



HOUSTON PUBLIC WORKS

WATER CONSERVATION PLAN

Effective Jul 1, 2019 – Jun 30, 2024



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DRAFT

INTRODUCTION

The Texas Water Development Board and the Texas Commission on Environmental Quality require utilities that provide treated water service to 3,300 or more connections to adopt a water conservation plan that meets the minimum requirements set forth in Title 30, Chapter 288 of the Texas Administrative Code, and to adopt an updated water conservation plan every five years. The 2019 City of Houston Water Conservation Plan (Plan) is the required five-year update to the 2014 City of Houston Water Conservation Plan and describes the City of Houston (Houston) water system and customer base, explains Houston's current conservation goals and targets, and discusses current and future programs to meet those goals and targets.

Houston provides water and wastewater service to its customers through the Houston Water service line of Houston Public Works. Houston Water strives to protect public health and the environment and provide superior customer service. Houston Water's goal is to provide all customers with drinking water that meets the State of Texas "superior" rating at pressures required to meet their daily needs. Houston is a large regional water supplier that provides both retail and wholesale service. Houston operates three water supply reservoirs, three water purification plants, 92 groundwater pumping stations, 142 ground water wells and over 7,000 linear miles of distribution pipeline across a four-county area consisting of more than 600 square miles, making Houston's water system one of the most complex water systems in the nation.

As of 2019, Houston provides treated water to approximately 2.4 million retail and wholesale customers and serves a total population of approximately 4.7 million. By 2070, this number is expected to reach 6.2 million.¹ To ensure that Houston can continue to provide treated water to this rapidly-growing region, customers must use water efficiently and conserve water when possible. The Texas Water Development Board emphasizes that water conservation is increasingly recognized as an integral part

¹http://www2.twdb.texas.gov/ReportServerExt/Pages/ReportViewer.aspx?%2fProjections%2f2022+Reports%2fpop_County&rs:Command=Render

of water resource planning and management and plays an important role in meeting current and future water supply, utility infrastructure, and environmental needs.²

The State Water Plan, which details how Texas will address our state's growing water needs, calls for serious statewide conservation efforts to meet a quarter of Texas' future water needs.³ Region H, the fast growing, mainly urbanized region in which Houston is located, has specific conservation goals articulated in the region's plan. The 2016 Region H Water Conservation Plan calls for 9.6% of future additional supplies to be met through municipal conservation and 15.7% to be met through irrigation (agricultural) conservation.⁴ In an effort to meet these aggressive goals, Houston has implemented, and will continue to develop, a wide range of water conservation programs to educate and engage customers about the importance of water and what they can do to protect and preserve this essential resource.

²<http://www.twdb.texas.gov/conservation/doc/StatewideWaterConservationQuantificationProject.pdf>

³<http://www.twdb.texas.gov/waterplanning/swp/2017/doc/SWP17-Water-for-Texas.pdf>

⁴http://regionhwater.org/Reg_H_2016_RWP_20151116.pdf

REQUIRED WATER CONSERVATION PLAN CONTENT

A. Water System, Wastewater System, and Customer Use Characteristics

The water conservation plan must include evaluation of the water and wastewater system and customer use characteristics to identify water conservation opportunities and potential targets and goals. Completion of the Water Conservation Utility Profile, TWDB – 1965 as part of the evaluation is required and should be submitted with the Plan. The utility profile should include water sales and use for the following classifications: residential (both for single-family and multi-family), commercial, institutional, industrial, agricultural, and wholesale; as appropriate.

1. Houston Drinking Water System

Houston is a regional water supplier. Houston operates three water supply reservoirs, three water purification plants, 142 groundwater wells, 49 groundwater plants, 8 re-pressurization plants, and over 7,000 linear miles of distribution pipeline across a four-county area consisting of more than 600 square miles, making Houston's water system one of the most complex water systems in the nation. Eighty-five percent of Houston's municipal water supply is derived from Houston's three water purification plants, which have a combined production capacity of up to 640 MGD. These plants are the Northeast Water Purification Plant (rated at 80 MGD), which is located at Lake Houston and serves the northern region of Houston's service area; the East Water Purification Plant (rated at 360 MGD), which is located east of I-610 and west of Greens Bayou and serves the central region of Houston's service area; and the Southeast Water Purification Plant (rated at 200 MGD), which is located north of Clear Lake and serves the southeastern region of Houston's service area. These plants meter all water produced and pressurize water at between 80 and 90 psi. The remaining 15% of Houston's municipal water supply is provided by 142 groundwater wells, which have a combined production capacity of up to 200 MGD. Three of the wells are permitted by the Lone Star Groundwater Conservation District, two of the wells are permitted by the

Fort Bend Subsidence District, and the remaining 137 wells are permitted by the Harris-Galveston Subsidence District.

In 2018, Houston produced a total of 169.5 billion gallons of treated water, averaging 464 MGD daily. Total usage, by both retail and wholesale customers, was 140.5 billion gallons, averaging 385 MGD daily. A small portion of the total water produced, 439 million gallons, was used by Houston's water system for routine maintenance activities, such as line flushing. Non-revenue water totaled 17% of the overall production.

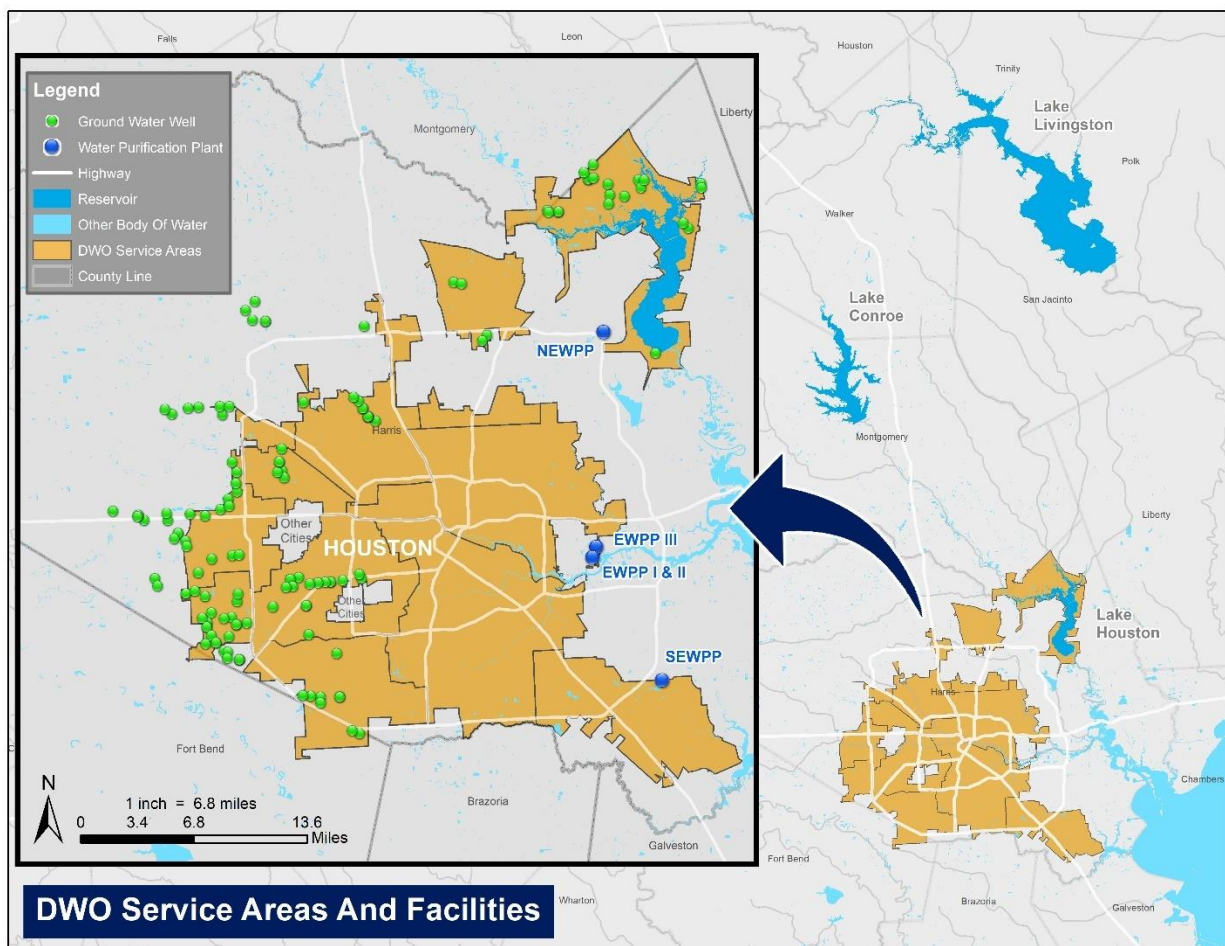


Figure 1. Map of Houston Water System Key Features.

2. Houston Wastewater System

Houston provides wastewater collection and treatment services to customers located inside Houston’s service area. Houston also provides wastewater treatment services to municipal utility districts under contracts referred to as “wastewater subscriber agreements.” Houston operates 39 wastewater treatment plants with a total permitted capacity of 564 MGD, 384 lift stations, and over 6,000 linear miles of collection pipeline. In 2018, Houston treated an average of 250 MGD of wastewater daily, which means there is capacity available to treat additional wastewater – and produce additional water for reuse.

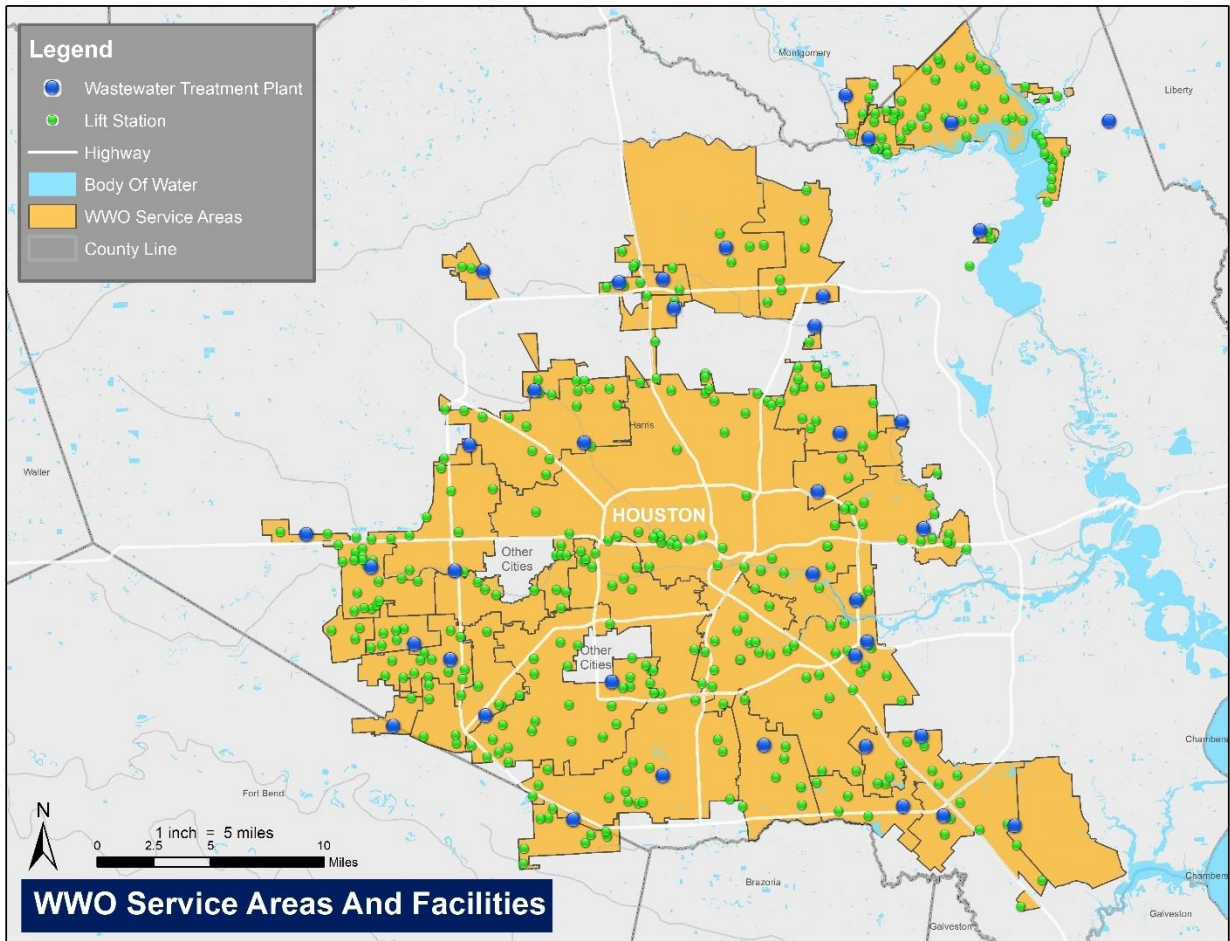


Figure 2. Map of Houston Wastewater System Key Features.

