



City of Houston

## WATER AND WASTEWATER COST OF SERVICE RATE STUDY

FINAL | June 2021

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# EXECUTIVE SUMMARY

## ES.1 Introduction

The City of Houston, Texas (City), provides water and wastewater service to nearly 500,000 customer accounts through its water and wastewater utility, the Combined Utility System (CUS) or “Houston Water,” as it is called throughout this report. Houston Water is financially self-sufficient, with funding for operating and capital requirements derived primarily from user charge revenues, impact fees, and other miscellaneous charges. This executive summary documents the results of the cost of service rate study and recommends water and wastewater rates that are appropriate to meet Houston Water’s funding needs and achieve pricing objectives.

Following a competitive proposal process, the City hired Carollo Engineers (Carollo) to complete a comprehensive study to update water and wastewater rates and impact fees, as well as miscellaneous fees charged by Customer Account Services (CAS) and the Houston Permitting Center (HPC), to support the utility. The findings and recommendations of the impact fee update and the miscellaneous fees update are summarized in separate reports.

The objectives of the cost of service rate study were to:

- Fund water and wastewater revenue requirements through fiscal year ending (FYE) 2026,
- Determine cost of service by customer type, and
- Develop fair and equitable water and wastewater rates.

## ES.2 Resilient Houston

Resilient Houston provides a framework for action that works to protect Houston against future disasters and to build a more resilient City. Part of this strategy is to protect the integrity of the City’s Water and Wastewater system through unforeseen disasters. Hurricane Harvey and Winter Storm Uri are examples that tested the limits of the System’s capabilities. Through these events, we have learned that disasters come in all shapes and forms and that the System needs to be ready in various circumstances. In order to align with the strategy and goals of Resilient Houston, Houston Water has taken into consideration what it would take to get us there. This means proactively responding to the needs of the aging water and wastewater infrastructure, increasing backups that support drinking water and wastewater plants, and identifying the vulnerabilities in the entire system and strengthening them. In order to respond to these needs Houston Water has built into this Rate Study the costs that are required to take steps towards a more Resilient Houston Water.

## ES.3 Background and System Overview

Houston Water’s mission is to protect public health, protect the environment, and provide superior customer service. The utility serves approximately 2.2 million customers across a service area of more than 600 square miles and an additional 2.4 million contract and wholesale customers outside the city limits. Houston Water must generate sufficient revenues to fully fund revenue requirements, maintain appropriate cash balances, and meet all requirements of the Master Ordinance, including adequate debt service coverage. Ordinance No. 2004-299, Houston Water’s “Master Ordinance,” provides for the issuance of Houston Water revenue obligations and contains restrictions and covenants regarding the issuance of Houston Water debt, to be issued pursuant to supplemental ordinances. The City completes a cost of service rate study at least every five years to update water and wastewater rates to continue to meet its financial goals.

Houston Water's Drinking Water Operations (DWO) Branch operates and maintains three water purification plants and 51 groundwater plants, in addition to an extensive transmission and distribution system. The Wastewater Operations (WWO) Branch operates and maintains 39 wastewater treatment plants and the collection system, including 381 lift stations and 6,200 miles of sanitary sewer lines.

## ES.4 Cost of Service Approach

The cost of service rate study provides a rational basis for distributing the costs of the City's water and wastewater systems to each customer type, including wholesale and contract customers, in proportion to the demands they place on the systems. Figure ES.1 provides an overview of the study process and the questions answered at each step.

The revenue requirements analysis prepared a financial plan for each system to determine the revenue increases needed for each to support itself while also considering key metrics of the combined utility system. A detailed cost allocation was developed for both the water and wastewater systems based on the unique attributes of each system to determine the portion of total revenue requirements that should be recovered from each customer type. Finally, recommendations were made to improve the equity and ease of understanding of the existing rate structure and rates were calculated to recover sufficient revenue from each customer type.

The rates presented within this report adhere to cost of service principles, as well as industry standards set by the American Water Works Association (AWWA) and the Water Environment Federation (WEF). The City should continue to perform a cost of service study at least every five years so that revenues from rates adequately fund utility operations, maintenance, and ongoing capital needs, and equitably recover costs from system users.

### ES.4.1 Assumptions

The study incorporated the key assumptions below into the analysis. Changes in these assumptions could have a material effect on study findings and recommendations.

- An automatic adjustment of 1.5 percent was implemented on April 1, 2021.
- With the exception of the initial adjustment recommended in this report, which will go into effect on July 1, 2021, all recommended adjustments will be implemented on April 1 of each year.
- Houston Water will use commercial paper to finance capital projects. Commercial paper debt is converted to first lien bonds, which are assumed to have a 30-year term and 5 percent interest rate.
- The target debt service coverage ratio (DSCR) is 1.4x for first lien and junior lien combined. DSCR is evaluated for the combined water and wastewater utility. However, because the wastewater utility's projected FYE 2021 DSCR is well below the 1.4x target, the analysis allows the wastewater DSCR to transition to the full target in the first two years as long as the wastewater DSCR is at least 1.3x and the combined utility DSCR is at least 1.4x.

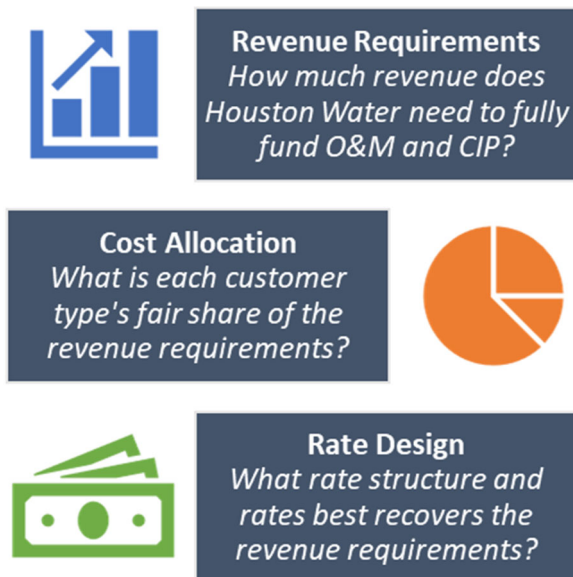


Figure ES.1 Cost of Service Rate Study Process

- The target for Pay-As-You-Go (PAYGO) or cash funding of capital projects is 20.0 percent of the annual Capital Improvement Plan (CIP) up to a maximum of \$200 million for the combined utility.
- Annual interest earnings on cash balances is 1.0 percent.
- The number of accounts increases by 0.2 percent per year.
- The minimum cash balance is 300 days of operating and maintenance (O&M) expense. This is calculated by dividing the ending cash balance by the annual O&M expenses.
- For the purpose of developing cost of service rate recommendations, costs are not escalated for inflation or growth, as Carollo understands that an automatic adjustment to Houston Water's rates and charges based on inflationary indices occurs annually in accordance with the Master Ordinance and Ordinance 2010-305.
- The analysis includes a bad debt allowance of 2.0 percent.
- Water and wastewater impact fees will increase to 25.0 percent and 35.0 percent, respectively, of the fees as calculated in the 2020 impact fee update, effective on July 1, 2021. Subsequent increases equal to the regional Producer Price Index (PPI) will take effect on July 1 of each year. An additional 5.0 percent will be added to the PPI increase for the water impact fee in 2023 and 2025 so that the ratio of the adopted fee to the calculated fee is the same for water and wastewater.

#### ES.4.2 Customer Demand Analyses

Carollo analyzed FYE 2019 customer billing data to understand how different types of customers use the water and wastewater systems. This analysis drives the allocation of costs to improve equity among customers. Figure ES.2 illustrates the findings of this analysis for single family residential, multifamily residential, and commercial customers, although the full analysis included all retail and wholesale customers. Additional detail from the customer demand analysis is provided in Appendix F.

