordinance. Violations include fines that can be up to $2000 per day per occurrence. Code enforcement issues tickets, and the judge sets the fine amounts.

For commercial properties in violation, the city can access an administrative fee in $200 increments up to $2000 directly into the water bill. Customers can appeal through hearings at the water department. In many cases, violators produce enough evidence to have the initial violation waived; however, the administrative fee will be higher if a subsequent violation occurs. During a period of drought, these violations are considered a criminal penalty. If a person accrues multiple offenses, fines can exceed $2000 and if the customer doesn't show up in court, a warrant could be issued for their arrest.

Cities should determine the best means of enforcement, be it tickets or administrative fees that work best for their community.

ADDITIONAL RESOURCES AND LINKS

City of Allen's Irrigation Checklist

City of Richardson Water Conservation

Texas Water Development Board: Prohibition on Wasting Water

RAIN AND FREEZE SENSORS FOR COMMERCIAL SPRINKLER SYSTEMS

BACKGROUND, IMPORTANCE AND BENEFITS

All new irrigation systems in Texas must have a rain or moisture shut-off device–commonly referred to as a rain and freeze sensor in North Texas–or other technology designed to inhibit or interrupt the irrigation system's operation during periods of moisture rainfall. Any repairs to existing irrigation systems require the installation of a rain or moisture shut-off device. (30 TAC Part 1 Ch 344)

These sensors interrupt an automatic irrigation system controller's cycle when a specific amount of rainfall has occurred. They are small devices connected to the irrigation system controller and mounted in an open area exposed to rain.

The amount of water that can be saved using rain shut-off devices varies, but savings are usually substantial in a year with average rainfall. Several factors are involved in determining how much a sensor can reduce water usage: how often it rains, whether or not the controller is left on for automatic operation, and the amount of water applied by the system per cycle. If the amount of water applied per watering cycle by the whole system is known, it is easy to calculate how much water is being saved each time the sensor interrupts the watering cycle because of rainfall.

TALKING POINTS

Advantages of a rain and freeze sensor:

- Conserves water -- prevents irrigation after recent rain events.
- Saves money -- reduces utility bills by interrupting the irrigation system after adequate rainfall.
- The system only runs when necessary, which reduces wear on the irrigation system.
- Reduces disease damage by eliminating unnecessary irrigation events.
- Reduces liability caused by irrigation systems running during a freeze event, which can cause road hazards.

Source: Alliance for Water Efficiency

Photo courtesy of the City of Lubbock, TX.

CASE STUDIES

City of Fort Worth
The City of Fort Worth requires a rain and freeze sensor on all commercial irrigation systems. An annual inspection is required and can be done in conjunction with the annual backflow inspection.

City of Frisco
The City of Frisco irrigation ordinance requires a rain and freeze sensor that has the capability to set thresholds for both rain and freeze at 40 degrees or above. Proof of compliance requires a letter from the manufacturer stating this capability.

City of Allen
The City of Allen requires all commercial irrigation accounts to be inspected with an audit once every three years. This audit includes testing if the rain and freeze sensor is functioning.

City of Dallas
The City of Dallas mandates working rain and freeze sensors on all automatic irrigation systems in Dallas, both residential and commercial.

ADDITIONAL LINKS AND RESOURCES

City of Allen Water Resource Management Ordinance

City of Frisco Irrigation Ordinance

City of Fort Worth Irrigation Requirements

ADOPT A WATER EFFICIENCY OUTREACH PROGRAM

BACKGROUND, IMPORTANCE AND BENEFITS

Perhaps one of the most important actions a utility can take in increasing water use efficiency among its customers is through public education and outreach programs (E&O).

The goal of E&O programs is to influence behavioral change for short and long-term water savings. Regular and consistent messaging in customer education will provide an overall picture of water resources in the community. Communicating the need for conservation helps manage existing water supplies and avoids or delays the need for expanded or new infrastructure to meet increased water demands.

Customer education also provides valuable information on specific actions they can take in their home or business to meet these community goals while also benefiting from them personally (i.e., managing their water bill).

Each utility should develop an education and outreach plan suited to their community that is adaptable over time. Understanding which messages need to be conveyed regularly and identifying the target audience(s) is key to a successful program. An effective public education program will help develop trust between the community and the utility as relevant, timely, and fact-based information is provided, and customer service is enhanced.

Many cities have dedicated water conservation web pages located within the main city or utility website to find tips and other resources. The Texas Water Development Board is one source that provides publications and other materials that can be placed online or made available in city/utility buildings.

The various education and outreach tools also allow cities to promote other programs offered, such as rebates or events, and to communicate other important messages, such as drought conditions or water service outages.

Some customers prefer to learn information during a class-type setting or to tour facilities or demonstration areas to understand certain conservation techniques better. Offering in-person or virtual classes or workshops provides an opportunity to connect with these customers and provide hands-on experience and answer questions on a range of conservation issues.

TALKING POINTS

- An effective Public Education and Outreach program can be an effective and cost-efficient method to produce short and long-term water savings.
- An effective Public Education and Outreach program can build trust in the utility and enhance the its customer service capabilities.
- Integrating educational resources that have been developed by other cities, state and federal agencies, and non-profit groups can significantly expand the cities' efforts at little or no cost.
- When developing a Public Education and Outreach program, cities should identify their target audiences and convey consistent messages.
- The size and scope of the Public Education and Outreach program will be dependent on the capability of the utility to manage the program.

CASE STUDIES

Water Is Awesome Regional Campaign
In 2016, the City of Dallas, North Texas Municipal Water District, and Tarrant Regional Water District launched a regional outreach campaign called "Water is awesome. Use it. Enjoy it. Just don't waste it." It aims to increase the general public's knowledge of the value of water in their everyday lives and encourages ways not to waste it. The campaign provides simple tips, mixed with a bit of humor, through television, radio, digital, print, outdoor, and social media advertising.