3. Houston Water Customer Use Characteristics

a. Wholesale Customers

Houston provides untreated, treated, and reclaimed water to wholesale customers by contract. As of 2019, Houston has 274 wholesale contracts, 68 of which are with cities, municipal utility districts, and regional water authorities for treated water service. In 2018, these treated water contract customers used a total of 53.4 billion gallons, averaging 146 MDG.

b. Retail Customers

As of 2019, Houston provides treated water to almost 480,000 retail customers within its municipal boundaries. In 2018, these customers used a total of 89.7 billion gallons, averaging 246 MGD. Retail usage is roughly divided in three equal parts between Single Family, Multi Family, and Commercial-Industrial-Institutional (CII) customer classes.

Customer Class	Number of Connections	Total Annual Usage (in billion gallons)	Average MGD
Single Family	415,228	26.0	71.2
Multi Family	15,759	29.7	81.3
CII	47,701	34.0	93.1
TOTAL	478,688	89.7	245.6

Table 1. Houston Retail Customer Usage by Customer Class, 2018

The remaining retail usage consists of irrigation meter accounts, use by City of Houston facilities, and other small-volume uses (emergency water, construction water, and unmetered esplanade irrigation).

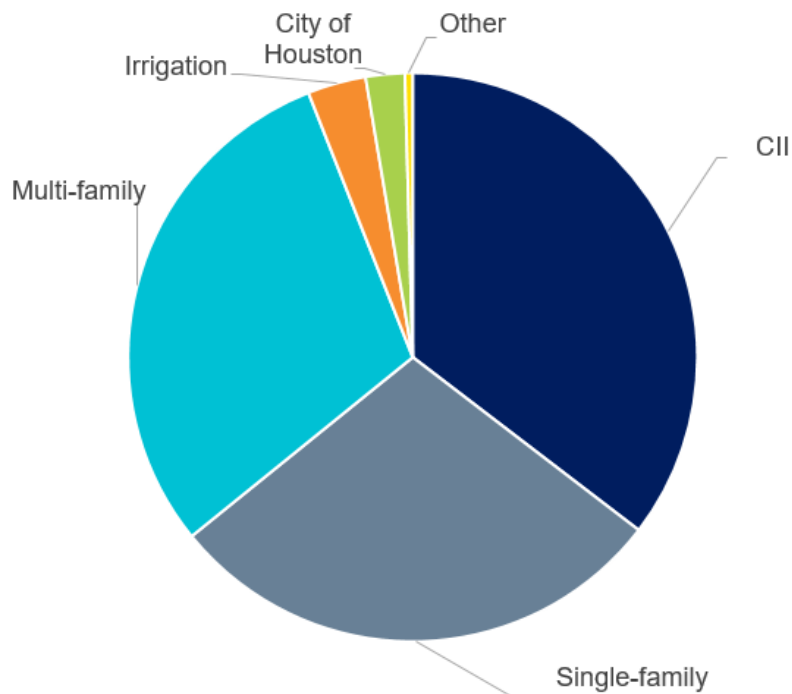


Figure 3. Houston Retail Customer Demand Shares, 2018

In 2018, the total gallons per capita per day (GPCD) among all retail classes was 136, with a five-year average (2014 – 2018) of 129. This GPCD is based on pumpage volumes and includes all water that leaves Houston’s water purification plants, including water loss. Evaluated separately, in 2018 the residential GPCD was 66, with a five-year average (2014 – 2018) of 62. The previous five-year average (2009 – 2013) was 68. This continues the downward trend seen over the last decade during which the residential GPCD has significantly decreased, reducing the total GPCD. Houston considers its five-year historic average of 129 to be healthy, as it falls well below the 140 total GPCD mark recommended by the 2004 Water Conservation Task Force Report⁵ and is very close to the 125 total GPCD mark adopted by the Texas Living Waters Project in the 2016 Texas Water Conservation Scorecard.⁶

⁵ http://www.twdb.texas.gov/conservation/resources/doc/WCITF_Leg_Report.pdf

⁶ <http://www.texaswaterconservationscorecard.org/>

B. Five-Year and Ten-Year Water Savings Targets

The water conservation plan must include five-year and ten-year targets that are specific and quantified for water savings and include goals for water loss programs in gallons per capita per day, and goals for municipal use and residential use, in gallons per capita per day. A base use figure should be included to be able to calculate your savings. Consider state and regional targets and goals, local climate, and demographics. Consider the anticipated savings that can be achieved by utilizing appropriate best management practices and other conservation techniques.

Houston's 2014 Water Conservation Plan stated a total GPCD baseline of 144, with the goal of reducing this number by 1.6% every five years, thereby establishing a total GPCD five-year target of 141.7 by 2019, and a ten-year target of 139.4 by 2024.

As of 2019, Houston's total GPCD (and new baseline) is 129, based on the five-year historical average. This exceeds both the five and ten-year targets and is lower than expected. While water efficient fixtures and increasing conservation and water awareness among Houston's customers can be credited for some of this reduction, Houston also experienced higher than average rainfalls during this same time. From 2014 to 2018, Houston averaged over 62 inches of rain – well above the 30-year annual average of 50 inches. During this same period, Houston's residential GPCD averaged 62. Although local climate may have played a role in this rapid reduction of Houston's total GPCD, Houston also experienced a net population growth of 95,109 people during the same time. Because of this, Houston will continue implementing a water reduction target of 1.6% every five years, which is also consistent with the water use reduction target adopted by the Region H Planning Group.

To reduce its total and residential GPCDs further, Houston must reduce its water loss. Based on the last five years' average, Houston's water loss is approximately 19%. Houston plans to reduce water loss by 1% every year with the long-term target of 10% or less of water loss. This goal is reasonable given Houston's water loss trends in the

last decade, and the target is consistent with the water loss target adopted by the Region H Water Planning Group in the 2016 Region H Water Conservation Plan.⁷

	Historic 5-year average	2019 Baseline	5-Year Reduction Goal	10-Year Reduction Goal
Total GPCD	129	129	127	125
Residential GPCD	62	62	61	60
Water Loss GPCD	24	24	23	22
Water Loss Percentage	19	19	18	17

Table 3. Five-Year and Ten-Year Targets for GPCD and Water Loss Reduction

C. Implementation Plan

The water conservation plan must include a schedule for implementing the plan to achieve the utility’s targets and goals.

Houston will continue, expand, and implement the following programs to achieve a 1.6% reduction in total GPCD and residential GPCD over the next five years.

1. Water Main Replacement Program

Aging water mains are a common problem and can lead to regulatory compliance issues, customer service issues, and water loss. Houston continues to invest in a comprehensive water main replacement program to address these issues. Work ranges from emergency repair or replacement of failing infrastructure to scheduled repair or replacement of aging infrastructure. The program relies on a water system needs assessment that considers each asset’s design service life, by asset type, and the remaining service life of the asset since its installation, replacement, or last rehabilitation date. For treated water distribution, pipe material is an important factor in

⁷ http://regionhwater.org/Reg_H_2016_RWP_20151116.pdf

determining service life. For example, based on Houston's experience with line breaks, small diameter asbestos-cement waterlines that were installed in the 1970s have a 40-year service life, whereas PVC waterlines have a 50-year service life.

Houston's water main replacement program is divided into two categories for purposes of capital improvement project programming: the water transmission system, and the water distribution system.

The water transmission system includes large diameter pipelines (16 inches and larger) and valves that move high volumes of treated water throughout Houston's service area, and large diameter pipelines that move untreated surface water to the three water purification plants. Houston's water transmission system has approximately 4.55 million linear feet of large diameter pipelines ranging from 16 inches to 120 inches in diameter. The water transmission system also includes seven major repump stations that repressurize the transmission system, and 156 storage tanks that provide water volume to meet average and peak day demands. Projects undertaken by Houston in the transmission system portion of the water main replacement program include the rehabilitation and replacement of large diameter water lines, valves, pumps, and storage tanks. Over the next five years, Houston plans to spend approximately \$890,000,000 on capital improvement projects for the water transmission system.

The water distribution system includes the small diameter pipelines (less than 16 inches) that deliver treated water to homes and businesses. The water distribution system also includes customer meters and the fire hydrants for fire protection. Houston's water distribution system has approximately 32.6 million linear feet (6,170 miles) of small diameter pipeline, approximately 460,000 water meters, and over 61,000 fire hydrants. Projects undertaken by Houston in the distribution system portion of the water main replacement program include repair and replacement of small diameter lines to help improve water quality fire and protection within neighborhoods. Over the next five years, Houston plans to spend approximately \$107,000,000 on capital improvement

projects for the water distribution system (referred to as the “Neighborhood Main Replacement Program”).

More information on Houston’s capital improvement program is available on Houston’s website at: <http://www.houstontx.gov/cip/>.

2. Water Loss Program

Houston has implemented and continues to develop cost-effective strategies for reducing water loss. These include the following:

- Reducing water loss by using the Advanced Metering Infrastructure (AMI) network to detect leaks.
- Reducing water usage by City of Houston facilities other non-revenue users.
- Reducing water theft (*e.g.*, disconnecting bypasses and direct connects).
- Expediting shutoff of water meters where there is no account owner.

In 2016, Houston engaged the consulting firm of Black & Veatch to conduct a water loss audit and develop a revenue enhancement strategy. Black & Veatch conducted a desktop water audit that analyzed water distribution system data for 2015 using the AWWA M36 standard methodology and conducted a field review that included staff interviews. Black & Veatch concluded that, in 2015, Houston lost approximately 111 gallons per connection per day, with approximately 87 gallons in real losses (due to infrastructure issues, such as leakage), and 24 gallons in apparent losses (due to metering and billing issues). These levels are within the range of losses reported and published by peer utilities.