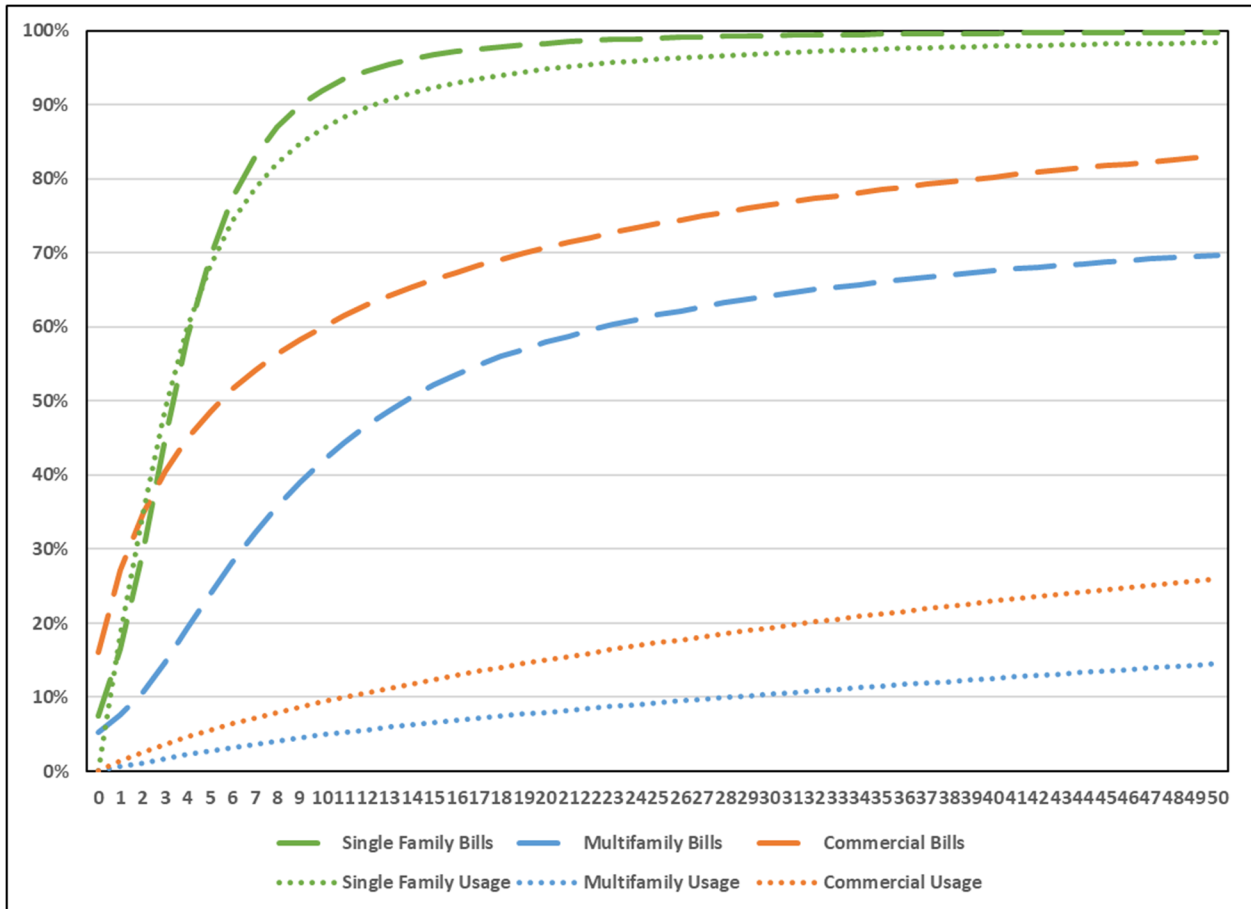


Figure ES.2 Bill Frequency and Usage Analysis

### ES.5 Revenue Requirements Analysis

The purpose of the Revenue Requirements Analysis is to determine the adequate and appropriate funding for the Utility. Revenue requirements are the summation of expenses or costs for providing safe drinking water and handling wastewater to return clean water to the environment. They are determined on an annual basis, and they include:

- **Operations & Maintenance** – salaries and benefits, chemicals, power, vehicles, equipment, supplies, etc. Some costs vary by the volume of treatment such as chemicals and power, but other costs are fixed and independent of volume such as salaries and vehicles.
- **Capital Improvements** – design and construction of new and replacement infrastructure, including labor for Houston Water employees and fees for consultants and contractors that perform this work.
- **Financing** – debt service payments, bond issuance costs, commercial paper fees, etc.

In addition to expenses, most debt instruments (bonds and loans) require the utility to keep a certain amount of cash in reserve dependent upon the amount of the debt. This cash reserve is restricted and cannot be used to pay for the Utility’s expenses.

### ES.5.1 Water System

The study analyzed the revenue requirements to test the fiscal health of the water system, evaluate the adequacy of current rates and charges, and set the basis for the five-year rate plan. The revenue requirement analysis covers the study period FYE 2021 through FYE 2030 with the primary focus for rate setting given to the five years, FYE 2022 through FYE 2026, of the study period as Houston Water has approved an automatic rate increase of 1.5 percent planned for FYE 2021. Carollo recommends Houston Water increase water rate revenue according to the following schedule:

July 1, 2021	9.0 percent	April 1, 2024	6.0 percent
April 1, 2022	7.5 percent	April 1, 2025	6.0 percent
April 1, 2023	7.5 percent	April 1, 2026	6.0 percent

### ES.5.2 Wastewater System

The study analyzed the revenue requirements to test the fiscal health of the wastewater system, evaluate the adequacy of current rates and charges, and set the basis for the five-year rate plan. Like for water, the wastewater revenue requirement analysis covers the study period FYE 2021 through FYE 2030 with the primary focus for rate setting given to the five years, FYE 2022 through FYE 2026, of the study period as Houston Water approved an automatic rate increase of 1.5 percent planned for FYE 2021. Carollo recommends Houston Water increase wastewater rate revenue according to the following schedule:

July 1, 2021	20.0 percent	April 1, 2024	6.0 percent
April 1, 2022	18.5 percent	April 1, 2025	6.0 percent
April 1, 2023	6.0 percent	April 1, 2026	4.5 percent

These recommended increases for both water and wastewater are necessary to fund operational and capital needs, as well as to meet debt service obligations associated with the CIP.

Table ES.1 summarizes key elements of the revenue requirements for the water and wastewater systems, including recommended revenue increases.

Table ES.1 Revenue Requirements for Water and Wastewater Systems (\$ millions) <sup>(1)</sup>

Description	FYE 2021	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	April 2021	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026
<b>Water System:</b>							
Recommended Revenue Increase	1.5%	9.0%	7.5%	7.5%	6.0%	6.0%	6.0%
Water Sales with Increase <sup>(2)</sup>	\$601.0	\$662.4	\$675.2	\$725.8	\$777.3	\$823.9	\$873.4
Impact Fee Revenue	9.9	20.6		21.4	26.7	27.7	33.6
O&M Expenses	291.3	294.7		297.8	304.0	308.2	322.2
Capital Improvements	483.4	673.3		541.6	526.2	772.6	763.8
<b>Annualized Revenue Requirement <sup>(3)</sup></b>	<b>\$607.7</b>	<b>\$662.4</b>	<b>\$712.1</b>	<b>\$765.5</b>	<b>\$811.4</b>	<b>\$860.1</b>	<b>\$911.7</b>



Description	FYE 2021	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
<i>Month of Adjustment</i>	<i>April 2021</i>	<i>July 2021</i>	<i>April 2022</i>	<i>April 2023</i>	<i>April 2024</i>	<i>April 2025</i>	<i>April 2026</i>
<b>Wastewater System:</b>							
Recommended Revenue Increase	1.5%	20.0%	18.5%	6.0%	6.0%	6.0%	4.5%
Wastewater Sales with Increase <sup>(2)</sup>	\$517.7	\$628.1	\$658.0	\$755.8	\$801.1	\$849.2	\$896.7
Impact Fee Revenue	15.1	20.6		21.2	22.0	22.7	23.5
O&M Expenses	286.3	290.6		290.6	290.6	290.7	290.7
Capital Improvements	429.7	542.4		567.4	592.3	568.2	477.4
<b>Annualized Revenue Requirement<sup>(3)</sup></b>	<b>\$523.4</b>	<b>\$628.1</b>	<b>\$744.3</b>	<b>\$789.0</b>	<b>\$836.3</b>	<b>\$886.5</b>	<b>\$926.4</b>

Notes:

- (1) Values are in million dollars, unless otherwise noted, and are rounded.
- (2) Projected annual rate revenue, including recommended revenue increase and all previous recommended revenue increases.
- (3) Annualized revenue requirement represents the projected revenue if the recommended increase, as well as all previous recommended increases, is in effect for the full 12-month period.

### ES.5.3 Combined Utility System

Although the study analyzed the water and wastewater systems separately, Houston Water’s financial performance is measured as a combined utility. The two primary indicators of the utility’s financial health are the DSCR and the number of days of O&M expenses that can be supported by the cash balance.

Many water and wastewater utilities use revenue bonds to fund a portion of their capital expenses. The DSCR test measures the ability of a utility to meet both legal and target revenue obligations associated with debt. To ensure that Houston Water retains financial flexibility for contingencies and is able to operate in accordance with sound business principles, it targets higher standards than the Master Ordinance minimum DSCR requirements of 1.20x for first lien debt and 1.00x for total debt. The utility’s target DSCR for first lien and junior lien combined is 1.40x, and the target DSCR for total debt is 1.20x. Carollo recommends Houston Water continue to target 1.40x DSCR for first lien and junior lien but not drop below 1.30x.