In 2019, an additional tagline, "Keep Texas Water on Tap," was incorporated to promote the Water is Awesome brand and direct traffic to waterisawesome.com. In 2020, a "customer city toolkit" provided customizable resources allowing cities to incorporate their logos with the campaign brand for their website, social media, and print. Cities are encouraged to use campaign resources to advance conservation efforts.

Demonstration Gardens
Growing popularity in native and adaptive plants for landscaping has led to the establishment of demonstration gardens throughout the Dallas-Fort Worth area. The Upper Trinity Regional Water District and Tarrant Regional Water District, for example, maintain demonstration gardens to provide examples to residents of the different plants that can be utilized and other gardens' styles.

These demonstration gardens are popular for tours and workshops to convey that water-efficient landscaping is beautiful and uses less water and chemicals. The cities of Dallas and Plano conduct WaterWise Landscape Tours annually, whereby residents can visit homes of other residents to see how these plants are incorporated into a home's landscape.

Water Efficiency Network of North Texas (WENNT)
WENNT is a conglomerate of cities and water providers in the Dallas-Fort Worth area that meets monthly to discuss water conservation efforts and highlight specific programs. Attending these monthly meetings allows participants to gain new ideas and learn about new resources that may benefit their program. To learn more contact your water provider conservation coordinator.

City of Plano
To help citizens identify and repair irrigation problems, the City of Plano developed an interactive website, "Water Water Everywhere: A Guide to Sprinkler Repair," that provides an overview of sprinkler system parts, how to identify sprinkler head problems, and an explanation of the "Cycle and Soak" watering method. This website is one example of resources that other cities can use by linking to their website and promoting on social media channels.

Demonstration garden found at TRWD.

ADDITIONAL LINKS AND RESOURCES

WaterIQ Statewide Water Education Program

Save Tarrant Water

City of Plano WaterWise Landscape Tours

City of Plano Sprinkler Repair Online Module

Upper Trinity Regional Water District Demonstration Garden

OUTREACH ASSISTANCE AVAILABLE FROM WATER PROVIDERS

BACKGROUND, IMPORTANCE AND BENEFITS

Many cities in the Dallas-Fort Worth area purchase raw or treated water from larger wholesale water providers. Both share a common goal to educate residents about conservation and increase awareness of water resource management. Without direct contact with residents (except for social media), wholesale providers can assist their wholesale customer cities with their communications and provide regional water conservation programs.

Public Outreach and Education is a common element in wholesale water provider and city/water utility Water Conservation Plans. Therefore, for wholesale providers to assist their customers' outreach efforts, both entities accomplish requirements in their conservation plans.

An additional benefit of wholesale provider outreach assistance is consistent messaging of conservation information across multiple cities. Taking advantage of resources and programs offered by wholesale providers can save money by reducing the expenditures needed to produce materials or coordinate programs.

TALKING POINTS

- Wholesale and retail water providers benefit from a consistent water conservation message across multiple cities and can enhance their reputation in the community.
- Utilizing resources and programs from wholesale providers allows retail cities to save money by not producing the resources or operating the programs themselves.
- Outreach assistance from wholesale providers accomplishes Public Outreach and Education elements in both the wholesale and retail water providers respective Water Conservation Plans.

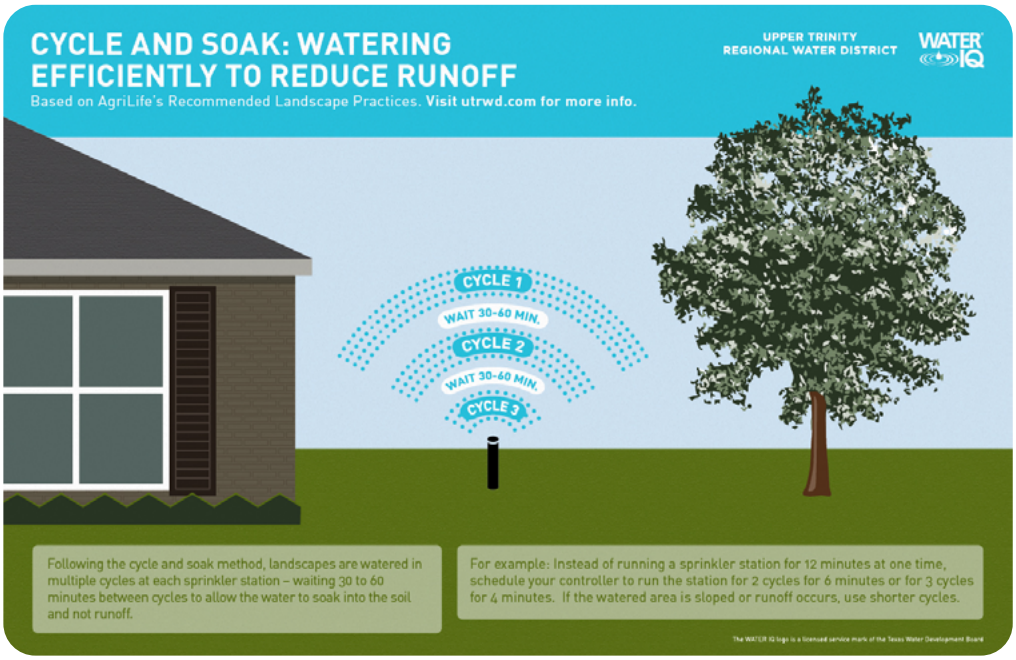
CASE STUDIES

Wholesale providers
Wholesale providers in the Dallas-Fort Worth area sponsor educational classes taught by Texas A&M AgriLife Extension, Master Gardeners, or others in the area with expertise in many water conservation-related topics. These topics can include water-efficient plant selection and maintenance, rainwater harvesting, sprinkler system maintenance, and more.