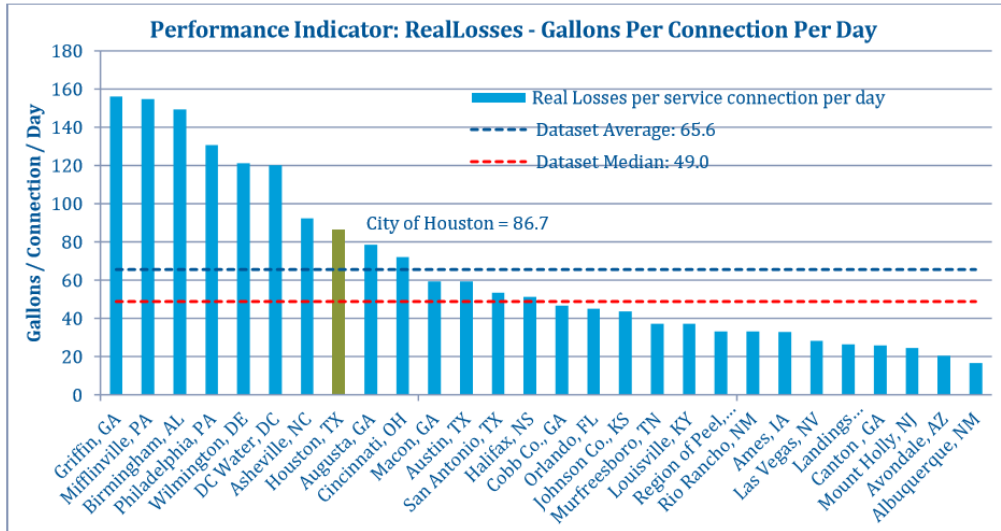


Figure 4. Real Losses: Houston and North American Benchmark Data (AWWA)

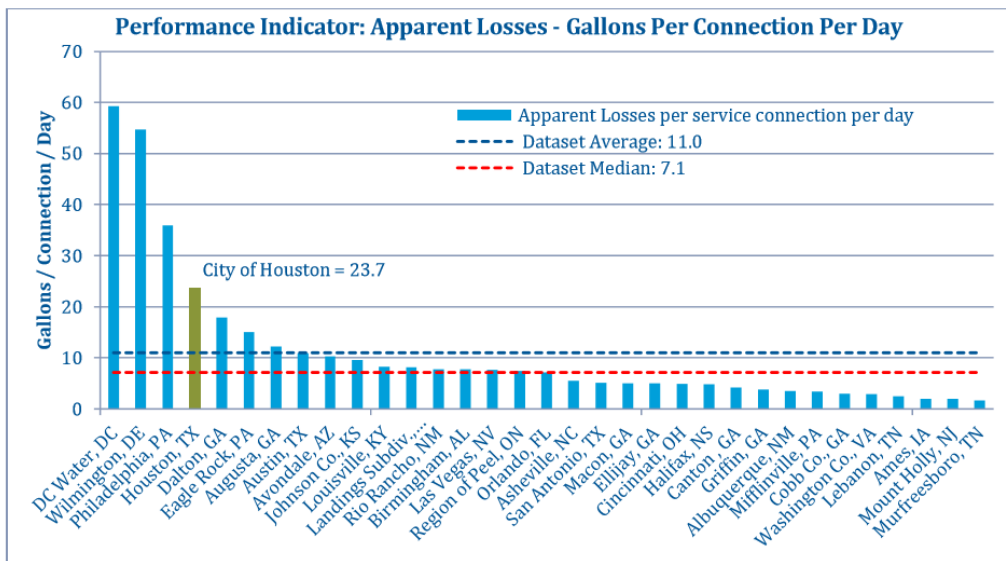


Figure 5. Apparent Losses: Houston and North American Benchmark Data (AWWA)

With the assistance of Black & Veatch, Houston identified ways to reduce non-revenue water through more accurate metering practices, improved record-keeping standards, and improved infrastructure. Houston has added dedicated staff to assist with data management and analysis, is undertaking an asset management project at key sites, and is investigating leak detection systems to be more proactive. Houston is also seeking to upgrade the existing AMI network, discussed below.

3. Consumption Awareness Program

Houston measures water consumption through an automated system that transmits water usage data via radio waves, also referred to as the AMI network. An attachment on the water meter sends a wireless signal that is picked up by one of the collecting devices located throughout the city, most often on utility poles. This information is transmitted to a central computer where the data can be accessed by Houston staff to generate alerts and create bills.

Using the AMI network, Houston developed the Consumption Awareness Program to provide customers with real-time usage information across multiple communication platforms. The Consumption Awareness Program allows customers to access their water consumption daily and to set alarms for high water usage and leak alerts. Customers can use the Consumption Awareness Program to identify uses and leaks that may result in water waste and bill increases, and to address those issues in real-time.

As of 2019, Houston has completed the first phase of Consumption Awareness Program implementation, which included the following activities:

- Converting 45% of retail customers to the AMI network as of February 2019.
- Creating a web portal for single family residential customers to access real-time water usage.
- Sending out more than 10,000 alerts since April 2018.
- Registering with the program a total of 14,254 accounts, 13,552 of which are single family residential.

Houston is now undertaking the second phase of implementation, which will include the following activities:

- Developing a web portal for multi-family and non-residential retail customers.
- Developing and implementing an information dissemination campaign to increase retail customer participation to 80%.
- Developing a more informative and user-friendly web portal for single family residential customers.

More information on the Consumption Awareness Program is attached at Appendix B and on Houston's website at: <https://www.houstonwaterbills.houstontx.gov>.

4. AMI Network

Ideally, Houston would read all retail customer meters by use of the AMI network. This would allow for more frequent readings (every 15 minutes) to assist Houston staff and customers with identifying usage trends in real time as compared to other meter reading methods (e.g., every month for billing purposes). Unfortunately, the AMI network capacity has been declining over the last five years, primarily due to aging infrastructure and lack of resources. As of 2019, the AMI network reads between 45 – 50% of all retail meters throughout the city.

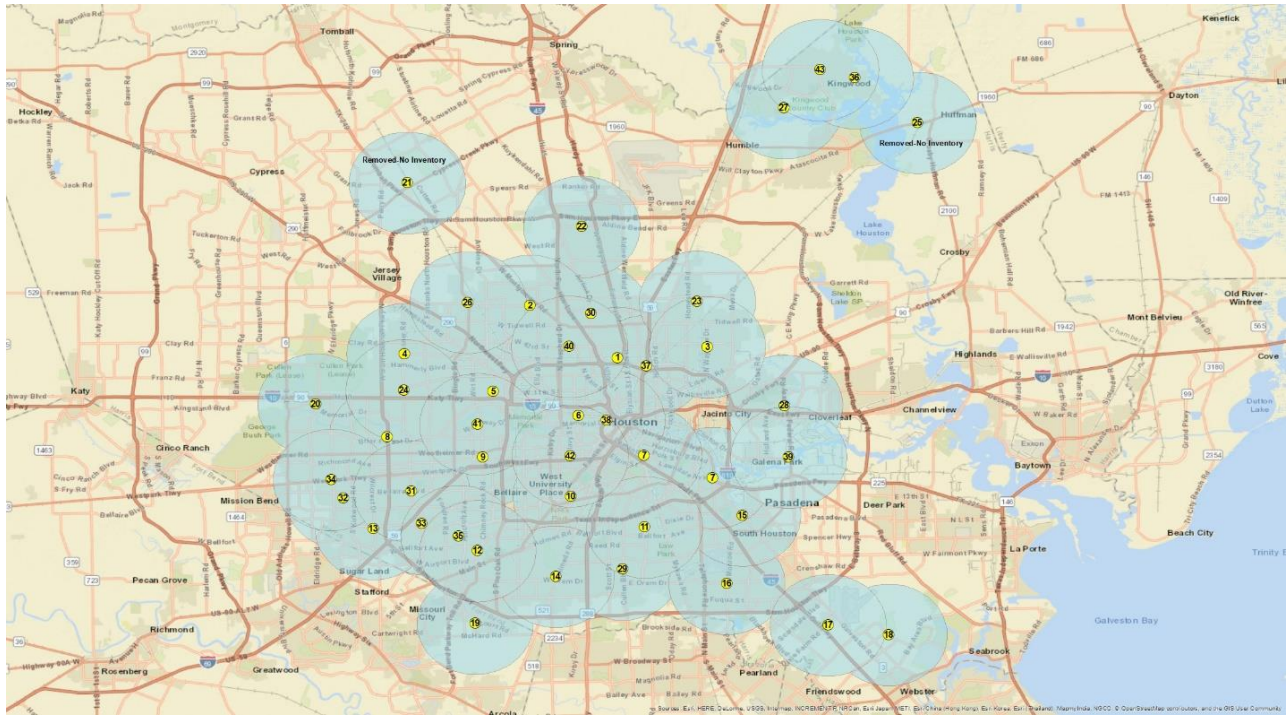


Figure 6. AMI Network Coverage 2019

Of the meters that cannot be read by use of the AMI network, roughly 90% are read by vehicle-mounted automated meter reading equipment and 10% are read manually. As funds become available, Houston intends to replace obsolete AMI network infrastructure with the goal of having between 85 – 95%⁸ of retail meters read by the AMI network.

5. Mainline Leak Detection Program

Houston plans to enhance its mainline leak detection program using the AMI network. Future applications are under development with manufacturers. Functionalities will include pressure sensing, hydrant flow monitoring, and water quality sensing, among others. The key to long-term viability of this plan is interoperable end-point functionality and open architecture protocols.

⁸ Weather can influence the number of meters that can be read by the AMI network, and recent flooding events have impacted AMI transmission of consumption data.

6. Water Wise Building Standards

In 2011, Houston revised its plumbing and building codes. These revisions contributed to a gradual reduction in Houston's residential GPCD from a five-year average (2009 – 2013) of 68 to a five-year average (2014 – 2018) of 62, despite a net population increase of 95,109 people during this same period. Houston also added a section on low impact development to Houston's Infrastructure Design Manual. Low impact development can reduce the amount of treated water used for irrigation by utilizing stored rainwater and slowing runoff through use of green storm water infrastructure improvements. Houston will continue to rigorously enforce its plumbing and building codes and encourage the use of low impact development practices.

A copy of Houston's plumbing and building codes is available on Houston's website at: <https://www.houstonpermittingcenter.org/building-code-enforcement.html>.

A copy of Houston's Infrastructure Design Manual is available on Houston's website at: https://edocs.publicworks.houstontx.gov/documents/design_manuals/idm.pdf.

In 2015, Houston adopted Resolution No. 2004-15 establishing the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating System™ as a standard for new or replacement city-owned facilities and for major renovation of city-owned buildings and facilities with over 10,000 square feet of occupied space. LEED™ provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED™ emphasizes state of the art strategies for various energy and environmental aspects of a building, including water savings.

More information about the LEED™ standard is available on Houston's website at: <https://www.houstontx.gov/generalservices/leed.html>.

D. Method for Tracking Plan Implementation and Effectiveness

The water conservation plan must include a method for tracking the implementation and effectiveness of the plan. The method should track annual water use and provide information sufficient to evaluate the implementation of conservation measures. The plan should measure progress annually and evaluate the progress towards meeting the goals.