The utility’s cash balance indicates its ability to financially sustain operations during unforeseen circumstances that may restrict its revenues. This is especially important for a utility like Houston Water that is prone to extreme weather events. Houston Water’s minimum cash balance is equal to 300 days of O&M expenses.

Table ES.2 summarizes the revenue requirements for the combined system, including cash and DSCR.



Table ES.2 Combined Utility System Revenue Requirements (\$ millions) <sup>(1)</sup>

Description	FYE 2021 <sup>(2)</sup>	FYE 2022 <sup>(3)</sup>	FYE 2023	FYE 2024	FYE 2025	FYE 2026
<b>Expenses:</b>						
O&M Expenses	\$577.6	\$585.2	\$588.4	\$594.6	\$598.8	\$612.9
Jr./1st Debt Service	542.2	621.9	703.3	775.7	853.7	918.9
Other Debt Service	39.9	43.5	45.1	47.5	49.5	50.5
Cash-funded CIP	0.0	200.0	200.0	200.0	200.0	200.0
<b>Total Expenses</b>	<b>\$1,159.7</b>	<b>\$1,450.6</b>	<b>\$1,536.8</b>	<b>\$1,617.8</b>	<b>\$1,702.0</b>	<b>\$1,782.3</b>
Plus: Required Debt Coverage <sup>(4)</sup>	146.5	178.8	190.5	150.8	125.0	111.1
Plus: Required Cash <sup>(5)</sup>	474.7	481.0	483.6	488.7	492.2	503.8
<b>Required Revenue + Cash</b>	<b>\$1,780.9</b>	<b>\$2,110.4</b>	<b>\$2,210.9</b>	<b>\$2,257.4</b>	<b>\$2,319.2</b>	<b>\$2,397.2</b>
Less: Cash Balance	(931.6)	(790.1)	(707.8)	(645.5)	(594.0)	(564.2)
Less: Impact Fee Revenue	(25.0)	(41.2)	(42.7)	(48.7)	(50.4)	(57.1)
Less: Other Non-Rate Revenue	(17.6)	(15.7)	(11.1)	(9.3)	(7.7)	(6.2)
Less: Rate Revenue (pre-increase)	(1,118.7)	(1,131.1)	(1,456.4)	(1,554.4)	(1,647.7)	(1,746.6)
<b>Rate Revenue (Surplus)/Deficit</b>	<b>(\$311.9)</b>	<b>\$132.3</b>	<b>(\$7.1)</b>	<b>(\$0.5)</b>	<b>\$19.4</b>	<b>\$23.1</b>
Recommended Increase <sup>(6)</sup>	---	28.8%	6.7%	6.0%	6.0%	5.2%
Additional Revenue	\$0.0	\$202.1	\$25.2	\$24.0	\$25.4	\$23.5
<b>First/Junior Lien DSCR</b>	<b>1.21 x</b>	<b>1.41 x</b>	<b>1.45 x</b>	<b>1.43 x</b>	<b>1.41 x</b>	<b>1.40 x</b>
<b>Cash (Days O&amp;M)</b>	<b>589</b>	<b>493</b>	<b>439</b>	<b>396</b>	<b>362</b>	<b>336</b>
Annualized Revenue Requirement <sup>(7)</sup>	\$1,131.1	\$1,456.4	\$1,554.4	\$1,647.7	\$1,746.6	\$1,838.1

## Notes:

- (1) Values are in million dollars, unless otherwise indicated, and are rounded.
- (2) FYE 2021 values are based on FYE 2021 budget.
- (3) FYE 2022 through FYE 2026 values are projected based on FYE 2021 budget.
- (4) Debt service coverage is a revenue requirement, but not a cash expense. This revenue may be used to pay for cash-funded CIP or debt service payments (not junior or first lien since the coverage shown is to cover these bonds). As such, the required debt coverage shown may be reduced from the full 40% of the junior/first debt service payment to avoid double-counting revenue requirements.
- (5) Required cash is equal to 300 days of O&M expenses.
- (6) Recommended increase shown for FYE 2022 includes the July 1, 2021, and the April 1, 2022, increases, as shown in Table ES.1.
- (7) Annualized revenue requirement represents the projected revenue if the recommended increase, as well as all previous recommended increases, is in effect for the full 12-month period.

Figure ES.3 shows the year-end cash balance from FYE 2019. Year-end balances for FYE 2022 through FYE 2026 are projected with and without the recommended revenue increases. These projections do not include inflationary cost increases or revenue associated with the annual automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.



Figure ES.3 Projected Cash Balance (Days of O&M)

Figure ES.4 shows the DSCR from FYE 2019. DSCRs for FYE 2022 through FYE 2026 are projected with and without the recommended revenue increases. These projections do not include inflationary cost increases or revenue associated with the annual automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

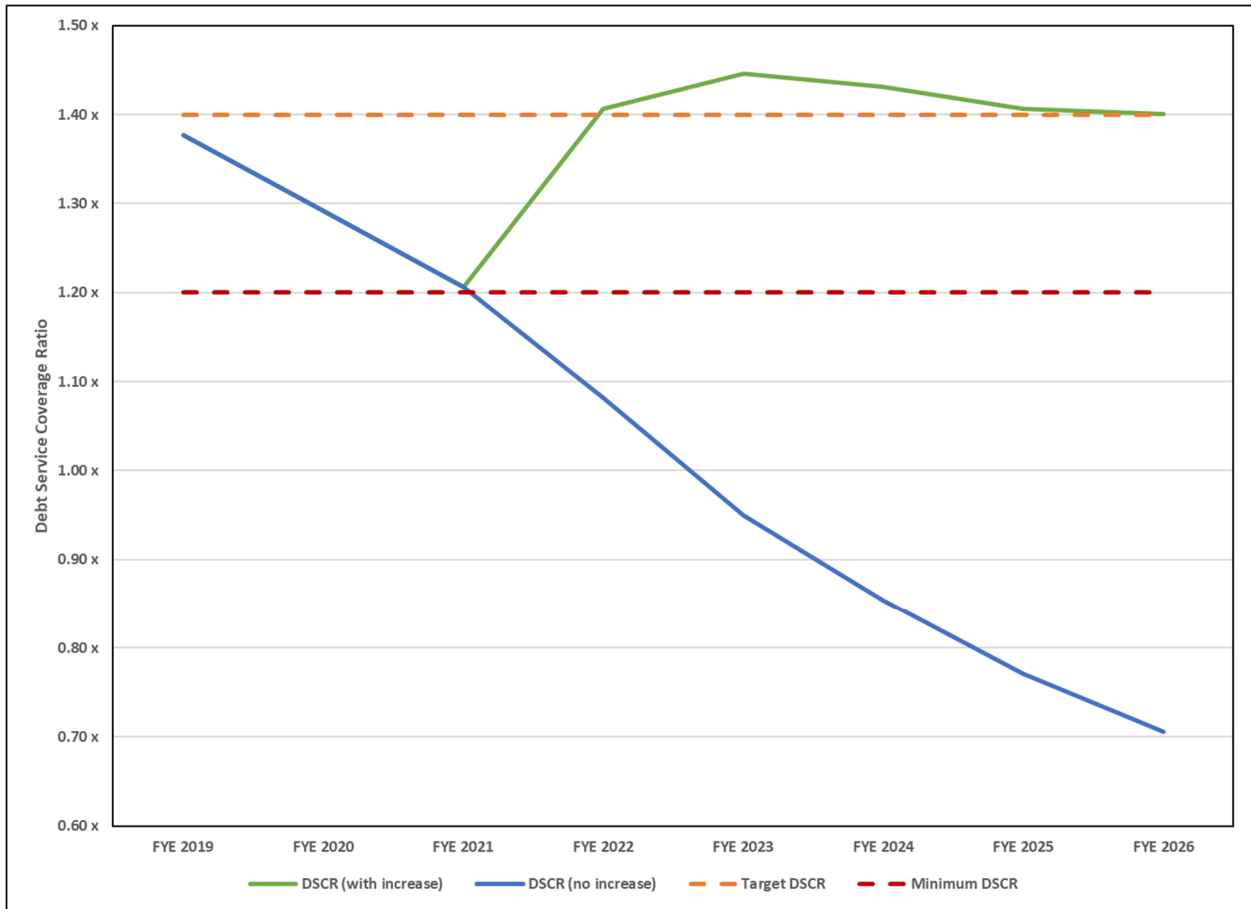


Figure ES.4 Projected Debt Service Coverage Ratio

## ES.6 Cost of Service Analysis

The cost of service analysis serves as a rational basis for distributing the full costs of Houston Water’s services to each customer type in proportion to the demands placed on the system. The analysis is typically completed in three steps:

1. Allocate costs to functional categories (e.g., water production, pumping, collection system).
2. Allocate functionalized costs to rate components:
  - a. Water – base, extra capacity, customer.
  - b. Wastewater – flow, loadings, customer.
3. Allocate costs to customer types using rate component unit costs.