Wholesale providers, such as Tarrant Regional Water District (TRWD) and Upper Trinity Regional Water District (UTRWD), offer residential irrigation evaluations to homeowners, at no-charge to the homeowner or the retail city.

TRWD, UTRWD, and Texas A&M AgriLife have partnered together to develop the Water Efficient Recognized Green Professionals Program for landscape professionals. The purpose of the Green Pros Program is to provide training and resources for professionals to establish and maintain sustainable landscapes. As part of the program, TRWD and AgriLife sponsor a series of five training workshops for landscape professionals on creating water-efficient landscapes, low impact design, native plants, irrigation design, and turfgrass management. After the program, the landscape professionals are recognized as Green Professionals and listed on the 'Save Tarrant Water' website.

Wholesale providers may also produce resources, such as print media, digital online resources, and other materials that can assist a retail provider in promoting of water conservation information. For example, UTRWD and the North Texas Municipal Water District sponsor the 'Water My Yard' program at no charge for their customer cities. UTRWD also produces materials and other resources for their customers to utilize when promoting 'Water My Yard.'



Example of outreach materials provided by Upper Trinity Regional Water District.

ADDITIONAL LINKS AND RESOURCES

UTRWD Irrigation Check-Up Request

Water Efficient Recognized Green Professionals

PARK/ATHLETIC FIELD CONSERVATION

BACKGROUND, IMPORTANCE AND BENEFITS

This BMP is intended to address park and athletic field conservation if the water provider manages and/or serves customers with irrigated parks and/or athletic fields. These facilities often face scrutiny by the public for using large amounts of water or being perceived as using excessive amounts. Athletic field and park irrigation conservation practices and the careful use of water in the operation and maintenance of park facilities can effectively reduce water demands. Once a water provider or customer adopts this practice, it should be followed closely in order to achieve maximum water efficiency benefits.

With the dedication of an athletic field manager, athletic field conservation effectively reduces system water demand. A manager will implement a watering regimen that only uses the amount of water necessary to maintain the viability of the turf and health of its users. Water is only applied to areas that are essential for the use of the field.

All park facilities should be metered and water use billed to reinforce the importance of water efficiency.

Before developing an efficient watering program, the water provider should consider meeting with parks irrigation personnel, management, and authorized landscape manager. This discussion should focus on water conservation issues and developing an adequate scope of action for efficiency.

The first key is to understand the performance and capabilities of your irrigation system at these facilities. Requiring automatic irrigation systems and controllers at all facilities is recommended. It's essential to have training in soil management, proper aeration methods, nutrient management, mowing, soil testing, and irrigation management. Determine whether the approach of achieving conservation will be voluntary compliance or regulatory compliance. Determine if there is an opportunity to use reclaimed, reused, or recycled water for parks to conserve potable water. However, specific uses must meet Texas Commission on Environmental Quality (TCEQ) water quality standards for reclaimed water and human contact. They must be appropriate for the particular use of the park. Reclaimed water should be applied based on the appropriate water budget.

When developing athletic field conservation practices, identify the various stakeholders, including the school district staff, nonprofit athletic associations, private sports complex managers, and city staff. Meeting with them will help achieve long-term results.

City of Arlington's MLK Sports Complex: the world's first sports facility to achieve the Audubon Signature designation.

CASE STUDIES

City of Plano
Plano's water conservation plan allows the City of Plano Parks and Recreation Department to operate using alternative water conservation methods. City of Plano site irrigation systems are programmed, controlled, and monitored remotely by an advanced computerized control system. Alternative landscape irrigation methods are also used in the community. Pecan Hollow Golf Course uses reclaimed water, and the Legacy Business Park uses private lake water supplied by wells to irrigate their respective sites, rather than treated drinking water.

City of Arlington
Recently, Arlington received the Green Ribbon Grant from the Texas Department of Transportation and was awarded $550,000 for landscaping using Texas native plants and permanent irrigation system improvements to central medians. Where feasible, native plants reduce potable water consumption at outdoor sports facilities. The Tierra Verde Golf Course (mentioned in BMP 11) and the MLK Sports Complex are the first Audubon sanctioned sports center in the United States dedicated to environmental sensitivity. The 100-acre center features baseball fields maintained with organic pesticides and herbicides, an interpretive nature trail, and a playground made of recycled materials. The park's drainage travels through a filter system before flowing into Sublett Creek.

Arlington uses an IRRINet smart-water monitoring system, which allows staff to make immediate adjustments to irrigation practices by monitoring weather conditions, water usage patterns, and remotely detecting leaks. This technology results in $53,000 in irrigation savings annually.

TALKING POINTS

- Park irrigation conservation practices and the careful use of water in the operation and maintenance of park facilities can effectively reduce water demands.
- Athletic field conservation is an effective method of reducing system water demands. It results in the athletic field manager following a watering regimen that uses only the amount of water necessary to maintain the turf's viability and its users' health.
- Implementing conservation practices and communicating them with the public can prevent scrutiny and water demand.
- Improvements in irrigation practices are often very cost-effective to achieve and may yield significant savings in a short period at a low cost.

ADDITIONAL LINKS AND RESOURCES

Texas Water Development Board Park Conservation

TWDB Athletic Field Conservation

Texas A&M AgriLife Extension: School of Irrigation

Texas A&M Turfgrass Resources

City of Plano Current Irrigation Practices

GOLF COURSE CONSERVATION AND REUSE

BACKGROUND, IMPORTANCE AND BENEFITS

Golf courses can use a considerable amount of water for irrigation, especially during the summer. The Environmental Institute for Golf found that from 2003-2005, an 18-hole course in the Southeast region of the country (including North Central Texas) applied an average of 29 inches of irrigation water per acre every year. Irrigation of course play areas, such as fairways, is necessary to support healthy turfgrass and landscape plants, which are important for course playability and aesthetics. However, golf courses can employ several practices to reduce water use while maintaining the course's playability and aesthetics. Also, over-watering and over-fertilization can negatively impact the water quality in local streams and lakes.