1. Water Conservation Annual Report, Water Loss Audit Annual Report, Utility Benchmarking Tool

Historically, Houston has tracked the implementation and effectiveness of this Plan through the Water Conservation Annual Report and the Water Loss Audit Report, which are submitted to the Texas Water Development Board every year. In 2019, Houston began using the American Water Works Association Utility Benchmarking Tool as an additional tracking method. The Utility Benchmarking Tool tracks utility performance data and calculates performance indicators in areas such as organizational development, business operations, customer service, and water and wastewater operations. Per the American Water Works Association, these indicators are designed to help utilities improve their operational and managerial effectiveness. Benchmarking utility performance indicators will allow Houston to track its performance and compare its results to peers to identify areas for improvement.

2. Water Conservation Division

In 2019, Houston established a Water Conservation Division with Houston Water. This new division is directed by a Water Conservation Manager, who is responsible for implementing this Plan and developing programming that produces measurable outputs to help Houston reach its GPCD and water loss five-year and ten-year targets. In addition, the Water Conservation Manager is responsible for implementing Houston's Drought Contingency Plan, managing Houston Water's education and outreach team,

working with drinking water operations staff to improve Houston's Water Loss Program, and coordinating efficiency efforts with other Houston city departments, such as the Houston Sustainability Office.

3. Dashboard Software Platform

Houston is negotiating a contract to pilot conservation software developed by a third-party vendor. This software platform will allow Houston and its wholesale customers to visualize and quantify the impacts of specific conservation and efficiency programming on retail and wholesale customer consumption behavior. With this information, Houston and its wholesale customers can make informed decisions regarding what programming to invest in, and more easily communicate the value of these programs to their ratepayers and elected officials. This comprehensive approach to conservation is critical to a large regional water supplier like Houston, which will be evaluating the software platform for the following benefits:

- Creation of a single data and communication hub for information on conservation activities throughout the retail and wholesale system.
- Regional reduction of peak-day, peak-season, and long-term demand on Houston's water system using highly advanced conservation analytics.
- Avoidance of transmission, treatment, distribution, and wastewater costs due to coordinated conservation programming across the retail and wholesale system.
- Deferment of plant expansion costs due to coordinated conservation programming across the retail and wholesale system.

Houston plans to license this software platform for up to three years beginning in 2019.

E. Master Meter

The water conservation plan must include a master meter to measure and account for the amount of water diverted from the source of supply.

Houston relies on several sources of water for its water supply: two surface water reservoirs in the San Jacinto River basin, Lake Houston and Lake Conroe; one surface water reservoir in the Trinity River basin, Lake Livingston; 142 groundwater wells; and wastewater effluent reuse. All water leaving Lake Houston and flowing into Houston's Northeast Water Purification Plant is measured and accounted for through an inflow meter. Houston's water stored in Lake Conroe is measured and accounted for by the San Jacinto River Authority, which manages Lake Conroe for the benefit of Houston pursuant to an operating agreement. Likewise, Houston's water stored in Lake Livingston is measured and accounted for by the Trinity River Authority, which manages Lake Livingston for the benefit of Houston pursuant to an operating agreement. All groundwater wells operated by Houston are metered. Any treated wastewater effluent sold to contract customers for reuse is metered at the customer's point of delivery.

F. Universal Metering and Meter Testing

The water conservation plan must include a program of universal metering of both customer and public uses of water, for meter testing, repair and for periodic replacement.

Section 47-4 of the City of Houston Code of Ordinances requires all water furnished and delivered through the Houston water distribution system to be metered. Meters must be maintained at an accuracy rate of 98-102% in accordance with the American Water Works Association benchmark.

In 2000, Houston began replacing small meters (5/8-inch to 2-inch meters) throughout the water distribution system. Houston monitors the accuracy and performance of small

meters by analyzing data gathered through meter testing (performance-driven and through an annual sampling program) and reviewing consumption at various flow ranges to understand whether accuracy is affected by volume of water consumed within each range. Based on this information, small meters are mapped for replacement.

For large meters (3-inch meters and larger), Houston has a preventive maintenance program that schedules meter testing and calibration based on meter type and the volume of water that passes through the meter. Large meters are replaced as needed based on maintenance costs and manufacturer standards.

G. Measures to Determine and Control Water Loss

The water conservation plan must include 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.).

Houston uses a system of data analytics (run daily and monthly) coupled with field inspections to identify and control water loss and potential theft or water waste. In addition, Houston provides citizens with a direct telephone line to report perceived water theft or waste and enforces its ordinances prohibiting water theft and waste as necessary.

H. Water Loss Program

The water conservation plan must include a continuous program of leak detection, repair, and water loss accounting for the transmission, delivery, and distribution system in order to control water loss.

Houston has developed a data network based on meter readings that delivers a more robust Supervisory Control and Data Acquisition (“SCADA”) view of the entire water distribution system. This data network was piloted in Houston’s wastewater system to monitor for sanitary sewer overflows and has since been used to detect water main leaks in Houston’s water system. Additional applications of the data network are being developed, including pressure sensing, hydrant flow monitoring, and water quality sensing. The key to the success of this data network is interoperable end-point functionality and open architecture protocols. Houston is working with the American Water Works Association Research Foundation to develop industry specifications involving these data networks to ensure these features.

In addition, Houston is assisting with efforts to standardize water loss reporting to ensure that what is reported as water loss is consistent across municipal and wholesale providers throughout the State of Texas. Houston is reviewing how water is accounted for in uses such as community fire response, dead end line flushing, new line flushing, and general city uses, and has an active transient program that monitors uses by contractors.

I. Education and Information Programs

The water conservation plan must include a program of continuing education and information regarding water conservation. This should include providing water conservation information directly to each residential, industrial, and commercial customer at least annually, and providing water conservation literature to new customer when they apply for service.

1. Consumption Awareness Program

For customers to reduce their water use long term, they first need to understand how they use water. Houston developed the Consumption Awareness Program to provide customers with access to real-time usage information across multiple communication

platforms. The Consumption Awareness Program helps customers see how they're using water, identify ways to save water (and money), and find leaks and stop water waste faster.

The Consumption Awareness Program communicates with customers through the Internet, email, text, and phone. Customers can access account billing information (such as current balance, due date, last payment received, and projected next bill) as well as usage information (such as current usage, meter read date, what they paid for their usage, and neighborhood average usage). Hourly and daily usage data is available for 60 days, and monthly usage data is available for up to 18 months. In addition, customers can set alerts, including leak alerts, and choose how to be alerted: by email, text, or phone call.

More information on the Consumption Awareness Program and a description of the dashboard is attached at Appendix B.

2. Water Education and Outreach Team

Houston maintains a dedicated staff for water education and outreach programs within the Water Conservation Division of Houston Water. This education and outreach team is responsible for staffing the WaterWorks Education Center, presenting the annual WaterWorks Festival, and providing Project WET educator training and school and community outreach programs that support Houston's conservation goals.

3. WaterWorks Education Center

Opened in 2010, the WaterWorks Education Center hosts numerous school field trips and tours. Located near the shores of Lake Houston at the City of Houston's Northeast Water Purification Plant, the WaterWorks Education Center is a one-of-a-kind water destination whose mission is to promote water education, conservation and stewardship. The City of Houston's WaterWorks Education Center welcomes all educational groups to explore the wonders of water during a field trip designed to

immerse them with a sense of wonderment and discovery about one of earth’s most precious resources. The Center offers visitors an innovative environment for creative learning with interactive exhibits, demonstrations and tour. Visitors are not only able to tour the Education Center but also learn from experts, and education activities and take home flyers, activity books and general information regarding water conservation and education. The WaterWorks Education Center has had over 31,000 visitors from 2014 to 2018 and over 55,000 visitors since its inception.

Early Childhood	Elementary School	Middle School	High School	Higher Education	Adults	Total
2,302	19,600	1,399	1,688	365	5,689	31,043

Table 6. WaterWorks Education Center Attendance from 2014 to 2018.

More information is available on Houston’s website at:

<https://www.publicworks.houstontx.gov/waterworks>.

4. Annual WaterWorks Festival

For 25 years, Houston has hosted this annual event to showcase Houston’s water conservation message. The event is geared toward school-aged children and young adults and has more than 50 sponsors and exhibitors reflecting a variety of careers in the public and private water and wastewater sectors. The event educates the community regarding Houston’s high-quality drinking water, drinking water supply and wastewater treatment systems, water conservation and efficiency initiatives. Over the last five years, 9,247 elementary students and 1,217 adults attended this event.

5. Project WET

The WaterWorks Education Center is a host institution for Project WET (Water Education for Teachers), a curriculum taught in 8-hour workshops to help educators teach all grade levels on diverse water-related topics with objective, experiential, science-based water education. Project WET is a world leader in developing interdisciplinary, hands-on activities that integrate knowledge of water resources and issues into K-12 classrooms using simulations and critical thinking skills at the core of Next Generation Science Standards.

As a host institution, the WaterWorks Education Center has certified over 300 educators on Project WET.

6. School and Community Outreach Program

Houston Water's education and outreach team gives presentations to Houston area students throughout the school year. The team is available to present to all grade levels, in individual classrooms or assemblies, and tailors its message to include age appropriate activities and content. Educators can request a topic and activity from a wide variety of content from the Project WET curriculum. Students can participate in hands-on activities that support the *Texas Essential Knowledge and Skills* standards. On average, the education and outreach team gives presentations at more than 25 schools and school-related events each year.

7. Gulf Coast Water Conservation Symposium

Houston is an active participant in the annual Gulf Coast Water Conservation Symposium, a one-day regional event that presents information to water utilities and customers about water conservation legislation, planning, education, smart conservation investment, implementation strategies, and industry best practices. Houston Water employees serve on the Symposium's Steering Committee, help plan the Symposium, and help raise awareness of the event.

In 2019, the Symposium was titled “Water Efficient Future: Planning, Tools & Best Practices” and focused on new and improved tools currently available to water utilities to meet their water conservation goals. The Symposium also featured case studies that highlighted planning, redevelopment, and water conservation implementation efforts from cities large to small.

J. Water Rate Structure

The water conservation plan must include 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. Include a copy of the rate structure.

Houston’s water rate structure is cost-based and is not promotional. Water rates are based on an inclining block structure, and wastewater rates are based on total water use. Houston’s objectives in rate structure design are that rates be based on the costs to serve, provide adequate and stable revenues, be equitable across customer classes and volume users, and be easy to implement and administer. Houston performs a cost-of-service study every ten years, and a study is underway in 2019.

A copy of Houston’s current rates is attached at Appendix C. Current rates for 2019 and beyond are published on Houston’s website at:

https://cohweb.houstontx.gov/FIN_FeeSchedule/default.aspx.

K. Implementation and Enforcement

The water conservation plan must include a means of implementation and enforcement, evidenced by adoption of the plan: (1) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the

utility; and (2) a description of the authority by which the utility will implement and enforce the conservation plan.

A copy of the Houston City Council ordinance adopting this Plan is attached at Appendix D.

Houston implements and enforces the regulatory aspects of this Plan through existing codes and ordinances. These include:

- Building and Plumbing Codes: www.houstonpermittingcenter.org/code-enforcement
- Chapter 47 – Water and Sewers, of the City of Houston Code of Ordinances: <http://www.houstontx.gov/codes/index.html>
- LEED Certification of City of Houston owned facilities (Resolution No. 2004-15): <http://www.usgbc.org/Docs/Archive/General/Docs1981.pdf>

L. Contract Customer Requirements

If the utility will utilize a project financed by the TWDB to furnish water or wastewater services to another supplying entity that in turn will furnish the water or wastewater services to the ultimate consumer, the requirements for the water conservation plan also pertain to these supplier entities. To comply with this requirement the utility shall: (1) submit its own water conservation plan; (2) submit the other entity's (or entities') water conservation plan; (3) require, by contract, that the other entity (or entities) adopt a water conservation plan that conforms to the TWDB's requirement and submit it to the TWDB. If the requirement is to be included in an existing water or wastewater service contract, it may be included, at the earliest of the renewal or substantial amendment of the contract, or by other appropriate measures.