The study followed this approach to develop a detailed cost allocation that serves as the basis for the proposed rate adjustments. This analysis yields an appropriate method for allocating costs, which could be sustained unless substantial changes in cost drivers or customer consumption patterns occur.

### ES.6.1 Water System

The cost of service analysis is consistent with the *AWWA M1 Manual Principles of Water Rates, Fees and Charges, Seventh Edition*, standard methods to allocate the revenue requirements among the various customer types based on their usage characteristics. Table ES.3 summarizes the results of the water cost of service analysis.

Table ES.3 Water System Cost of Service Results (\$ millions) <sup>(1)</sup>

Customer Type	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026
<b>Retail:</b>						
Single Family Residential	\$179.8	\$194.0	\$206.4	\$217.2	\$229.5	\$239.6
Multifamily Residential	153.5	165.7	177.0	187.3	199.3	209.4
Commercial/Industrial	184.1	198.9	212.9	225.4	239.8	251.9
Irrigation	19.7	21.3	22.8	24.1	25.6	26.9
Transient	5.3	5.7	6.1	6.5	6.9	7.3
Resale	0.1	0.1	0.1	0.1	0.1	0.1
Emergency Backup	0.8	0.9	0.9	1.0	1.1	1.1
Metered Fire	1.1	1.2	1.3	1.3	1.4	1.4
Unmetered Fire	9.3	10.0	10.5	10.9	11.3	11.6
<b>Wholesale:</b>						
Contract Treated with Airgap	32.2	34.8	36.7	38.8	41.2	43.3
Contract Treated without Airgap	4.4	4.8	5.1	5.3	5.7	6.0
GRP Participants	13.2	14.3	22.1	23.3	24.8	26.1
Contract Water – Untreated	21.5	23.0	23.4	23.4	23.1	22.6
Contract Treated – SEWPP Co-participants	15.4	15.4	15.4	15.4	15.4	15.4
Contract Treated – EWPP Water Authorities	9.6	9.6	9.6	9.6	9.6	9.6
Contract Treated – NEWPP Water Authorities	12.6	12.6	15.3	21.7	25.2	39.5
<b>Total Revenue Requirements</b>	<b>\$662.4</b>	<b>\$712.1</b>	<b>\$765.5</b>	<b>\$811.4</b>	<b>\$860.1</b>	<b>\$911.7</b>

Note:

(1) Values are in million dollars and are rounded.

### ES.6.2 Wastewater System

The cost-of-service analysis is consistent with the WEF *Manual of Practice No. 27, Financing and Charges for Wastewater Systems*, standard methods to allocate the revenue requirements among the various customer types based on their wastewater contributions. The results of the wastewater cost of service analysis are summarized in Table ES.4.

Table ES.4 Wastewater System Cost of Service Results (\$ millions) <sup>(1)</sup>

Customer Type	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
<i>Month of Adjustment</i>	<i>July 2021</i>	<i>April 2022</i>	<i>April 2023</i>	<i>April 2024</i>	<i>April 2025</i>	<i>April 2026</i>
<b>Retail:</b>						
Single Family Residential	\$212.8	\$251.8	\$265.7	\$280.6	\$296.8	\$309.7
Multifamily Residential	210.2	249.3	265.2	281.9	299.2	313.1
Commercial	170.2	201.9	214.7	228.1	242.1	253.3
Industrial Surcharge	28.4	33.7	35.6	37.7	39.9	41.7
Sewer Only (Unmetered)	0.5	0.6	0.6	0.6	0.6	0.7
<b>Wholesale:</b>						
Capital without Collection System	3.9	4.6	4.6	4.6	4.8	4.9
No Capital with Collection System	1.8	2.1	2.2	2.3	2.5	2.6
Connection-based	0.3	0.4	0.4	0.4	0.4	0.4
<b>Total Revenue Requirements</b>	<b>\$628.1</b>	<b>\$744.3</b>	<b>\$789.0</b>	<b>\$836.3</b>	<b>\$886.5</b>	<b>\$926.4</b>

Note:

(1) Values are in million dollars and are rounded.

## ES.7 Rate Design

Carollo worked with Houston Water staff to analyze various adjustments with the goals of simplifying the water and wastewater rate structures and improving equity and understanding among customers. The allocated revenue requirements serve as the basis for the rate design, although some accommodations were made to improve affordability, especially as the proposed rates transition toward cost-of-service. Existing rates shown are FYE 2021 rates, which went into effect on April 1, 2021.

### ES.7.1 Water System

The water rate design analysis determines rates required to achieve cost recovery, proportionately for each customer. Houston Water's existing rate structure consists of two components: a volumetric rate (variable) and a monthly meter charge (fixed). The volumetric component is assessed based on metered water usage per 1,000 gallons (kgal) and, by design, is intended to recover the cost incurred for delivering each unit of water. The monthly meter charge is intended to recognize that the utility incurs fixed costs to provide the availability of water service, which must be recovered independent of monthly water demands and consumption.

#### ES.7.1.1 Monthly Meter Charge

By design, the monthly meter charge includes a customer component and a capacity component based on meter size. The customer component recovers expenses associated with billing, collection, and customer service. This component is the same for all customers regardless of meter size. The capacity component captures maintenance costs related to meters and services, as well as a portion of the water system capital costs. This component varies based on meter size to reflect the difference in potential demand that can be placed on the system by different sized meters. The capacity charge is then added to the customer unit cost to calculate the total monthly meter charge.

In addition to the monthly meter charge, the study recommends a second fixed monthly charge, which would be assessed per connection, to equitably recover the annual fee paid to the Texas Commission on Environmental Quality (TCEQ).

*Residential, Commercial, Industrial, Irrigation, and Emergency Backup Customers*

Table ES.5 shows the existing monthly meter charges, which vary by customer type and meter size.

Table ES.5 Existing Water Monthly Meter Charges by Customer Type

Meter Size	SFR	MFR	Com/Ind	Irrigation	Emergency
5/8"	\$5.82	\$6.05	\$6.05	\$30.10	\$8.68
3/4"	5.82	6.24	6.24	30.10	8.68
1"	7.21	7.50	7.50	33.74	12.34
1½"	10.92	11.35	11.35	89.57	18.20
2"	12.86	13.36	13.36	138.44	24.22
3"	12.86	35.35	35.35	300.56	50.73
4"	---	48.19	48.19	508.83	80.53
6"	---	82.59	82.59	1,047.84	155.57
8"	---	215.64	215.64	1,515.30	230.44
10"	---	215.64	215.64	1,515.30	238.54

Notes:

- (1) SFR is Single Family Residential
- (2) MFR is Multifamily Residential

Table ES.6 summarizes the proposed monthly meter charges for July 1, 2021, which vary by meter size, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305. Carollo recommends charging the same monthly meter charge for single family and multifamily residential, commercial/industrial, irrigation, and emergency backup rather than varying them by customer type.

Table ES.6 Proposed Water Monthly Meter Charges and Future Adjustments

Meter Size	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026
<i>Month of Adjustment</i>	<i>Charges</i>		<i>Future Adjustments</i>			
5/8"	\$6.25	+\$0.32	+\$0.25	+\$0.14	+\$0.11	+\$0.03
3/4"	6.25	+0.32	+0.25	+0.14	+0.11	+0.03
1"	8.80	+0.41	+0.39	+0.24	+0.21	+0.11
1½"	12.43	+0.54	+0.60	+0.39	+0.36	+0.20
2"	14.61	+0.62	+0.73	+0.47	+0.45	+0.26
3"	32.76	+1.29	+1.77	+1.18	+1.20	+0.77
4"	63.27	+2.40	+3.52	+2.38	+2.46	+1.62
6"	147.88	+5.50	+8.36	+5.71	+5.95	+3.97
8"	184.20	+6.83	+10.44	+7.13	+7.45	+4.98
10"	244.84	+9.05	+13.91	+9.52	+9.95	+6.67
12"	341.44	+12.59	+19.44	+13.31	+13.94	+9.35
TCEQ Fee per connection	0.21	+0.00	+0.00	+0.00	+0.00	+0.00

Note:

- (1) Monthly meter charges and adjustments shown are proposed for single family residential, multifamily residential, commercial/industrial, irrigation, and emergency backup customers.