By adopting a Conservation Plan, golf courses can benefit by:

- Being a good neighbor by conserving local water supplies.
- Saving money by reducing water use.
- Protecting local water quality.
- Maintaining playing conditions on the course.
- Increasing irrigation equipment longevity.

Water providers may take different golf course conservation approaches: encouraging voluntary efforts by the golf courses to conserve water, making it required as part of a contract, or, if possible, passing an ordinance requiring golf courses to develop and implement a conservation plan.

It is important for water providers to work closely with golf courses since they know which practices will have the greatest potential for implementation. The courses may have already completed some best management practices and knowledge which may be effective or not. Water providers should work to coordinate and implement conservation practices on courses that are owned and operated by the local government.

TALKING POINTS

- Golf courses can implement many practices that reduce water use while maintaining the course's playability and aesthetics.
- Local governments can encourage or require golf courses to reduce water use by developing and implementing a Conservation Plan for the course. It is essential to work closely with golf course staff to identify practices that may save water and evaluate the effectiveness of methods already implemented.
- Golf courses benefit from conservation by saving money on water and maintenance while maintaining high-quality, aesthetically appealing courses.
- Golf courses that are owned and operated by local governments need to implement conservation practices as a way to conserve their water supply.
- Designing a course that reduces irrigated areas and maximizes water use efficiency in the irrigation system also protects water quality in local streams and lakes by reducing runoff and pollutants coming from the courses.
- Golf courses can promote that they are a good neighbor by educating the public on the practices they've implemented and how much water has been saved annually.

Water conservation and water quality protection measures for golf courses can be found in Appendix C.

CASE STUDIES

City of Dallas Cedar Crest Golf Course and Stevens Park Golf Course
Two City of Dallas public golf courses, Cedar Crest and Stevens Park, irrigate with treated effluent (direct reuse) provided by Dallas' Central Wastewater Treatment Plant. Cedar Crest stopped using potable water for irrigation in 2004, and Stevens Park began direct reuse in 2011.

Hole 6 at Tierra Verde Golf Course. More information can be found at https://www.arlingtongolf.com/facts-fees.

City of Arlington Tierra Verde Golf Course
Tierra Verde golf course is owned and operated by the City of Arlington. Several measures have saved the golf course an estimated 25-35% on water use compared to ten years ago. Some of the water-saving measures implemented include:

- Replacing the nozzles on almost all of the fairway, rough, and greens sprinkler heads to more efficient brass nozzles.
- Improving irrigation uniformity through careful evaluation of sprinkler head design, nozzle selection, head spacing, pipe size, and pressure selection.
- Replacing smaller rotors (1") in tee areas to part circle and adjustable rotors to eliminate any water hitting non-mowed spots.
- Upgrades to the on-site weather station to give better evapotranspiration data.
- Installing in-ground soil moisture sensors in various course areas to monitor moisture content.
- Utilizing handheld moisture sensors to determine water needs on greens daily.
- Removal of cedar trees and other high water use plants adjacent to turf areas that create dry spots.
- Improving the aerification program to allow more water to infiltrate in high traffic and turf areas.
- Installing an EZFlo fertigation tank to apply wetting agents more easily to the turf.

ADDITIONAL LINKS AND RESOURCES

Golf Course Superintendents Association of America

Environmental Institute for Golf

Audubon International Cooperative Sanctuary Program for Golf

Texas Water Development Board – Golf Course Conservation

United States Golf Association Water Resource Center

Alliance for Water Efficiency – Golf Course Water Efficiency

USE OF LICENSED IRRIGATORS TO INSPECT & REVIEW ALL IRRIGATION PERMITS & PLANS

BACKGROUND, IMPORTANCE AND BENEFITS

This BMP promotes using licensed irrigation inspectors to review and inspect all irrigation system plans and installed components before a permit is released. Many cities use licensed plumbing inspectors, as allowed by TCEQ rules, to perform these duties. However, having dedicated licensed irrigation inspectors to implement all aspects of an irrigation system permitting program provides a certain level of focus for complying with water efficiency standards.

Reviewing irrigation permits and plans before installing allows for changes to be made to the plans and not after the pipe is already in the ground. This ensures the irrigation system's overall quality, promotes irrigation efficiency and guarantees that the system will comply with state and local requirements.

Developing a review and inspection program at the municipal level reduces the chance for unlicensed irrigators to install irrigation systems improperly. Improper installation can waste water, money, cause future maintenance issues, but most importantly, it may contaminate the public water supply. It is crucial to prevent non-potable water in lawn irrigation pipes from flowing into public water supply pipes.

Inspecting the system provides benefits for water conservation. With open-trench inspections, you can check:

- Depth of piping-which protects from freezing temperatures.
- Potential invasion of plant/shrubbery roots.
- Joints are glued appropriately, and no leaks occur.
- Pipe size-to eliminate water hammer.
- Pressure management requirements.
- The overall layout of system.

Keep in mind that staff can hold an irrigators license and inspectors license, but to prevent them from installing and inspecting their work, staff can't have both running concurrently.

In 2011, the 82nd Texas Legislature passed House Bill 2507, making it a Class C misdemeanor for an individual to operate as an irrigator in the state of Texas without a valid irrigation license. Therefore, effective September 1, 2011, individuals operating without a license are in direct violation of the Texas Occupational Code, Sec. 1903.256.