All water supply contracts entered into after this Plan was first adopted require the customer (and its customers, if the entity is a wholesale provider) to adopt and implement a water conservation plan meeting the requirements of state law and that is at least as stringent as this Plan.

M. Region H Notification

The water conservation plan must include documentation that the regional water planning group for the service area of the utility has been notified of the utility's water conservation plan.

A copy of Houston's letter notifying Region H of Houston's 2019 Water Conservation Plan is attached at Appendix E.

N. Drought Contingency Plan

The water conservation plan must include a copy of the utility's drought conservation plan that meets the requirements of the TWDB's Water Conservation Plan Guidance Checklist, Form TWDB-1968 (Rev. 1/08/2013).

A copy of Houston's 2019 Drought Contingency Plan is attached at Appendix F.

O. Adoption

The water conservation plan must be formally adopted by the governing body of the entity. For a municipal water system, adoption would be by the city council as an ordinance, or a resolution by the utility's board of directors.

A copy of the Houston City Council ordinance adopting this Plan is attached at Appendix D.

P. Reporting Requirement

The water conservation plan must identify who will be responsible for preparing the annual report on the utility profile form TWDB-1965. Loan/grant recipients must maintain an approved water conservation program in effect until all financial obligations to the state have been discharged and shall report annually to the executive administrator of the TWDB on the progress in implementing each of the minimum requirements in its water conservation plan and the status of any of its customers' water conservation plan required by contract. The content and format for the annual reporting is included in the forms: Water Conservation Plan Annual Report; TWDB-1966 for retail water suppliers; TWDB-1967 for non-water suppliers; and TWDB-1969 for wholesale water suppliers.

Houston Water, through its Water Conservation Manager, will be responsible for preparing the Water Conservation Plan Annual Report, TWDB-1966 for retail water suppliers and TWDB 1969 for wholesale water supplies.

Appendix A

Water Utility Profile

This exhibit is currently under development and will be available in the final version of this document to be submitted on July 1, 2019 to the Texas Commission on Environmental Quality and the Texas Water Development Board.

DRAFT

Appendix B

Consumption Awareness Program Dashboard Features

Features of Usage Calculator:

- USAGE SUMMARY - provides you with a dashboard of information about your water usage including reading status, actual usage, project usage for next bill, and usage comparison information.
- MONTHLY USAGE HISTORY - provides you with a chart and table of monthly usage and billed history for up to the past 18 months. This information is useful for reviewing your usage and charge trends across seasons as well as from month to month.
- DAILY USAGE HISTORY - provides you with up to 90 days of daily usage history useful for comparing usage by day of week or from week to week. The daily usage is also a good tool for quickly identifying when unexpected high usage began.
- HOURLY USAGE HISTORY - provides you with hourly usage for any selected day up to the past 90 days. This tool is helpful for associating usage to specific events in your home or business (i.e., irrigation use, bathroom use, appliance use, etc.).
- USAGE ALERT HISTORY - provides you with a history of usage alert notifications sent for your account.
- USAGE ALERT SETTINGS - provides you with options for custom daily, monthly, and leak threshold alert settings that can be delivered to your mobile phone as a text or app notification, email, or phone call.

USAGE SUMMARY

CAP Usage Manager

Summary Monthly Daily Hourly Alerts Settings

1 HOURLY METER READING SERVICE

Service Available	ACTIVE: GOOD COMMUNICATION SERVICE
Service Address	TX 77051
Rate Class	RESIDENTIAL

2 USAGE ALERTS

There are 14 usage alerts within the last 30 days.

3 ACTIVE BILLING CYCLE

Usage ?	420 GALS
Usage Days	6
Usage Charge	\$ 16.42

PROJECTED NEXT BILL

Usage ?	2710 GALS
Charge ?	\$ 23.25

ACTIVE READINGS

Start Reading	180000
Active Reading	181030
Active Reading Date	05/12/2013

4 MONTHLY USAGE HISTORY FOR PERIOD 11/01/2011 to 05/06/2013

	Usage	Cost
Highest	9000 GALS	\$ 105.15
Average	4000 GALS	\$ 48.09
Lowest	3000 GALS	\$ 23.89
Neighborhood Average ?	4713 GALS	\$ 48.09

5 METER INFORMATION

Meter Number	09307748
Meter Make	BADGER
Meter Size	1

1 HOURLY METER READING SERVICE provides you with the current status of the hourly meter reading service, the service address of the account, and the rate class assigned to the account.

See [Hourly Reading Communication Status](#) for more information on your status, possible reasons, and possible corrective actions.

2 USAGE ALERTS provides you with a summary count of the number of usage alert notifications that have been triggered for the account in the past 30 days.

3 ACTIVE BILLING CYCLE USAGE reports your actual water usage since your last billed reading (i.e., current billing cycle or usage for your next bill). The information includes the usage in gallons, the days of usage, and the approximate charge for this usage.

Note that the usage includes unbilled usage from the previous cycle and actual usage for the usage days as of the last meter reading. You can view the last meter reading date and time by logging on to your account.

PROJECTED NEXT BILL estimates what your bill could be if the current pattern of usage continues. The projection is based on actual usage plus an estimated daily usage over the remaining days in the billing month.

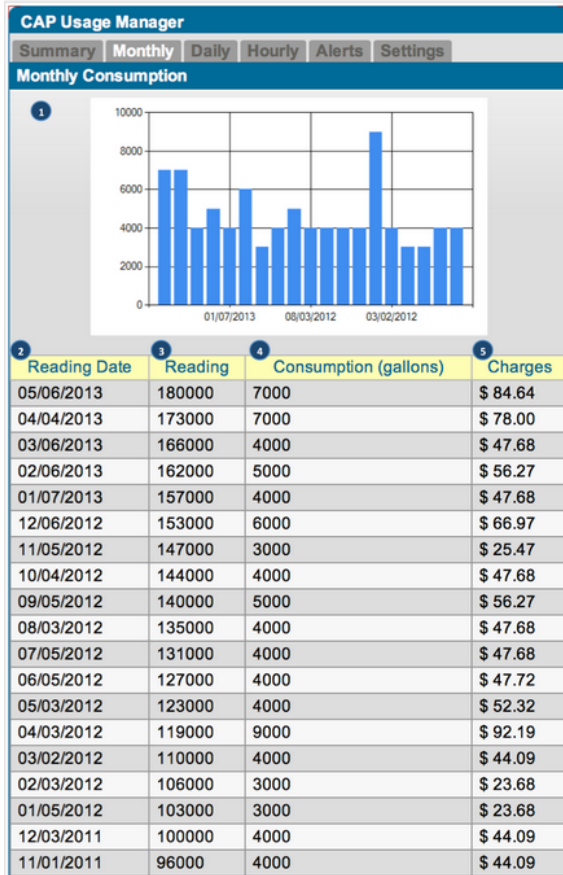
If you have an unexpected high projection, you can take action to avoid this charge if you are early in the cycle. If not, you can still take action to avoid these charges on your future bills.

4 USAGE HISTORY FOR PERIOD provides you with a basis for comparing your usage to your past usage history to determine if it is normal or unusually high. Your average usage over the past 18-months shows you what's normal, the highest usage could reflect a month when you had a leak, and the lowest usage could reflect a month when you were away from home.

[Neighborhood Average](#) provides you with a basis for comparing your usage to homes in your surrounding area. The average is based on active single family residential customers with meter sizes of 1-inch or smaller. The number of homes included in the average is reported below the comparison table.

5 METER INFORMATION provides you with useful information that can help when investigating possible meter reading issues.

MONTHLY USAGE HISTORY



1 MONTHLY USAGE HISTOGRAM CHART provides you with graphical representation of the distribution usage by month.

2 READING DATE provides you with meter reading date that was used for the corresponding billing period.
You can click the column heading title to sort the table. Click twice to reverse the order.

3 READING provides you with the meter reading (in thousands of gallons) recorded on the specified reading date. Your usage is charged in thousands of gallons and any usage in excess of a factor of one thousand will be charged in the next billing cycle.

You can click the column heading title to sort the table. Click twice to reverse the order.

4 CONSUMPTION provides you the billed usage for the corresponding billing month.

You can click the column heading title to sort the table. Click twice to reverse the order.

5 CHARGES provides you with the amount that was actually billed for corresponding billing month.

You can click the column heading title to sort the table. Click twice to reverse the order.

USAGE ALERT SETTINGS

The screenshot shows a web interface titled "Calculator" with a blue header. It is divided into four sections: "Daily", "Monthly", "Leak Alert (Continuous flow over 24 hours)", and "Notification Preference".

- Daily:** Includes a "Turn On" radio button (selected) and a "Turn Off" radio button. Below are input fields for "Current Daily Average" (133 Gallons) and "Alert Threshold" (200 Gallons).
- Monthly:** Includes a "Turn On" radio button (selected) and a "Turn Off" radio button. Below are input fields for "Current Monthly Average" (4000 Gallons) and "Alert Threshold" (4000 Gallons).
- Leak Alert (Continuous flow over 24 hours):** Includes a "Turn On" radio button (selected) and a "Turn Off" radio button.
- Notification Preference:** Includes a "Method" dropdown menu (set to "Text"), an "Email" field (somya_scott@yahoo.com), a "Cell Phone" field (713)492-3482, and an empty "Telephone" field.

A blue "SAVE" button is located at the bottom right of the form.

CALCULATOR provides you with a tool that can be used to determine what your daily and monthly water usage should be based on key factors impacting your household such as: the total number of people in your household, bathroom usage, number of loads typically washed or the frequency for yard watering, etc.

This tool will effectively estimate the expected daily, monthly and annual water consumption for your household and compare it to the average of similar households across the City of Houston.

DAILY USAGE THRESHOLD SETTING provides you with tool that monitors your daily water usage.

The Daily Alert feature includes the average daily consumption based on a rolling 12-month period. You can set the alert threshold by entering the consumption amount that you believe is unusually high for a given day. Review your daily consumption history to help determine an effective high consumption threshold.

1. Click the 'Turn On' option to turn on the notification.
2. Review the daily average for the past 12 months.
3. Select a usage alert threshold based on your desired notification needs.
 - Set the threshold at twice your average if you want to be notified of unusually high usage or...
 - Set the threshold to 10 if you have a vacant property where you want to be notified of any use.

MONTHLY USAGE THRESHOLD SETTING provides you with a tool that can be used to notify you when your projected month charge exceeds your monthly budget threshold.

The Monthly Alert feature includes the average monthly consumption based on a rolling 12-month period. You can set the alert threshold by entering the consumption amount that you believe is unusually high for a given month. Review your daily consumption history to help determine an effective high consumption threshold.

LEAK ALERT SETTING provides you with a tool that detects a continuous flow of water through your meter for 1 to 7 days (depending on meter type). This scenario typically indicates a leak for residential single family accounts but may not be an effective indicator for multi-family or commercial accounts.

Notification Preference allows you to choose a preferred method of notification (i.e., text, mobile app, email, or phone).