*Transient, Resale, and Fire Customers.* Houston Water has several other customer types receiving water service, and these customers are charged different monthly meter charges based on customer type and meter size. Table ES.7 shows existing and proposed July 1, 2021, monthly meter charges for these other customer types, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.7 Existing and Proposed Water Monthly Meter Charges and Future Adjustments – Transient, Resale, and Fire Customers

Meter Size	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026	April 2026
	Charges		Future Adjustments				
<b>Transient:</b>							
1"	\$20.17	\$95.00	+\$11.96	+\$10.33	+\$10.30	+\$10.28	+\$10.27
2"	26.90	185.00	+20.00	+20.00	+20.00	+20.00	+20.00
3"	33.62	460.00	+51.36	+50.24	+50.31	+50.37	+50.40
<b>Resale:</b>							
5/8" and 3/4"	\$22.83	\$24.05	+\$0.20	+\$0.10	+\$0.06	+\$0.02	+\$0.00
1"	26.47	39.00	+0.27	+0.13	+0.10	+0.07	+0.04
1½"	65.31	60.40	+0.31	+0.20	+0.16	+0.12	+0.11
2"	99.60	73.25	+0.33	+0.23	+0.20	+0.16	+0.15
3"	215.61	180.00	+0.83	+0.52	+0.49	+0.48	+0.46
4"	363.21	360.00	+1.00	+1.00	+1.00	+1.00	+1.00
6"	744.47	859.00	+1.76	+2.34	+2.40	+2.45	+2.49
8"	1,078.45	1,075.00	+0.25	+2.91	+3.00	+3.08	+3.13
<b>Metered Fire:</b>							
5/8"	\$6.05	\$4.70	+\$0.23	+\$0.12	+\$0.07	+\$0.03	+\$0.01
3/4"	6.24	4.70	+0.23	+0.12	+0.07	+0.03	+0.01
1"	7.50	6.15	+0.27	+0.17	+0.13	+0.08	+0.07
1½"	11.35	8.20	+0.35	+0.24	+0.20	+0.17	+0.14
2"	13.36	9.45	+0.38	+0.29	+0.24	+0.21	+0.19
3"	35.35	20.00	+0.48	+0.66	+0.62	+0.58	+0.58
4"	48.19	37.00	+1.37	+1.28	+1.25	+1.23	+1.21
6"	82.59	85.00	+3.00	+3.00	+3.00	+3.00	+3.00
8"	215.64	105.00	+4.30	+3.74	+3.75	+3.76	+3.77
10"	215.64	140.00	+4.87	+4.98	+5.00	+5.03	+5.05



Meter Size	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026	
	Charges		Future Adjustments				
<b>Unmetered Fire <sup>(1)</sup>:</b>							
5/8" and 3/4"	\$15.83	\$6.70	+\$0.21	+\$0.09	+\$0.05	+\$0.00	+\$0.00
1"	15.83	9.55	+0.23	+0.12	+0.09	+0.04	+0.02
1½"	63.05	13.60	+0.29	+0.17	+0.13	+0.10	+0.07
2"	93.00	16.05	+0.30	+0.20	+0.16	+0.13	+0.10
3"	93.00	36.00	+0.87	+0.45	+0.41	+0.38	+0.37
4"	93.00	70.00	+1.35	+0.86	+0.84	+0.81	+0.79
6"	103.59	165.00	+2.00	+2.00	+2.00	+2.00	+2.00
8"	176.82	205.00	+3.05	+2.49	+2.50	+2.51	+2.52
10"	238.53	275.00	+1.60	+3.31	+3.34	+3.36	+3.38
12"	238.53	380.00	+5.79	+4.61	+4.67	+4.73	+4.75

Note:

(1) Monthly meter charges and adjustments for unmetered fire customers are based on the size of the service line.

#### ES.7.1.2 Volume Rates

Variable volume rates include a base component, which represents the cost to meet the average day demand; a maximum day component, which represents the incremental cost to meet the maximum day demand; and a maximum hour component, which represents the incremental cost to meet the maximum hour demand. These costs are allocated to the different customer types based on the demands they place on the water system. The three allocated components are then summed and divided by the projected usage to calculate the average rate per 1,000 gallons for each customer type.

*Single Family Residential Customers.* The existing single-family residential rate structure is made up of rates that vary for each incremental 1,000 gallons for the first 6,000 gallons, increasing and decreasing as a customer uses more water. This results in large bill increases at specific usage intervals. Transitioning to a water conservation rate structure with rates for usage blocks that increase as a customer uses more water was a key focus of this study.

Table ES.8 shows existing and proposed July 1, 2021, single family residential water volume rates for the study period, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.8 Existing and Proposed Single Family Residential Water Volume Rates and Future Adjustments

Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026	
	Rates		Future Adjustments				
<b>Customers with usage up to 3,000 gallons per month:</b>							
First 1 kgal	\$0.16	\$1.00	+\$0.20	+\$0.15	+\$0.15	+\$0.15	+\$0.10
Next 1 kgal	7.65						
Next 1 kgal	0.45						

\* Single family residential customers who use 3,000 gallons or less per month receive a conservation credit.

Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment		July 2021	April 2022	April 2023	April 2024	April 2025	April 2026
		Rates		Future Adjustments			

**Customers with usage in excess of 3,000 gallons per month:**

First 1 kgal	\$0.16						
Next 1 kgal	7.65						
Next 1 kgal	0.45	\$5.50	+\$0.60	+\$0.50	+\$0.45	+\$0.50	+\$0.45
Next 1 kgal	12.56						
Next 1 kgal	5.29						
Next 1 kgal	5.29						
Next 6 kgal	5.74	8.00	+0.65	+0.55	+0.60	+0.60	+0.60
Next 8 kgal	9.46	11.00	+0.65	+0.55	+0.60	+0.60	+0.60
Over 20 kgal	9.46	15.00	+0.65	+0.55	+0.45	+0.45	+0.40

To calculate the monthly water bill, customers add the appropriate monthly meter charge derived from Table ES.5 (existing charges) or Table ES.6 (proposed charges) and add the volume rate for each incremental 1,000-gallon unit derived from Table ES.8. Table ES.9 shows existing and proposed July 1, 2021, monthly water bills for single family residential customers with usage up to 6,000 gallons in one month, as well as the incremental amount added to the bills each year as a result of the recommended adjustments.

Table ES.9 Existing and Proposed Single Family Residential Bills and Future Adjustments – Water Only

Billed Usage	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment		July 2021	April 2022	April 2023	April 2024	April 2025	April 2026
		Bills		Incremental Bill Amounts			
Meter Charge + TCEQ Fee	\$5.82	\$6.46	+\$0.32	+\$0.25	+\$0.14	+\$0.11	+\$0.03
1,000 gallons	5.98	7.46	+0.52	+0.40	+0.29	+0.26	+0.13
2,000 gallons	13.63	8.46	+0.72	+0.55	+0.44	+0.41	+0.23
3,000 gallons	14.08	9.46	+0.92	+0.70	+0.59	+0.56	+0.33
4,000 gallons	26.64	28.46	+2.72	+2.25	+1.94	+2.11	+1.83
5,000 gallons	31.93	33.96	+3.32	+2.75	+2.39	+2.61	+2.28
6,000 gallons	37.22	39.46	+3.92	+3.25	+2.84	+3.11	+2.73

Figure ES.5 illustrates the existing and proposed single family residential water rates and bills for the first 6,000 gallons in 1,000-gallon increments. The amounts shown in this figure do not include future automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