Tarrant Regional Water District and Upper Trinity Regional Water District partners with Texas A&M AgriLife Extension to sponsor the Green Pros Program. A training workshop for licensed irrigators that desire to create and maintain environmentally sustainable landscapes. Should you have staff become licensed, this is a great program to meet local contractors and become a water-efficient recognized green professional.

According to the Texas Administrative Code, upon completion of the irrigation system, four items must be completed to inform and educate the owner of the system. These items include a final walk-through, a maintenance checklist, licensed irrigator contact information, and an as-built plan. All irrigation system plans, installation, and review requirements must be followed for long-term water efficiency. Minimum state requirements for Landscape Irrigation can be found in Chapter 344 of the Texas Administrative Code.

CASE STUDIES

City of Frisco
The City of Frisco uses licensed staff to review irrigation system permits and plans and conduct initial inspections of the irrigation system before backfilling any part of the system. For more information about the irrigation program, visit the City of Frisco Irrigation website.

City of Mansfield
Since 2012, every new house or building must have an irrigation system in the city of Mansfield. The city has licensed irrigation inspectors on staff to review irrigation system permits and plans before installation. On average, the City of Mansfield inspects and reviews 300-400 plans a year. For more information about the irrigation program, visit the City of Mansfield Conservation website.

TALKING POINTS

- Inspections and reviews of permits and plans will optimize the irrigation system's water efficiency and performance, which conserves water, money, and time for the system's owner.
- Inspections and reviews of permits and plans will confirm the proper installation of components, such as a backflow prevention device, isolation valves, and Y-strainers, ensuring public drinking water safety.
- Having an inspection and review process helps water providers know the location and number of systems and who installed them.
- Irrigation systems use a large amount of water. Permit and plan reviews by licensed irrigation inspectors help with the conservation and protection of available water resources.

ADDITIONAL LINKS AND RESOURCES

Texas Irrigation Association Best Management Practices

Irrigation Association Landscape Irrigation Best Management Practices

Texas Water Development Board: BMPs for Municipal Water Providers

OFFER FREE OR DISCOUNTED IRRIGATION SYSTEM CHECK-UPS FOR RESIDENTIAL CUSTOMERS

BACKGROUND, IMPORTANCE AND BENEFITS

The Environmental Protection Agency estimates that up to 70% of the total water used during the summer months is applied as outdoor irrigation. As much as 50% of the water used outdoors is wasted due to overwatering and inefficient or malfunctioning irrigation system components.

Irrigation System Check-Ups (also known as Evaluations or Audits) for residential customers, is a tool that cities can employ to reduce outdoor watering demand. Check-ups are typically offered at no charge to homeowners.

A licensed irrigator will evaluate the irrigation system components and controller settings during a typical check-up to see if the irrigation system can operate more efficiently and identifies needed repairs or adjustments. The licensed irrigator will run the irrigation system to see if the sprinkler heads function correctly and apply water only to the intended areas. They will check the irrigation system's pressure and discuss the controller settings with the homeowner to advise them on the most efficient watering methods.

One valuable aspect of check-ups is the one-on-one assistance and education that a residential customer receives on properly managing the irrigation system. This education can result in long-term water savings because the customer has a better understanding about the system. Water savings may last for multiple years after the evaluation is completed, mainly due to more efficient watering habits. As part of the check-up, the licensed irrigator will identify inefficiencies in the resident's irrigation system and educate them on programming the irrigation controller for more efficient watering practices, such as seasonal adjustment settings and 'Cycle and Soak'. The sponsoring water provider or city can also offer handouts, brochures, and other educational information to residents.

The licensed irrigator can provide a report to the residential customer detailing equipment problems and offer recommendations to change watering habits. Reports can include an estimated water savings amount based on recommended adjustments to the controller run times. The licensed irrigator should also provide a copy of the report to the sponsoring water provider or city.

A drawback of check-ups is that, unlike indoor fixture or appliance replacements, water savings from irrigation system repairs will last a limited number of years. Benefits of check-ups include one-on-one contact with residential customers, providing educational information that may result in greater water savings than irrigation system fixes alone. Check-ups are an excellent customer service tool when managing residents' complaints. When using check-ups, cities can be selective by targeting high water users or those with large lots to maximize budget and water savings.

Water providers or cities should consider conducting a customer satisfaction survey after the check-up is completed to determine how many residents have implemented recommended modifications and gauge satisfaction with the check-up program.

CASE STUDIES

City of Frisco
The cities of Dallas and Frisco have licensed irrigators on staff who conduct free Irrigation System Check-Ups for their customers upon request by filling out a form online.

The City of Frisco performs check-ups as a conservation program to manage outdoor watering demands. In the first year offered (2006), city staff of completed 660 check-ups. Today, the program has evolved to completing about 3,000 check-ups a year and recently began offering the service to commercial properties. The check-ups, which include programming the watering schedule, searching for leaks or damage, and a detailed report for the customer, boast an average of 40-45% in water savings for the irrigation system.

City of Mansfield
The City of Mansfield participates in TRWD's check-up program and employs licensed irrigators who conduct evaluations for residents. This service is offered to help alleviate the frustrations residents have when they complain about their water bills.

North Texas cities and water districts
Other cities and water districts (i.e., Allen, Propser, Southlake, TRWD, and UTRWD) contract with a licensed irrigation company that conducts the check-up. It is essential to be specific about expectations and deliverables when developing the city and irrigation company's agreement.

ADDITIONAL LINKS AND RESOURCES

Shimabuku, M., D. Stellar, and P. Mayer. 2016. Impact Evaluation of Residential Irrigation Audits on Water Conservation in Colorado. Journal AWWA.