Appendix C

2018 WATER & SEWER RATES

A copy of the 2018 water and wastewater rates is attached. Current rates in future years will be posted on Houston's website at: www.houstonwater.org

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2018 WATER & SEWER RATES Effective date April 1, 2018

The basic service charge for both water and sewer is affected by the water meter size. For all classes that include sewer, the water consumption is used to determine the appropriate sewer consumption charge.

Single-Family Residential – TU 01, 02, & 03:

The basic charge for each meter size is listed below. For simplicity, this table adds volume and base charges together for 1,000 to 6,000 gallons. From 7,000 to 12,000 gallons the rate is \$5.32 per 1,000 gallons, regardless of meter size. Starting at 13,000 gallons, the rate is \$8.76 per 1,000 gallons.

Water Rates				
	5/8 or 3/4" meters	1 inch meter	1.5 inch meter	2 or 3 inch meter
Basic charge, per meter size	\$ 5.39	\$ 6.67	\$ 10.11	\$11.91
The numbers below this line include both Base and Volume charges				
1,000 gallons	\$5.54	\$6.82	\$10.26	\$12.05
2,000 gallons	\$12.62	\$13.90	\$17.34	\$19.13
3,000 gallons	\$13.04	\$14.32	\$17.76	\$19.56
4,000 gallons	\$24.67	\$25.95	\$29.39	\$31.18
5,000 gallons	\$29.57	\$30.85	\$34.29	\$36.08
6,000 gallons	\$34.46	\$35.74	\$39.18	\$40.98
7,000 to 12,000 gallons	The total charge for 6,000 gallons + \$5.32 per 1,000 gallons			
Over 12,000 gallons	The total charge for 12,000 gallons + \$8.76 per 1,000 gallons			

Sewer Rates					
	5/8 or 3/4" meters	1 inch meter	1.5 inch meter	2 inch meter	3 inch meter
Basic charge, per meter size	\$11.45	\$12.04	\$13.94	\$14.53	\$26.02
The numbers below this line include both Base and Volume charges					
1,000 gallons	\$11.64	\$12.23	\$14.13	\$14.72	\$26.21
2,000 gallons	\$12.02	\$12.61	\$14.51	\$15.10	\$26.59
3,000 gallons	\$12.32	\$12.91	\$14.81	\$15.40	\$26.89
4,000 gallons	\$28.25	\$28.84	\$30.74	\$31.33	\$42.82
5,000 gallons	\$34.01	\$34.60	\$36.50	\$37.09	\$48.58
6,000 gallons	\$42.39	\$42.98	\$44.88	\$45.47	\$56.96
Over 6,000 gallons	The total charge for 6,000 gallons + \$8.38 per 1,000 gallons				

EXAMPLES OF RESIDENTIAL BILLINGS:

<p>1,000 gallons, 5/8" meter</p> <p>Total/Month</p>	<p>\$ 5.54 Water</p> <p>\$ 11.64 Sewer</p> <p>\$ 17.18</p>	<p style="text-align: center;">Water Charges</p> <hr/> <p>\$34.46 for 6,000 gallons plus 1,000 gallons at \$5.32 = \$39.78</p>	<p style="text-align: center;">Sewer Charges</p> <hr/> <p>\$42.39 for 6,000 gallons plus 1,000 gallons at \$8.38 = \$50.77</p>
<p>7,000 gallons, 5/8" meter</p> <p>Total/Month</p>	<p>\$ 39.78 Water</p> <p>\$ 50.77 Sewer</p> <p>\$ 90.55</p>	<p>\$34.46 for 6,000 gallons plus 6,000 gallons at \$5.32 plus 2,000 gallons at \$8.76 = \$83.90</p>	<p>\$42.39 for 6,000 gallons plus 8,000 gallons at \$8.38 = \$109.43</p>
<p>14,000 gallons, 5/8" meter</p> <p>Total/Month</p>	<p>\$ 83.90 Water</p> <p>\$109.43 Sewer</p> <p>\$193.33</p>	<p>\$34.46 for 6,000 gallons plus 6,000 gallons at \$5.32 plus 2,000 gallons at \$8.76 = \$83.90</p>	<p>\$42.39 for 6,000 gallons plus 8,000 gallons at \$8.38 = \$109.43</p>

Multi-Family – TU 14-19:

- 14 (duplex – 2 units)
- 15 (tri-plex – 3 units)
- 16 (quad-plex – 4 units)
- 17 (master-metered townhomes – any number of units)
- 18 (apartments — 5+ units)
- 19 (trailer parks)

Consumption is no longer included with the basic charge. The volume charges are applied to all usage.

Rate	Meter size (Inches)	Basic Water Charge	Basic Sewer Charge
Basic Charge (0 consumption)	5/8	\$5.60	\$9.85
	¾	\$5.77	\$9.85
	1	\$6.94	\$10.34
	1.5	\$10.51	\$12.00
	2	\$12.37	\$12.49
	3	\$32.74	\$22.38
	4	\$44.62	\$25.35
	6	\$76.47	\$36.22
	8	\$199.68	\$87.97
	10	\$199.68	\$106.92
Volume Charge	All	+ \$4.31 per 1,000 gallons	+ \$6.26 per 1,000 gallons

Commercial – TU 21-60:

Consumption is no longer included with the basic charge. The volume charges are applied to all usage.

Rate	Meter Size (Inches)	Basic Water Charge	Basic Sewer Charge
Basic Charge (0 consumption)	5/8	\$ 5.60	\$9.85
	3/4	\$ 5.77	\$9.85
	1	\$ 6.94	\$10.34
	1.5	\$ 10.51	\$12.00
	2	\$ 12.37	\$12.49
	3	\$ 32.74	\$22.38
	4	\$ 44.62	\$25.35
	6	\$ 76.47	\$36.22
	8	\$ 199.68	\$87.97
	10	\$ 199.68	\$106.92
Volume Charge	All	+ \$4.42 per 1,000 gallons	+ \$6.26 per 1,000 gallons

Industrial, No Surcharge – (WSC 6) TU 21-60, 61, 62:

Industrial rates include a monthly basic charge and volume charges for both water and sewer. No consumption is included with the basic charge for water or sewer. Some customers are billed for sewer only, based on readings from non-City of Houston water meters.

Rate	Meter Size (Inches)	Water Charge	Basic Sewer Charge
Basic Charge (0 consumption)	5/8	\$ 5.60	\$16.65
	3/4	\$ 5.77	\$16.65
	1	\$ 6.94	\$16.65
	1.5	\$ 10.51	\$16.65
	2	\$ 12.37	\$16.65
	3	\$ 32.74	\$22.18
	4	\$ 44.62	\$25.35
	6	\$ 76.47	\$36.22
	8	\$ 199.68	\$87.97
		10+	\$ 199.68
Volume Charge	All	+ \$4.42 per 1,000 gallons	Up to 2,000 gallons at \$3.85 per 1,000 gallons All over 2,000 gallons at \$6.85 per 1,000 gallons.

Transient Meters – TU 71:

These accounts have rental fees, base charges and consumption charges.

Rate	Basic Water Charge		
	1"	2"	3"
Basic Charge/Rental Fee (0 consumption)	\$18.68	\$24.91	\$31.13
Volume Charges	+\$4.96 per 1,000 gallons		

Please refer questions to Krystal Jones at 832-395-6285, or fax to 713-371-1122.

Lawn/Outdoor Meters – TU 72:

No consumption is included with the basic charge. Volume charges are applied to all usage, but there are two rate tiers. The "defined quantity" marks the point where the tier changes, which is different for each meter size. Volumes up to the defined quantity are charged at the lower rate tier; volumes in excess of the defined quantity are charged at the higher rate tier.

Rate	Meter Size (Inches)	Basic Water Charge	Defined Quantity (First Tier of Volume Charges)
Basic Rate, per meter size, (plus first tier of volume charges)	5/8	\$ 27.87	None – all consumption at 2 nd tier
	3/4	\$ 27.87	None – all consumption at 2 nd tier
	1	\$ 31.24	None – all consumption at 2 nd tier
	1.5	\$ 82.94	Up to 10,000: + \$3.24 per 1,000 gallons
	2	\$ 128.20	Up to 16,000: + \$3.24 per 1,000 gallons
	3	\$ 278.31	Up to 35,000: + \$3.24 per 1,000 gallons
	4	\$ 471.17	Up to 60,000: + \$3.24 per 1,000 gallons
	6	\$ 970.28	Up to 125,000: + \$3.24 per 1,000 gallons
	8	\$ 1403.13	Up to 180,000: + \$3.24 per 1,000 gallons
	10	\$ 1403.13	Up to 180,000: + \$3.24 per 1,000 gallons
Volume Charges Second Tier (All meter sizes)	All consumption over defined quantity: + \$7.46 per 1,000 gallons		

EXAMPLES OF LAWN BILLING:

<u>5/8" Meter w/2,000 gallons</u>		<u>1" Meter w/12,000 gallons</u>		<u>3" meter w 60,000 gallons</u>		<u>6" meter w 60,000 gallons</u>	
Basic:	\$27.87	Basic:	\$31.24	Basic:	\$278.31	Basic:	\$970.28
2nd tier: 2*7.26	\$14.52	2 nd tier: 12*7.46	<u>\$89.52</u>	1 st tier: 35*3.24	\$113.40	1 st tier: 60*3.24	\$194.40
				2 nd tier: 25*7.46	\$186.50		
TOTAL:	\$42.39	TOTAL:	\$120.76	TOTAL:	\$578.21	TOTAL:	\$1164.68

Other Classes:

Industrial w/Surcharge – (WSC 9) TU 21-60, 61, 62, 63:

Industrial rates include a monthly basic charge and volume charges for both water and sewer. Some customers are billed for sewer only, based on readings from non-City of Houston water meters. These customers take their water from non-City of Houston sources and may choose to install a water meter of the type and standard approved by the department for the purpose of measuring the amount of water taken into such facilities. The water consumption indicated by such meter shall be the basis of determining the sewer charge. Rates are the same as if the water is from City of Houston source.

No consumption is included with the basic charge for water or sewer. While the basic charge for water and sewer is determined by meter size, the volume charge for sewer may vary based on the results of effluent testing.

Rate	Meter Size (Inches)	Water Charge	Basic Sewer Charge
Basic Charge (0 consumption)	5/8	\$ 5.60	\$16.65
	3/4	\$ 5.77	\$16.65
	1	\$ 6.94	\$16.65
	1.5	\$ 10.51	\$16.65
	2	\$ 12.37	\$16.65
	3	\$ 32.74	\$22.18
	4	\$ 44.62	\$25.35
	6	\$ 76.47	\$36.22
	8	\$ 199.68	\$87.97
	10+	\$ 199.68	\$106.92
Volume Charge	All	+ \$4.61 per 1,000 gallons	See below



Additional surcharges for industrial sewer accounts are determined by application of a special formula to the results of effluent tests:

$$R = X + (BOD * 8.337 * Y/1000) + (SS * 8.337 * Z/1000)$$

Or R= Rate / TG as 47-122(b)(2)(b), whichever is greater

Where:

X = \$4.61 per 1000 gallons, R= 8.337, Y= \$0.7932 / lb., Z = \$0.3131 / lb.

BOD = Five-day, 20 degrees Centigrade biochemical oxygen demand content of the waste delivered, in mg/l.

SS = Suspended solids content of the waste delivered, in mg/l.