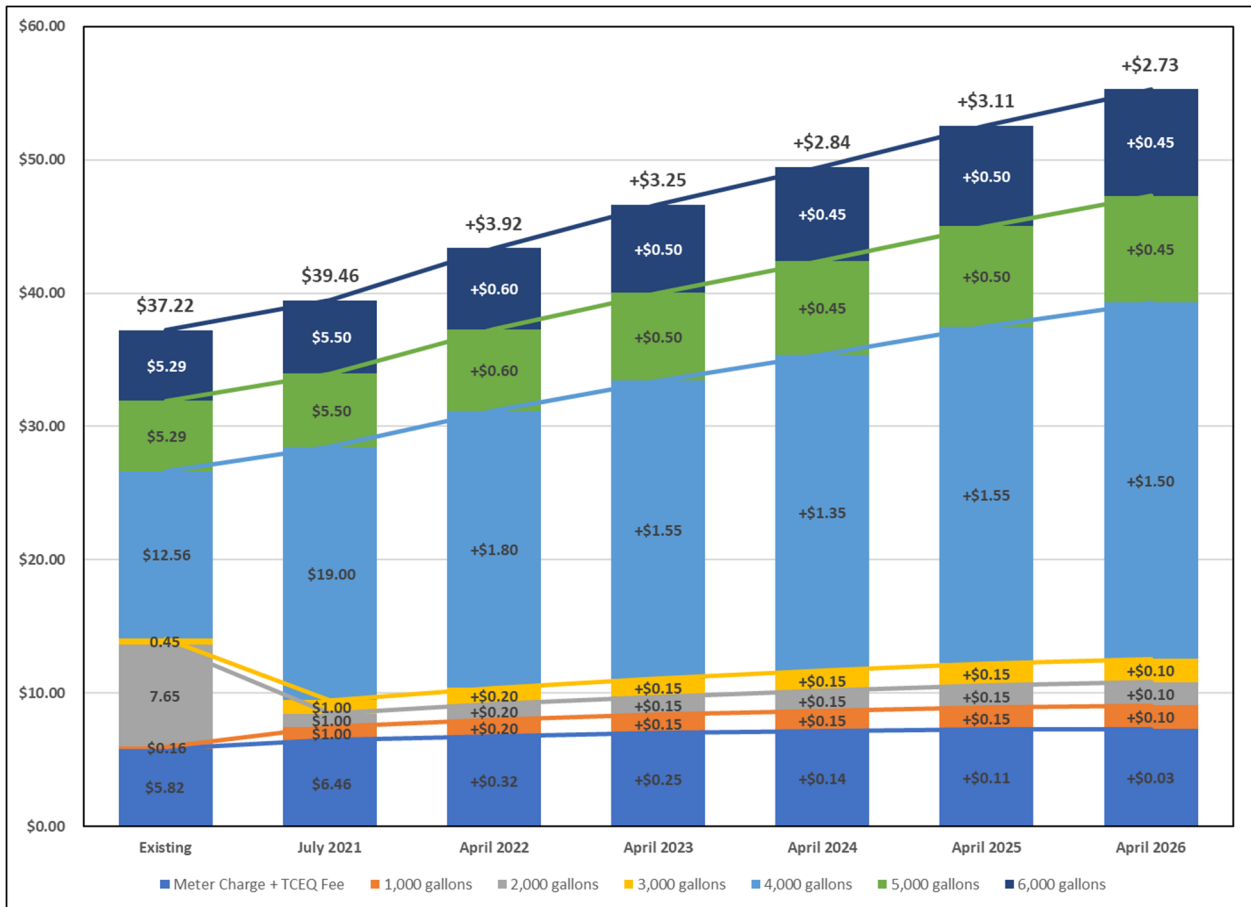


Figure ES.5 Existing and Proposed Single Family Residential Water Rates and Bills

*Other Retail Customer Types.* With the exception of irrigation customers, all other retail customer types pay a uniform rate per 1,000 gallons for all usage, which varies by customer type. Irrigation customers pay a reduced rate for a “defined quantity” of water that is set based on their meter size; all usage in excess of that amount is assessed a higher rate. Carollo recommends Houston Water continue to charge uniform rates for all retail customer types other than single family residential, including irrigation.

Table ES.10 shows existing and proposed July 1, 2021, volume rates for all retail customer types except single family residential, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.10 Existing and Proposed Retail Water Volume Rates and Future Adjustments

Customer Type	Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
			Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025
		Rates			Future Adjustments			
Multifamily Residential	All Usage	\$4.65	\$5.45	+\$0.49	+\$0.45	+\$0.40	+\$0.47	+\$0.38
Commercial/Industrial	All Usage	4.77	5.55	+0.60	+0.55	+0.50	+0.57	+0.47
Irrigation <sup>(1)</sup>	Block 1	3.50	---	---	---	---	---	---
	Block 2	8.06	---	---	---	---	---	---
	All Usage	---	10.00	+0.45	+0.42	+0.35	+0.44	+0.34
Transient	All Usage	5.35	10.00	+0.45	+0.42	+0.35	+0.44	+0.34
Resale	All Usage	5.73	10.00	+0.45	+0.42	+0.35	+0.44	+0.34
Emergency Backup	All Usage	8.85	10.00	+0.45	+0.42	+0.35	+0.44	+0.34
Metered Fire	All Usage	4.77	10.00	+0.45	+0.42	+0.35	+0.44	+0.34

Note:

(1) Irrigation customers with meters larger than 1 inch receive a “defined quantity” of water at a reduced Block 1 rate. The defined quantity is based on the meter size. Irrigation customers with 1-inch or smaller meters do not receive any water at the reduced Block 1 rate.

The study recommends maintaining the wholesale and contract customers’ rate structures. Contract Treated Water customers pay a uniform rate for all usage and an excess surcharge for all usage above their contract minimum volume. Groundwater Reduction Plan (GRP) customers’ rate is based on the Contract Treated Water – Airgap rate although it is reduced based on the required groundwater reduction for each Area. Areas 1 and 2 pay 80 percent of the Contract Treated rate, and Area 3 currently pays 30 percent, but that increases to 60 percent in FYE 2023. These rates, as well as the Contract Untreated rate, are shown for July 1, 2021, in Table ES.11, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.11 Existing and Proposed Wholesale Water Volume Rates and Future Adjustments

Customer Type	Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
			Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025
		Rates			Future Adjustments			
Contract w/Airgap	Minimum	\$3.31	\$3.35	+\$0.35	+\$0.05	+\$0.10	+\$0.15	+\$0.10
	Excess	0.82	0.85	+0.05	+0.05	+0.05	+0.05	+0.05
Contract w/o Airgap	Minimum	4.04	4.05	+0.15	+0.05	+0.05	+0.15	+0.15
	Excess	0.82	0.85	+0.05	+0.05	+0.05	+0.05	+0.05
GRP Areas 1 & 2	All Usage	3.23	2.68	+0.28	+0.04	+0.08	+0.12	+0.08
GRP Area 3	All Usage	1.21	1.01	+0.11	+1.14	+0.06	+0.09	+0.06
Contract Untreated	All Usage	0.7573	0.8500	+0.0000	+0.0000	+0.0000	+0.0000	+0.0000

## ES.7.2 Wastewater System

The wastewater rate design analysis determines rates required to achieve cost recovery, proportionately for each customer. Like the water rates, Houston Water's existing wastewater rate structure consists of two components: a volumetric rate (variable) and a monthly service charge (fixed). The volumetric component is assessed based on metered water usage per 1,000 gallons and, by design, is intended to recover the cost incurred for collecting and treating each unit of wastewater. The monthly service charge is intended to recognize that the utility incurs fixed costs to provide the availability of wastewater service, which must be recovered independent of monthly wastewater flow.

### ES.7.2.1 Monthly Meter Charge

By design, the monthly meter charge includes a customer component and a capacity component based on water meter size. The customer component recovers expenses associated with billing, collection, and customer service. This component is the same for all customers regardless of meter size. The capacity component captures a portion of the wastewater system capital costs. This component varies based on water meter size to reflect the difference in potential flow that can be discharged to the system by customers with different sized water meters. The capacity charge is then added to the customer unit cost to calculate the total monthly meter charge.

*Residential, Commercial, and Industrial Customers.* Table ES.12 shows the existing monthly meter charges by customer type and water meter size.

Table ES.12 Existing Wastewater Monthly Meter Charges by Customer Type

Meter Size	SFR	MFR <sup>(1)</sup>	Commercial	Industrial
5/8"	\$12.37	\$10.64	\$10.64	\$17.98
3/4"	12.37	10.64	10.64	17.98
1"	13.00	11.17	11.17	17.98
1½"	15.06	12.96	12.96	17.98
2"	15.69	13.49	13.49	17.98
3"	28.11	24.17	24.17	23.95
4"	---	27.37	27.37	27.37
6"	---	39.12	39.12	39.12
8"	---	95.00	95.00	95.00
10"	---	115.47	115.47	115.47

Notes:

(1) SFR is Single Family Residential.

(2) MFR is Multifamily Residential.

(3) Monthly meter charges for industrial customers in this table are for all industrial customers, including those who pay surcharges.

Table ES.13 summarizes the proposed monthly meter charges for July 1, 2021, which vary by water meter size, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305. Carollo recommends charging the same monthly meter charge for single family residential, multifamily residential, commercial, and industrial (with and without surcharges) customers rather than varying them by customer type.

Table ES.13 Proposed Wastewater Monthly Meter Charges and Future Adjustments

Meter Size	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026
	Charges		Future Adjustments			
5/8"	\$10.00	+\$1.50	+\$1.50	+\$0.75	+\$0.75	+\$0.62
3/4"	10.00	+1.50	+1.50	+0.75	+0.75	+0.62
1"	12.45	+1.79	+2.57	+1.24	+1.13	+0.93
1½"	15.93	+2.23	+4.08	+1.95	+1.66	+1.40
2"	18.03	+2.47	+5.00	+2.38	+1.97	+1.69
3"	35.46	+4.60	+12.60	+5.92	+4.63	+4.03
4"	64.76	+8.16	+25.37	+11.87	+9.09	+7.97
6"	146.02	+18.05	+60.80	+28.36	+21.47	+18.89
8"	180.90	+22.29	+76.01	+35.43	+26.79	+23.58
10"	239.14	+29.38	+101.40	+47.26	+35.66	+31.40
12"	331.92	+40.65	+141.85	+66.09	+49.79	+43.87
16"	805.89	+98.31	+348.49	+162.30	+122.00	+107.56

Note:

- (1) Monthly meter charges and adjustments shown are proposed for single family residential, multifamily residential, commercial, and industrial customers, including those who pay surcharges.