Tarrant Regional Water District Residential Sprinkler System Evaluation Program

City of Frisco Free Sprinkler System Check-Ups

City of Dallas Free Sprinkler System Check-Ups

City of Mansfield Sprinkler System Evaluation Form

TALKING POINTS

- Outdoor irrigation accounts for up to 70% of total water use during the summer months, and as much as half is wasted due to overwatering and inefficient or malfunctioning irrigation systems.
- Irrigation System Check-ups are a valuable conservation tool that can reduce outdoor watering demand by helping residential customers identify inefficiencies or needed repairs with their irrigation system and how to program the irrigation controller properly.
- Irrigation System Check-ups are performed by a licensed irrigator who is either an city employee or contracts with the city to perform the service.
- Irrigation System Check-ups is a valuable education tool for residential customers by providing one-on-one assistance and providing additional conservation information on brochures, handouts, etc.
- Water savings from Irrigation System Check-ups can last for multiple years from both recommended repairs to the system and more efficient watering habits by the customer.

REBATES TO ENCOURAGE IMPROVED EFFICIENCY IN EXISTING IRRIGATION SYSTEMS

BACKGROUND, IMPORTANCE AND BENEFITS

As the population increases in the North Texas region, so makes the demand for more water, especially because many newer cities require irrigation systems in new developments. Based on a 2012 study conducted by the Texas Water Development Board, outdoor water use accounted for approximately 31% of all residential water use across Texas from 2004 to 2008. For more details, visit Texas Water Development Board's 2012 Technical Note 12-01, The Grass is Always Greener…Outdoor Residential Water Use in Texas. In this report, on page 23, Table 3 illustrates outdoor residential water use for many larger cities across Texas.

Creating a program that encourages residents to become educated on their irrigation system can improve operation and efficiency. Texas AgriLife Extension has developed a presentation titled Irrigation Efficiency, which provides this education.

Furthermore, when it comes to the type of irrigation system and standard efficiencies, the Texas AgriLife Research and Extension Urban Solutions Center provide the following average efficiencies by system type:

- Surface/Subsurface drip – 90%
- Surface micro drip irrigation – 85%
- Large Rotors – 70%
- Small Rotors – 65%
- Spray Heads – 50%

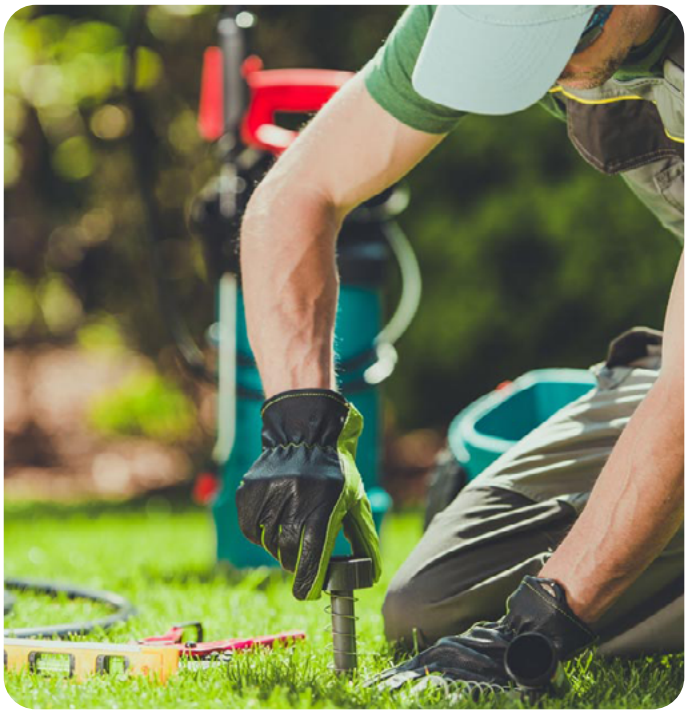
This BMP provides, in conjunction with the sprinkler evaluation (check-up) program, an incentive to have an evaluation done and make recommended changes.

With such a substantial opportunity for efficiency gains, some cities may wish to consider offering rebates to both residential and commercial customers for upgrading their current irrigation system.

By changing out less efficient equipment, this BMP intends to increase the irrigation efficiency by 10 percent or more.

With 31% of all residential water use statewide attributed to irrigation, and most of that conducted using spray heads with an average efficiency of 50%, there is a real benefit for developing a rebate program for irrigation systems.

According to the Texas Water Development Board's "Water Use of Texas Water Utilities" 2020 report to the 87th Texas Legislature, residential per capita water consumption across all analyzed utilities was 82 gpcd. The total residential water use is approximately 868 billion gallons per year, based on the current population of around 29 million people, and 82 gpcd residential water use. Landscape irrigation attributes to 31% or 269 billion gallons per year based on a review of available data.



CASE STUDIES

City of Dallas
Dallas revamped the rebate portion of its Industrial, Dallas revamped the rebate portion of its Industrial, Commercial, Institutional (ICI) Program in January 2019 to include a more appropriate calculation for determining potential rebates for the cost of new water-saving equipment and processes, including irrigation systems. For more information about the program, visit the City of Dallas ICI Program website.

City of Allen
The City of Allen offers a rebate program, depending on the annual budget. Through the H2Ome Improvement SMART Irrigation Technology Rebate Program, participants can receive 50% of the cost up to a maximum of $125.00 to install qualifying SMART irrigation technology equipment. For more information about the program, visit the City of Allen H2Ome Rebate Program website.

There are many North Texas cities with rebate programs that are unique to their community's needs. Here is a list of some North Texas cities with outdoor irrigation rebate programs:

- City of Plano
- City of Southlake
- City of Lewisville
- City of McKinney
- City of Carollton

TALKING POINTS

- Outdoor water use accounts for approximately 31% of all residential water use across Texas from 2004 to 2008.*
- 89% of single-family households practice irrigation. 95% is spray irrigation. 92% of the 95% do not understand how an irrigation system runs.**
- Rebates incentivize customers to invest in upgrades they would not typically invest in by reducing the overall payback period.
- A 10 percent reduction in statewide annual residential irrigation would yield potential savings of approximately 23.9 billion gallons per year.