Any questions on how the surcharges are calculated, or regarding prohibited discharges, should be referred to the Wastewater Operations Branch by calling (832) 395-5779 or by emailing allison.osborne@houston.tx.gov.

Resale – TU 73:

These customers purchase water from the City of Houston for resale.

Rate	Meter Size (Inches)	Basic Water Charge
Basic Charge, per meter size (0 consumption)	5/8	\$21.14
	3/4	\$21.14
	1	\$24.51
	1.5	\$60.48
	2	\$92.23
	3	\$199.65
	4	\$336.33
	6	\$689.36
8 and above	\$998.62	
Volume Charge (All meter sizes, all consumption)	\$5.30 per 1,000 gallons	

Emergency Backup Service – TU 74:

The Contact Center at 713-371-1400 can answer routine questions about these accounts. To notify UCS of EBS use, fax the report to 832-395-5255.

Rate	Meter Size (Inches)	Basic Water Charge
Basic Charge, per meter size (0 consumption)	5/8,3/4	\$ 8.03
	1	\$ 11.42
	1.5	\$ 16.85
	2	\$ 22.43
	3	\$ 46.98
	4	\$ 74.57
	6	\$ 144.05
	8	\$ 213.39
	10+	\$ 220.89
Volume Charge (All meter sizes, all consumption)	\$8.20 per 1,000 gallons	

Un-Metered Fire Line Charge – TU 21-60, 75:

Un-metered fire lines are charged a flat fee every month, under the provisions of City of Houston Ordinance §47-64. These lines must be equipped with backflow prevention assemblies.

<i>Corresponding size of the diameter of service line</i>	Monthly Charge for Basic Service
<i>5/8 inch</i>	\$14.66
<i>3/4 inch</i>	\$14.66
<i>1.0 inch</i>	\$14.66
<i>1.5 inch</i>	\$58.39
<i>2.0 inch</i>	\$86.11
<i>3.0 inch</i>	\$86.11
<i>4.0 inch</i>	\$86.11
<i>6.0 inch</i>	\$95.92
<i>8.0 inch</i>	\$163.73
<i>10.0 inch</i>	\$220.88

Metered Fire Line Charge Only – TU 21-60:

These customers have their fire service isolated from the remainder of the water supply, and served through an independent meter. Normally they will have zero consumption, but a consumption charge applies if consumption occurs.

Rate	Meter Size (Inches)	Basic Water Charge
Basic Charge, per meter size (0 consumption)	5/8	\$5.60
	¾	\$5.77
	1	\$6.94
	1.5	\$10.51
	2	\$12.37
	3	\$32.74
	4	\$44.62
	6	\$76.47
	8 and above	\$199.68
Volume Charge (All meter sizes, all consumption)	\$4.42 per 1,000 gallons	

Un-Metered Sewer Only Customer – TU 81-82:

Special rates apply to sewer customers without City of Houston water or effluent meters. These are monthly rates, but will continue to be billed on a bi-monthly basis.

Class	Monthly Fee
Single Family Residential	\$28.25
Duplex	\$59.92
Multi-family (3+ units)	\$35.04 per single family unit
Commercial	\$66.13 per unit (defined in §47-1002)
Industrial	\$66.10 per unit (defined in §47-1002)

Contract, Untreated and Reclaimed Water (TU 91):

Treated Water (TU 91) – contracted

	R1=	\$3.064	/ TG	R2=	\$3.739	/TG	N=	\$0.760	/ TG	N=	\$0.760	/TG
with airgap water: $p * R1 + (p-m) * N1$ without airgap = $p * R2 + (p - m) * N2$ (p: total water delivery in the month, M: minimum monthly water quantity in contract)												

Untreated Water (TU 91) – no contract

Consumption (/TG)	Per /TG
0 - 10,000	\$1.7544
11,000-20,000	\$1.5764
21,000-50,000	\$1.4867
51,000-150,000	\$1.3970
151,000 & up	\$1.3521

Reclaimed/ Untreated Water (TU 91) – contracted

Surcharge (\$)	Quantity Charge (/TG)
R= \$0.7013 /TG	\$0.7013

If $(P - M) > 10\% M$, $S = P * R * 5\%$ (M; Max. Qty in contract)

If you have further questions on these accounts, contact Monique Pichon in Contract Water at (832) 395-6304 or Maria Carrillo 832-395-6220.

Contract Sewer:

These rates vary, based on whether the contracting district has participated in capital outlays.

If you have further questions on these accounts, contact Monique Pichon in Contract Water at (832) 395-3604 or Maria Carrillo 832-395-6220.

Agricultural and Rice Farmers (TU 91):

Agricultural - General

Quantity Charge (/MG)	\$143.11
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Agricultural - Rice

First Watering (/MG or /Acre)	\$143.11
Additional Watering (/MG or /Acre)	\$26.03

If you have further questions on these accounts, contact Monique Pichon in Contract Water at (832) 395-3604 or Maria Carrillo 832-395-6220.

Groundwater Reduction Plan (GRP) Participants:

GRP: $R \cdot P \cdot Q$ where

- R is the base rate for contract treated water customer receiving water through airgap
- P is the percentage reduction for groundwater production required for GRP participant
- Q is the quantity of groundwater produced by the GRP participant during the month.

R1=	\$3.064	/TG	R2=	\$3.739	/TG	N=	\$0.760	/TG	N=	\$0.760	/TG
with airgap water: $p \cdot R1 + (p-m) \cdot N1$ without airgap = $p \cdot R2 + (p - m) \cdot N2$ (p: total water delivery in the month, M: minimum monthly water quantity in contract)											

If you have further questions on these accounts, contact Veronica Osegueda at (832) 395-3080.

For additional reference, see chart on next page.

Fee Schedule

Name	Description	Statutory Authority	Amount	As Of
Water Rates	Untreated Water Sales No Contract Standard Rate for volume from 1,000 to 10,000 gallons, per 1,000 gallons	47-84(d)(1)	\$1.7544	4/1/2018
Water Rates	Untreated Water Sales No Contract Standard Rate for volume from over 10,000 to 20,000 gallons, per 1,000 gallons (in addition to Volume Charge for the first increment of 10,000 gallons)	47-84(d)(2)	\$1.5764	4/1/2018
Water Rates	Untreated Water Sales No Contract Standard Rate for volume from over 21,000 to 50,000 gallons, per 1,000 gallons (in addition to Volume Charges for the first increment of 10,000 gallons and for the second increment of 10,000gallons)	47-84(d)(3)	\$1.4867	4/1/2018
Water Rates	Untreated Water Sales No Contract Standard Rate for volume from over 51,000 to 150,000 gallons, per 1,000 gallons (in addition to Volume Charges for the first increment of 10,000 gallons, the second increment of 10,000 gallons and the third increment of 30,000 gallons)	47-84(d)(4)	\$1.3970	4/1/2018
Water Rates	Untreated Water Sales No Contract Standard Rate for volume over 151,000 gallons, per 1,000 gallons (in addition to Volume Charges for the first 10,000 gallons, the second increment of 10,000 gallons, the third increment of 30,000 gallons and the fourth increment of 100,000 gallons)	47-84(d)(5)	\$1.3521	4/1/2018
Water Rates	Contract Untreated Water sold in excess of contract amount, per 1,000 gallons	47-85	\$0.7013	4/1/2018
Water Rates	Contract Untreated Water for agricultural use, general agriculture, per 1,000 gallons	47-89(b)(1)	\$143.11	4/1/2018
Water Rates	Contract Untreated Water for agricultural use, rice irrigation, rate for first watering, per acre of contracted land (if diverted through a meter on canal / conveyance system - per 1,000 gallons actually used)	47-89(b)(2)a	\$143.11	4/1/2018
Water Rates	Contract Untreated Water for agricultural use, rice irrigation, Rate for each additional watering, per acre of contracted land (if diverted through a meter on canal / conveyance system - per 1,000 gallons actually used)	47-89(b)(2)b	\$26.03	4/1/2018

Appendix D

Ordinance Adopting the 2019 Water Conservation Plan

This exhibit is currently under development and will be available in the final version of this document to be submitted on July 1, 2019 to the Texas Commission on Environmental Quality and the Texas Water Development Board.

DRAFT

Appendix E

Letter to Region H

This exhibit is currently under development and will be available in the final version of this document to be submitted on July 1, 2019 to the Texas Commission on Environmental Quality and the Texas Water Development Board.

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Appendix F
2019 Drought Contingency Plan

See Drought Contingency Plan on next page.

**DROUGHT CONTINGENCY PLAN
CITY OF HOUSTON**

CCN# 99144

PWS# 1010013

July 2019

Section 1 Declaration of Policy, Purpose, and Intent

The purpose of the Drought Contingency Plan (the “Plan”) is to establish policies and procedures for the City of Houston to follow in case of a water shortage emergency. A water shortage emergency caused by drought or other uncontrollable circumstances that hinder the City of Houston’s ability to meet water demand can range from mild to critical and can disrupt the normal availability of water supplies. Therefore, it is important that the City of Houston establish this procedure so that guidelines exist in the event that a water shortage emergency occurs. The City of Houston Code of Ordinances at Chapter 47, Article VII contains the policy regarding the actions the City of Houston will take in the event of a water shortage or emergency. Definitions of terms used throughout the Plan can be found in Section 47-249 of Article VII.

Section 2 Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by:

(check at least one of the following)

- Scheduling and providing public notice of a public meeting to accept input on the

Plan

- Mailed survey with summary of results (attach survey and results)
- Bill insert inviting comment (attach bill insert)
- Other method: Not applicable. The Plan has not changed since its adoption by the Houston City Council in 2014.

Section 3 Public Education

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

Drought plan information will be provided by:
(check at least one of the following)

- public meeting
- press releases
- utility bill inserts
- The Plan will be available on the City of Houston's websites.

Section 4 Coordination with Regional Water Planning Groups

The service area of the City of Houston is located within the Region H Water Planning

Group. The City of Houston will mail a copy of the Plan to Regional H on June 13, 2019.

Section 5 Notice Requirements

Written notice will be provided to each customer **prior to implementation or termination of each stage of the water restriction program**. Mailed notice will be given to each customer 72 hours prior to the start of water restriction. If notice is hand delivered, the City of Houston understands it cannot enforce the provisions of the Plan for 24 hours after notice is provided. The written notice to customers will contain the following information:

1. the date restrictions will begin;
2. the circumstances that triggered the restrictions;
3. the stages of response and explanation of the restrictions to be implemented;
and
4. an explanation of the consequences for violations.

The City of Houston will notify the TCEQ by telephone at (512) 239-4714, or electronic mail at watermon@tceq.state.tx.us prior to implementing Stage II and will notify in writing the Public Drinking Water Section at MC - 155, P.O. Box 13087, Austin, Texas 78711-3087 within five (5) working days of implementation including a copy of the City's restriction notice. The City of Houston will file a status report of its restriction program with the TCEQ at the initiation and termination of mandatory water use restrictions (i.e., Stages II through IV).

Section 6 Violations

With the exception of customers with water service contracts, in accordance with Section 54.001 of the Texas Local Government Code, any person who violates any provision of this article shall be guilty of an offense and upon conviction thereof, shall be punished by a fine of not less than \$100.00 nor more than \$2,000.00 for each violation. Each act of city water use in violation of this article shall constitute and be punishable as a separate offense. Each day that any violation continues shall constitute and be

punishable as a separate offense. Unless another penalty is specifically provided by this Code or by state law, the penalty for violation of any provision of this article shall be as follows:

(1) **For violations of stage two water shortage**, the department may issue a written warning to a customer for a first-time violation. Any subsequent violations are subject to a fine of \$100.00 to \$2,000.00.