*Industrial Surcharge and Sewer Only (Unmetered) Customers.* Houston Water manages an Industrial Wastewater Program for permitted industrial customers who discharge high-strength wastewater into the system. These customers are sampled regularly and pay surcharges based on the loadings concentrations of their sampled wastewater. As part of the cost of service rate study, Carollo worked with Houston Water staff to identify and isolate the cost of this program and allocate it to the industrial surcharge customers. The study recommends implementation of an Industrial Program Charge, which would be added to the industrial surcharge customers' bills, in addition to the monthly service charge, to pay for the cost of the program. The recommended July 1, 2021, industrial program charge and future adjustments in Table ES.14 phase in this charge over the 5-year study period. Table ES.14 also shows proposed July 1, 2021, monthly service charges, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305, for sewer only customers, which are based on customer type.

Table ES.14 Existing and Proposed Wastewater Monthly Service Charges and Future Adjustments – Industrial Customers with Surcharges and Sewer Only Customers

Meter Size	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026	April 2026
	Charges		Future Adjustments				
<b>Industrial with Surcharge:</b>							
Industrial Program	---	\$100.00	+\$200.00	+\$300.00	+\$200.00	+\$200.00	+\$200.00
<b>Sewer Only:</b>							
Single Family Res.	\$30.51	\$36.00	+\$7.00	+\$5.00	+\$4.00	+\$4.00	+\$4.00
Duplex	64.71	72.00	+14.00	+10.00	+8.00	+8.00	+8.00
Multifamily Res.	37.85	36.00	+7.00	+5.00	+4.00	+4.00	+4.00
Commercial	71.41	72.00	+14.00	+10.00	+8.00	+8.00	+8.00
Industrial	71.39	72.00	+14.00	+10.00	+8.00	+8.00	+8.00

Note:

- (1) Charges and adjustments shown for sewer only customers are monthly, but sewer only customers are billed and will continue to be billed bimonthly. The existing multifamily charge is per unit for multifamily accounts with 3 or more units. The existing commercial and industrial charges are per unit as defined in §47-1002.

ES.7.2.2 Volume Rates

Variable volume rates include a flow component, which represents the cost to collect and treat wastewater flow; a biochemical oxygen demand (BOD) component, which represents the cost to treat BOD; a total suspended solids (TSS) component, which represents the cost to treat TSS; and an ammonia component, which represents the cost to treat ammonia. These costs are allocated to the different customer types based on their contributed flows and assumed loadings (BOD, TSS, and ammonia). The allocated components are then summed and divided by the projected flow to calculate the average rate per 1,000 gallons for each customer type. The billable volume for each customer is equal to the metered water usage, with the exception of unmetered sewer only customers and those customers with effluent meters.

*Single Family Residential Customers.* Similar to the existing single family residential water rate structure, the existing single family residential wastewater rate structure is made up of rates that vary for each incremental 1,000 gallons for the first 6,000 gallons, increasing and decreasing as a customer’s billable volume goes up. This results in large bill increases at specific usage intervals. Carollo recommends simplifying this structure to two blocks with a reduced rate per 1,000 gallons for the first 3,000 gallons and a higher rate per 1,000 gallons for all usage in excess of 3,000 gallons per month.

Table ES.15 shows the existing and proposed July 1, 2021, single family residential wastewater volume rates for the study period, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.15 Existing and Proposed Single Family Residential Wastewater Volume Rates and Future Adjustments

Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
<i>Month of Adjustment</i>		<i>July 2021</i>	<i>April 2022</i>	<i>April 2023</i>	<i>April 2024</i>	<i>April 2025</i>	<i>April 2026</i>
	<i>Rates</i>	<i>Future Adjustments</i>					
First 1 kgal	\$0.20	\$4.00	+\$1.10	+\$0.30	+\$0.60	+\$0.55	+\$0.45
Next 1 kgal	0.41						
Next 1 kgal	0.33	10.50	+1.60	+0.15	+0.25	+0.50	+0.35
Next 1 kgal	17.20						
Next 1 kgal	6.22						
Over 5 kgal	9.05						

To calculate the monthly wastewater bill, customers add the appropriate monthly meter charge derived from Table ES.12 (existing charges) or Table ES.13 (proposed charges) and add the volume rate for each incremental 1,000-gallon unit derived from Table ES.15. Table ES.16 shows existing and proposed July 1, 2021, monthly wastewater bills for single family residential customers with usage up to 6,000 gallons in one month, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.



Table ES.16 Existing and Proposed Single Family Residential Bills and Future Adjustments – Wastewater Only

Billable Volume	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
Month of Adjustment	July 2021	April 2022	April 2023	April 2024	April 2025	April 2026	April 2026
	Bills		Incremental Bill Amounts				
Meter Charge only	\$12.37	\$10.00	+\$1.50	+\$1.50	+\$0.75	+\$0.75	+\$0.62
1,000 gallons	12.57	14.00	+2.60	+1.80	+1.35	+1.30	+1.07
2,000 gallons	12.98	18.00	+3.70	+2.10	+1.95	+1.85	+1.52
3,000 gallons	13.31	22.00	+4.80	+2.40	+2.55	+2.40	+1.97
4,000 gallons	30.51	32.50	+6.40	+2.55	+2.80	+2.90	+2.32
5,000 gallons	36.73	43.00	+8.00	+2.70	+3.05	+3.40	+2.67
6,000 gallons	45.78	53.50	+9.60	+2.85	+3.30	+3.90	+3.02

Figure ES.6 illustrates the existing and proposed single family residential wastewater rates and bills for the first 6,000 gallons in 1,000-gallon increments. The amounts shown in this figure do not include future automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

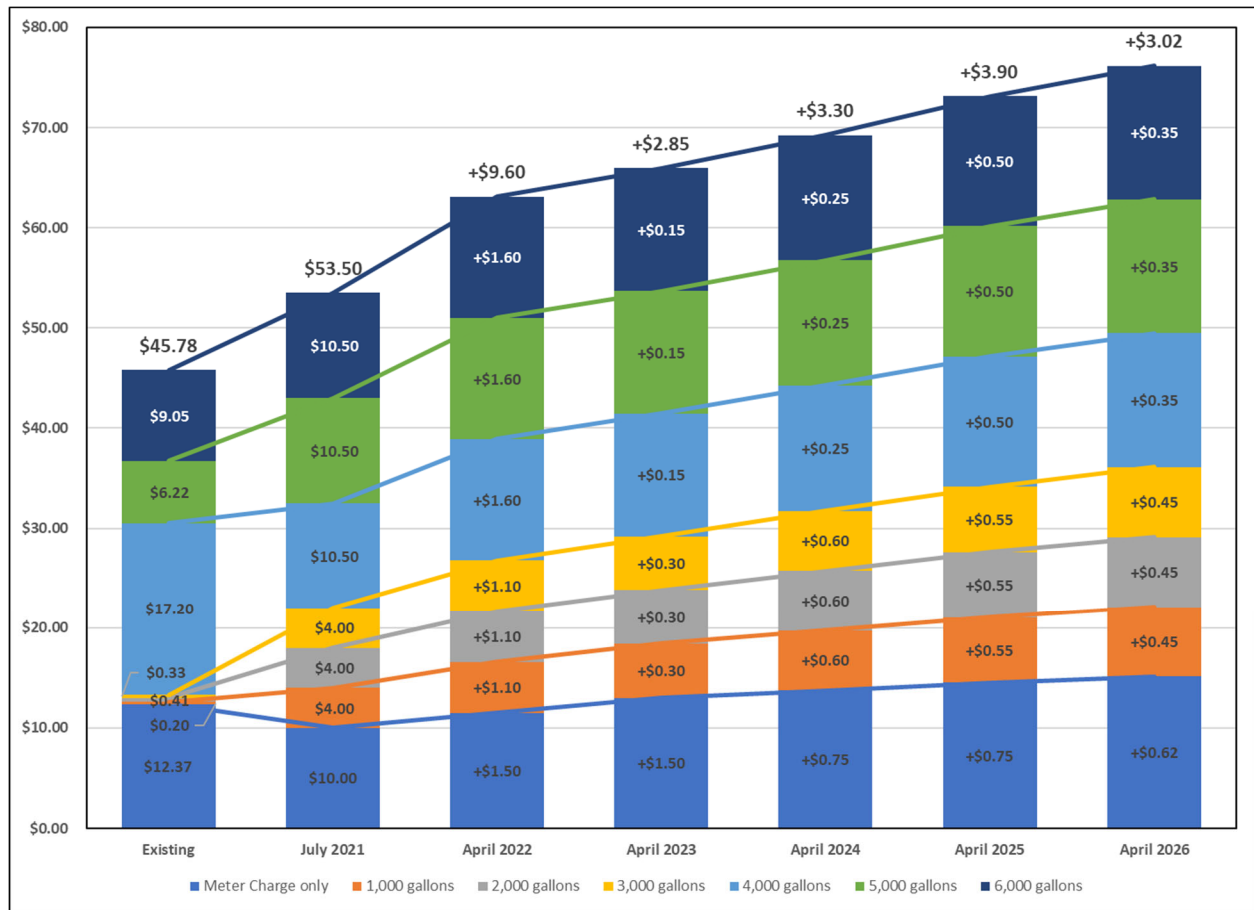


Figure ES.6 Existing and Proposed Single Family Residential Wastewater Rates and Bills