Sources:
*2012 study conducted by the Texas Water Development Board,

** Texas AgriLife Research and Extension Urban Solutions Center

ADDITIONAL LINKS AND RESOURCES

Rebate and Voucher Program Introduction

TWDB: Best Management Practices for Water Providers

WaterSense Rebate Finder

SAWS Residential Irrigation Design Rebate

City of Round Rock Conservation Rebates

APPENDICES
TABLE OF CONTENTS

COMMUNICATION TOOLKIT

GENERAL COMMUNICATION TOOLS AND STRATEGIES

GENERAL COMMUNICATION TIPS

Before using the tools and strategies, decide what to measure or how you will track success.

Readability matters. The general public reads at an 8th-grade reading level. Use simple words, refrain from using water-related jargon and acronyms.

Translate legalistic terms when required to use regulatory language.

Determine your target audience for each message and event. Defining a niche audience will help you reach more people on a deeper level.

Develop internal and external brand ambassadors. These are community influencers who amplify your message.

Use the same voice and tone across each messaging platform.

Create a content calendar that includes evergreen material–national campaigns and events–or seasonal occurrences, such as frozen pipes or high water bills.

Consistency is the key to establishing the cadence for your posts, blogs, newsletters, etc.

WATER CONSERVATION AND COMMUNICATION TIPS

Develop your “water story” for all stakeholders. The “story” includes infrastructure needs, water pricing, water sources, how your city fits in the bigger picture, etc.

All water providers are encouraged to understand their water system and communicate the value of conservation measures on current and future infrastructure needs.

Provide graphics to illustrate water use concepts, such as the urban water cycle, rising water rates, and projects.

COMMUNICATION TOOLKIT

GENERAL COMMUNICATION TOOLS AND STRATEGIES

CUSTOMER TOUCH POINTS

Water providers should use a diverse mix of tools and strategies to communicate their water conservation message, including:

- Utility/Water Bills
- Virtual/Live Events
- Newsletters
- Local Ambassadors
- Educational Classes
- Print Media
- Customer Portals
- Demonstration Gardens
- Radio
- Social Media
- Billboards
- Television
- Schools
- Websites

SOCIAL MEDIA ETIQUETTE

DO'S

Do remember all content is for your audience, not you or your organization.

Do break up big ideas or concepts into smaller points, which creates more content and easier understanding.

Do link to more information (your website) whenever possible.

Do include humor, puns, national calendar days, and interesting facts when appropriate.

Do use trending topics and hashtags when appropriate.

Do retweet or share related appropriate organizations' posts.

Do appropriately credit the photo/video source.

DON'TS

Don't assume your audience knows anything about your subject.

Don't post without a visual to support your point.

Don't post an image until you confirmed the platform's photo specs.

Don't post for quantity. Posts should be engaging and purposeful.

Don't use low-quality photos or logos. The minimum high-resolution image is 72 dpi for web use.

Don't create long videos. Keep videos 30 seconds to 90 seconds and include captions.

Don't create complicated graphics or infographics. Simplicity is key.

ADDITIONAL WATER SAVING MEASURES FOR NEW IRRIGATION SYSTEM REQUIREMENTS

Many cities within Region C have adopted irrigation system standards above the minimum state requirements. Some of these standards include:

- Require property owners that install their irrigation system to also comply with the adopted city ordinance.
- Require submission of the irrigation plan in conjunction with the permit application to the applicable city official/department.
- Require all new irrigation systems to include an automatic controller.
- Require all new irrigation systems to not utilize above-ground spray in landscapes that are less than 60 inches in either length or width and which contain impervious pedestrian or vehicular traffic surfaces along two or more perimeters. The use of subsurface or drip irrigation and pressure compensating tubing is permitted if the qualifying area will be irrigated.
- Require all non-turf landscape areas included in the irrigation plan to be designed with subsurface irrigation, drip irrigation, and/or pressure compensating tubing. If the irrigation plan includes a foundation watering system, require a separate station be dedicated for drip irrigation for the purpose of watering a structure's foundation.
- Require a flow control master valve to be installed on the discharge side of the backflow prevention device on all new installations.
- Require check valves where elevation differences may result in low head drainage. Check valves may be located at the sprinkler head(s) or on the lateral line.
- Require that pop-up heads shall be installed at grade level and operated to extend above all landscape turfgrass.
- Require that all new irrigation systems must include an automatic controller capable of providing the following features:
    1. Multiple irrigation programs with at least three start times per program.
    2. Limiting the irrigation frequency to once every 7 days and once every 14 days
    3. Water budgeting feature
- Require additional information and description for the required "walk-through."
- Require an "operational" rain and freeze sensor.
- Require the signed maintenance checklist be submitted to the applicable city official/department. Require the irrigator's name, license number, company name, telephone number, and the dates of the warranty period to be on the maintenance checklist.
- Require the irrigation plan indicating the actual installation of the system and the associated seasonal watering schedule be submitted to the applicable city official/department.
- Require the irrigation plan and maintenance checklist be transferred from the new home builder to the first home buyer with documentation confirming the transaction provided to the applicable city official/department.

ADDITIONAL GOLF COURSE CONSERVATION REUSE

WATER CONSERVATION AND WATER QUALITY PROTECTION MEASURES

Water conservation and water quality protection measures for golf courses may include, but are not limited to, the following:

Golf Course Landscape Design and Water Sources

- When feasible, use alternative water sources, such as reclaimed or reuse water from wastewater treatment facilities, to supplement or replace potable water sources. Monitor reclaimed water tests regularly for salinity. Rainwater harvesting and on-site pond storage are additional alternative water sources to consider.
- Select drought-tolerant turfgrass varieties to minimize water use while maintaining a high-quality playing surface.
- Reduce the number of irrigated acres on the course by converting non-play and rough areas to native grasses and other drought-tolerant plants. These plants will provide an attractive and low-maintenance landscape.
- Develop a Drought Management Plan that can be implemented when water supplies are low enough to enact local drought mitigation efforts.