(2) **For violations of stage three water shortage**, the department may issue a written warning to a customer for a first-time violation. Any subsequent violations are subject to a fine of \$500.00 to \$2,000.00. Additionally, the director may monitor the water account of any customer who has been convicted of a violation of [section 47-253](#). Daily monitoring may continue through the end of the existing water shortage period. The director may turn off city water if a customer has violated the authorized water use during a stage three water shortage on three separate instances within a 30-day period. Water service may be reinstated to a customer after a termination only upon a) payment of all applicable fines and any outstanding water service charges; and b) agreeing to the maximum rate in existence, regardless of the customer's billing rate class, for all future water service provided during the 12 months immediately following the termination and filing such agreement in writing with the department.

(3) **Violations of stage four water shortage** are subject to fines of \$1,000.00 to \$2,000.00. Additionally, all customers exceeding the allowed water usage during a stage four water shortage by ten percent or more shall pay a 20 percent surcharge for the current and two subsequent billing periods. The director may also turn off city water if a customer has exceeded the authorized water use during a stage four water shortage on three separate instances within a 30-day period. Water service may be reinstated to a customer after termination only upon a) payment of all applicable fines and any outstanding water service charges; and b) agreeing to the maximum rate in existence, regardless of the customer's billing rate class, for all future water service provided during the 12

months immediately following the termination and filing such agreement in writing with the department.

In the event that a customer with a water service contract engages in the unauthorized use of city water, the city shall have the right to pursue any and all rights and remedies allowed under existing contracts with customers, and any and all remedies allowed under Texas law.

Section 7 Exemptions or Variances

The utility official may grant in writing a temporary variance for an otherwise prohibited water use if the utility official determines that:

- (1) Failure to grant the variance would cause an emergency condition immediately threatening the life, safety, welfare, or fire protection of the public, the person requesting the variance, or the environment; or
- (2) The applicant cannot comply with the prohibition for technical reasons; or
- (3) The applicant agrees to implement alternative methods that will achieve the same or a greater level of reduction in water use.

An application for a variance shall be made in writing with the utility official and shall include the following:

- (1) Name and address of the applicant;
- (2) Purpose of water use;
- (3) Specific provision(s) of this article from which the applicant is requesting relief;

(4) A detailed statement as to how the specific provision(s) of this article adversely affects the applicant or what damage or harm will occur to the applicant or others if the applicant complies with this article;

(5) Description of the relief requested;

(6) Period of time for which the variance is sought;

(7) Alternative water use restrictions or other measures the applicant is taking or proposes to take to conform to the provisions of this article and the compliance date; and

(8) Other pertinent information reasonably required by the utility official to determine whether the criteria of subsection (a) have been met.

No variance shall be retroactive or otherwise justify any violation of the prohibitions hereunder occurring prior to the issuance of the variance. A variance is valid for only the declared water shortage period in existence at the time of issuance and shall expire at the conclusion of the existing water shortage period. If the conclusion of the existing water shortage period is immediately followed by a newly declared water shortage period, consisting of either more or less threatening conditions, a new application for a variance must be filed in accordance with subsection (b) of this section. Notwithstanding the foregoing, a variance may be applied retroactively if issued to a residential customer who is a member of a family consisting of five or more persons living in a single residential unit served by a single water meter.

Section 8 Response Stages

STAGE I – ABNORMAL CONDITIONS (VOLUNATARY):

Target: Achieve a FIVE percent reduction in OVERALL water use.

Stage I will begin:

When the director finds that the city's water supply system is under stress because of lower than average annual rainfall, temperatures that are higher or lower than normal, or other circumstances.

Stage I will end:

When the director finds that the abnormal conditions leading to the declaration either no longer exist, have been mitigated, or have been escalated, and the director files a written declaration to that effect with the city secretary.

Utility Measures:

The director's declaration, which may cover all or a portion of the city's water supply system, shall be in writing and filed with the city secretary. City departments' water use reduction plans shall be implemented immediately upon the declaration of a stage one water shortage period and shall remain in effect until the conclusion of the water shortage period.

Voluntary Water Use Restrictions:

Unless otherwise stated in the declaration, all customers are requested to take the following voluntary water use restriction measures:

- (1) Check for and repair all leaks, dripping faucets, and running toilets;
- (2) Check for and correct excessive irrigation or uncorrected leaks that result in city water leaving the customer's property by drainage onto adjacent properties or public or private roadways or streets or gutters; and
- (3) Irrigate between 7:00 p.m. and 5:00 a.m. of the following day on no more than two days per week in conformity with the following schedule:
 - a. Sundays and Thursdays for single-family residential customers with even-numbered street addresses; and
 - b. Saturdays and Wednesdays for single-family residential customers with odd-numbered street addresses; and
 - c. Tuesdays and Fridays for all other customers.

STAGE II - SEVERE CONDITIONS (MANDATORY):

Target: Achieve a TEN percent reduction in OVERALL water use.

The City of Houston will implement Stage II when, upon the recommendation of the director of the Public Works and Engineering Department, the mayor declares a stage two water shortage upon finding that one or more of the following conditions exist that may impact all or a portion of the city's water supply system:

Triggers:

- (1) Combined total storage of surface water supply is less than 24 months,

based on a calculated projection of monthly production of city water that includes historic production and information provided by customers;

- (2) Combined total storage of surface water supply is less than 16 months, based on a calculated projection of current water production for the most recent 24-hour period;
- (3) Current water production is 80 percent of the available treatment capacity;
- (4) Loss of approximately 20 percent of available treatment capacity; or
- (5) Water pressure readings of 45 pounds per square inch or less throughout all or material portions of the city's treated water distribution system.

Upon initiation and termination of Stage II, the City of Houston will mail a public announcement to its customers. Notice to TCEQ required.

Requirements for Termination:

A stage two water shortage ends when the mayor declares, based on the recommendation from the director that the severe conditions leading to the declaration either no longer exist, have been mitigated, or have been escalated, and the director files a written declaration to that effect with the city secretary.

Utility Measures:

City departments' water use reduction plans shall be implemented immediately upon the declaration of a stage four water shortage period and shall remain in effect until the conclusion of the water shortage period.

The second water source for City of Houston is: (check one)

- Inter-connection with other system

- Purchased water

- Other: Groundwater

Mandatory Water Use Restrictions:

During a stage two water shortage, unless otherwise stated in the declaration, all classes of customers are subject to mandatory restrictions of outdoor use. During a stage two water shortage, outdoor use shall be unlawful with the exception of the following time periods as specified in the declaration:

- (1) Between 7:00 p.m. and 5:00 a.m. of the following day on no more than two days per week in conformity with the following schedule:
 - a. Sundays and Thursdays for single-family residential customers with even-numbered street addresses; and
 - b. Saturdays and Wednesdays for single-family residential customers with odd-numbered street addresses; and
 - c. Tuesdays and Fridays for all other customers; or
- (2) Between 7:00 p.m. and 5:00 a.m. of the following day on no more than one day per week in conformity with the following schedule:
 - a. Saturdays for single-family residential customers with odd-numbered addresses;
 - b. Sundays for single-family residential customers with even-numbered addresses; and
 - c. Tuesdays for all other customers.

Any outdoor water use that results in city water leaving the customer's property by drainage onto adjacent properties or public or private roadways or streets or gutters shall be unlawful.

STAGE III – EXTREME CONDITIONS (MANDATORY):

Target: Achieve a TWENTY percent reduction in OVERALL water use.

Triggers:

The water utility will implement Stage III when any one of the selected triggers is reached that may impact all or a portion of the city's water supply system:

- (1) Combined total storage of surface water supply is less than 18 months based on a calculated projection of monthly production of city water that includes historic production and information provided by customers;
- (2) Combined total storage of surface water supply is less than 12 months, based on a calculated projection of current water production for the most recent 24-hour period;
- (3) Current water production is 85 percent of the available treatment capacity;
- (4) Loss of approximately 25 percent of available treatment capacity; or
- (5) Water pressure readings of 40 pounds per square inch or less throughout all or material portions of the city's treated water distribution system.

Upon initiation and termination of Stage III, the City of Houston will mail a public announcement to its customers. Notice to TCEQ required.

Requirements for Termination:

A stage three water shortage ends when, upon the recommendations of the director and the mayor, the city council finds that the extreme conditions leading to the declaration either no longer exist, have been mitigated, or have been escalated, and the city council files a written declaration to that effect with the city secretary.

Utility Measures:

City departments' water use reduction plans shall be implemented immediately upon the declaration of a stage four water shortage period and shall remain in effect until the conclusion of the water shortage period.

Mandatory Water Use Restrictions:

During a stage three water shortage, all outdoor use shall be unlawful except that customers may use city water to continue production and protect inventory of their primary business products.

STAGE IV – EXCEPTIONAL CONDITIONS (MANDATORY):

Target: Achieve a THIRTY FIVE percent reduction in OVERALL water use.

Triggers:

The water utility will implement Stage IV when any one of the selected triggers is reached that may impact all or a portion of the city's water supply system:

- (1) Combined total storage of surface water supply is less than 12 months, based on a calculated projection of monthly production of city water that includes historic production and information provided by customers;
- (2) Combined total storage of surface water supply is less than six months, based on a calculated projection of current water production for the most recent 24-hour period;
- (3) Current water production is 90 percent of the available treatment capacity;
or
- (4) Water pressure readings of 35 pounds per square inch or less throughout

all or material portions of the city's treated water distribution system.

Upon initiation and termination of Stage IV, the City of Houston will mail a public announcement to its customers. Notice to TCEQ required.

Requirements for Termination:

A stage four water shortage ends when, upon the recommendations of the director and the mayor, the city council finds that the exceptional conditions leading to the declaration either no longer exist or have been mitigated, and the city council files a written declaration to that effect with the city secretary.

Operational Measures:

City departments' water use reduction plans shall be implemented immediately upon the declaration of a stage four water shortage period and shall remain in effect until the conclusion of the water shortage period.

Mandatory Water Use Restrictions:

During a stage four water shortage, the following acts or omissions shall be unlawful:

- (1) All outdoor use;
- (2) Use of more than 4,000 gallons of city water per month by single-family residential customers;
- (3) Use of more than 4,000 gallons of city water per month (used per unit, as provided in [section 47-71](#) of City of Houston Code of Ordinance) by multifamily residential customers; and

- (4) For all customers other than residential customers, failure to reduce use of city water by 15 percent of baseline usage, or any other percentage if recommended by the director and adopted by city council in the stage four water shortage declaration.

During a stage four water shortage, the director may authorize a ten percent rate reduction for water usage to customers for reductions of city water use by 20 percent or more than those restrictions set forth in subsection (d), except that the ten percent rate reduction shall not be available to customers whose average monthly usage during the preceding 12-month period was less than 4,000 gallons. The rate reduction for water usage shall be effective for the duration of the existing water shortage period.

Immediately upon the declaration of a stage four water shortage, the city may claim force majeure to all of its existing water service contracts consistent with the terms of such water service contracts and in accordance with applicable state law.

SYSTEM OUTAGE or SUPPLY CONTAMINATION

The City of Houston will notify the TCEQ Regional Office as soon as communication can be established.