Irrigation System Design and Maintenance

- Irrigation systems should be properly designed and installed to maximize water use efficiency while reducing operational costs and maintaining a healthy and playable course.
- Utilize new technology, such as soil moisture sensors, evapotranspiration data, and computer-controlled systems that maximize water efficiency by irrigating based on the turfgrass's moisture needs.
- Hand watering greens or other smaller areas will save water compared to running the entire zone in that area.
- Design the irrigation system to ensure that the irrigation water is distributed evenly and efficiently, with a Distribution Uniformity of 80% or better.
- Frequently inspect all sprinkler heads and other components of the irrigation system and make any adjustments or repairs as needed to improve water use efficiency. Conducting a system-wide audit by a licensed irrigation professional annually can help identify inefficiencies in the system.
- Fix leaks in the system immediately.
- Rain sensors can shut off the irrigation system when an adequate amount of rainfall is received.
- Irrigating in the early morning hours before temperatures rise and when wind speeds are low will reduce the amount of water lost to evaporation.
- Use mowing, aeration, nutrients, and soil amendments to improve soil condition and increase water infiltration.

Water Quality Protection

- Apply fertilizers and chemicals according to the directions on the label. Do not overapply.
- Do not overwater fertilizers when applying, resulting in runoff that could carry fertilizers into a nearby stream or pond.
- Maintain vegetated buffers at least 15 feet from the edge of a stream or pond to capture pollutants that may runoff from the course.

The water savings should be simple to quantify for golf courses with meters or computer-controlled irrigation systems if records existed before implementing any practices.

This document was made in collaboration with the North Texas Regional Water Providers to be a guide of best management practices to reduce water waste and encourage long-term water conservation.

The North Texas Regional Water Providers are comprised of:
Dallas Water Utilities
North Texas Municipal Water District
Tarrant Regional Water District
Upper Trinity Regional Water District

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APPENDIX H

TARRANT REGIONAL WATER DISTRICT BOARD RESOLUTION ADOPTING THE WATER CONSERVATION AND DROUGHT CONTINGENCY AND EMERGENCY WATER MANAGEMENT PLAN

RESOLUTION
OF
THE BOARD OF DIRECTORS OF
TARRANT REGIONAL WATER DISTRICT
ADOPTING THE WATER CONSERVATION AND
DROUGHT CONTINGENCY AND EMERGENCY WATER MANAGEMENT PLAN

WHEREAS, Tarrant Regional Water District, a Water Control and Improvement District (the "District"), as a wholesale water supplier, is required by the Texas Commission on Environmental Quality to develop (a) a water conservation plan pursuant to Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.5 of the Texas Administrative Code and (b) a drought contingency plan pursuant to Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.22 of the Texas Administrative Code; and

WHEREAS, the District recognizes the importance of a long-term approach to conserving water supplies by reducing the volume of water withdrawn from its reservoirs, reducing the loss or waste of water, improving water use efficiency, and increasing the recycling and reuse of water; and

WHEREAS, the plan provides significant benefits to the District, its customers, and the public they serve through the implementation of year-round water saving strategies to increase District reservoir storage volumes during wet or dry weather conditions; and

WHEREAS, as authorized under law, and in the best interests of its customers, the District deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE TARRANT REGIONAL WATER DISTRICT that the Water Conservation and Drought Contingency and Emergency Water Management Plan attached hereto as Exhibit A is adopted as the controlling policy of the District.

Passed and approved this 16th day of April, 2024.

By: Leah M. King
Leah M. King
President, Board of Directors

ATTEST:

By: Mary Kelleher
Mary Kelleher
Secretary, Board of Directors

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APPENDIX I

LETTER TO REGION C WATER PLANNING GROUP

APPENDIX I

Letter to Region C Water Planning Group

May 1, 2024

Mr. Kevin Ward
Chair, Region C Water Planning Group
Trinity River Authority
P.O. Box 60
Arlington, TX 76004

Dear Mr. Ward:

Enclosed please find a copy of the recently adopted water conservation and drought contingency and emergency water management plan for the Tarrant Regional Water District. I am submitting a copy of this plan to the Region C Water Planning Group in accordance with the Texas Water Development Board and Texas Commission on Environmental Quality rules. The Board of the Tarrant Regional Water District adopted the attached plan on April 16, 2024.

Sincerely,

Dan Buhman
General Manager
Tarrant Regional Water District

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APPENDIX J

TEXAS WATER CODE SECTION 11.039

APPENDIX J

Texas Water Code Section 11.039

§ 11.039. Distribution of Water During Shortage

(a) If a shortage of water in a water supply not covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the water to be distributed shall be divided among all customers pro rata, according to the amount each may be entitled to, so that preference is given to no one and everyone suffers alike.

(b) If a shortage of water in a water supply covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the person, association of persons, or corporation owning or controlling the water shall divide the water to be distributed among all customers pro rata, according to:

(1) the amount of water to which each customer may be entitled; or

(2) the amount of water to which each customer may be entitled, less the amount of water the customer would have saved if the customer had operated its water system in compliance with the water conservation plan.

(c) Nothing in Subsection (a) or (b) precludes the person, association of persons, or corporation owning or controlling the water from supplying water to a person who has a prior vested right to the water under the laws of this state.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977.

Amended by Acts 2001, 77th Leg., ch. 1126, § 1, eff. June 15, 2001.

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