*Other Retail Customer Types.* With the exception of industrial customers who do not pay surcharges, all other retail customer types pay a uniform rate per 1,000 gallons for all billable volume, which varies by customer type. Non-surcharge industrial customers pay a reduced rate for the first 2,000 gallons; all usage in excess of 2,000 gallons is assessed a higher rate. Carollo recommends Houston Water continue to charge uniform rates for all retail customer types other than single family residential, including all industrial customers. Table ES.17 shows existing and proposed July 1, 2021, volume rates for all retail customer types except single family residential, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.17 Existing and Proposed Retail Wastewater Volume Rates and Future Adjustments

Customer Type	Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026
<i>Month of Adjustment</i>			<i>July 2021</i>	<i>April 2022</i>	<i>April 2023</i>	<i>April 2024</i>	<i>April 2025</i>	<i>April 2026</i>
		<i>Rates</i>		<i>Future Adjustments</i>				
Multifamily Residential	All Flow	+\$6.76	+\$7.40	+\$1.40	+\$0.22	+\$0.46	+\$0.52	+\$0.40
Commercial	All Flow	6.76	7.40	+1.40	+0.22	+0.46	+0.52	+0.40
Industrial (no surcharge)	First 2 kgal	4.16	---	---	---	---	---	---
	Over 2 kgal	7.40	---	---	---	---	---	---
	All Usage	---	7.40	+1.40	+0.22	+0.46	+0.52	+0.40
Industrial with Surcharge	All Flow	4.90	8.00	+1.26	+0.02	+0.15	+0.28	+0.14
	BOD <sup>(1)</sup>	0.8440	0.4437	+0.0842	+0.0382	+0.0394	+0.0387	+0.0309
	TSS <sup>(1)</sup>	0.3331	0.3384	+0.0603	+0.0151	+0.0171	+0.0211	+0.0161
	Ammonia <sup>1</sup>	---	0.6253	+0.1033	-0.0019	+0.0040	+0.0210	+0.0137

Note:

(1) BOD, TSS, and ammonia surcharges are assessed per pound.

Carollo recommends maintaining the existing wholesale and contract customers’ rate structures. There are currently three types of contract wastewater customers:

1. Customers who have contributed capital and discharge directly to the wastewater treatment plant (billed per 1,000 gallons). These customers pay a reduced rate that does not include capital costs or costs related to collecting wastewater and conveying it to the treatment plant.
2. Customers who have not contributed capital and discharge into the collection system. These customers pay the full cost of collecting and treating wastewater based on how they are billed:
  - a. Billed per 1,000 gallons,
  - b. Billed per connection.

In addition to these existing contract rates, Houston Water requested a fourth rate for contract customers who have contributed capital and discharge into the collection system. This rate does not include capital costs. Existing and proposed July 1, 2021, contract wastewater rates are shown in Table ES.18, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305.

Table ES.18 Existing and Proposed Wholesale Wastewater Volume Rates and Future Adjustments

Customer Type	Rate Block	Existing	FYE 2022		FYE 2023	FYE 2024	FYE 2025	FYE 2026	
		<i>Month of Adjustment</i>		<i>July 2021</i>	<i>April 2022</i>	<i>April 2023</i>	<i>April 2024</i>	<i>April 2025</i>	<i>April 2026</i>
		<i>Rates</i>			<i>Future Adjustments</i>				
Capital w/o Collection System	All Flow	\$1.64	\$1.65	+\$0.00	+\$0.00	+\$0.00	+\$0.00	+\$0.00	
Capital with Collection System	All Flow	---	3.00	+0.23	+0.01	+0.01	+0.02	+0.03	
No Capital w/Collection System	All Flow	6.25	6.25	+0.23	+0.36	+0.38	+0.41	+0.31	
Connection-based	All Connections	8.86/24.71	25.00	+2.01	+1.54	+1.64	+1.77	+1.40	

### ES.7.3 Customer Bill Impacts

Figure ES.7 illustrates the impact of the recommended July 1, 2021, rates, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305, on the combined water and wastewater bill for single family residential customers with a 5/8-inch meter across various usage levels. The incremental percentage of single family residential bills is shown between usage levels. The estimated per capita usage at each level is shown at the far right of each line. This estimate assumes 2.6 people per account.

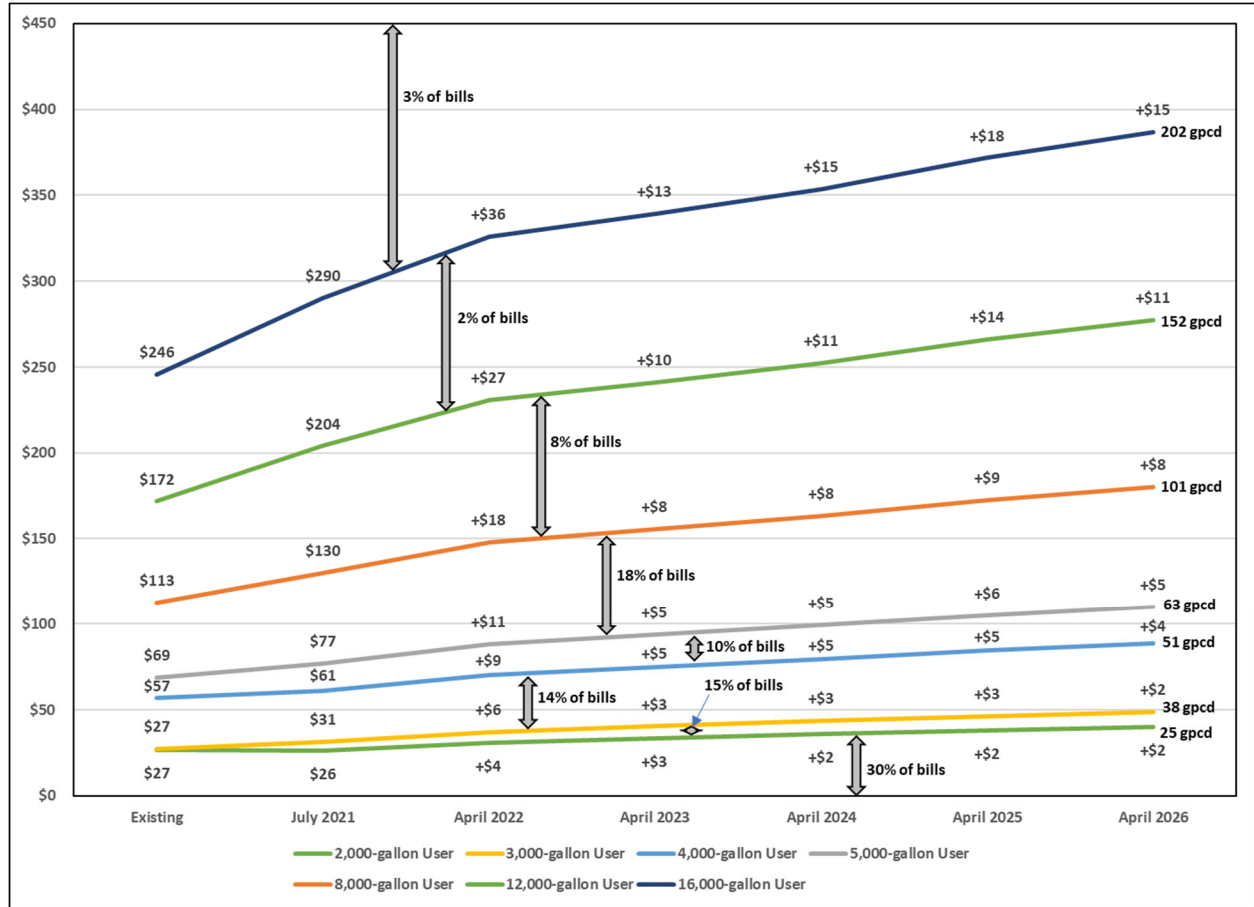


Figure ES.7 Single Family Residential Monthly Combined Bill Impact

Figure ES.8 illustrates the impact of the recommended rates, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305, on the combined water and wastewater bill for multifamily residential customers with varied meter sizes and usage levels. The incremental percentage of multifamily residential bills is shown between usage levels.

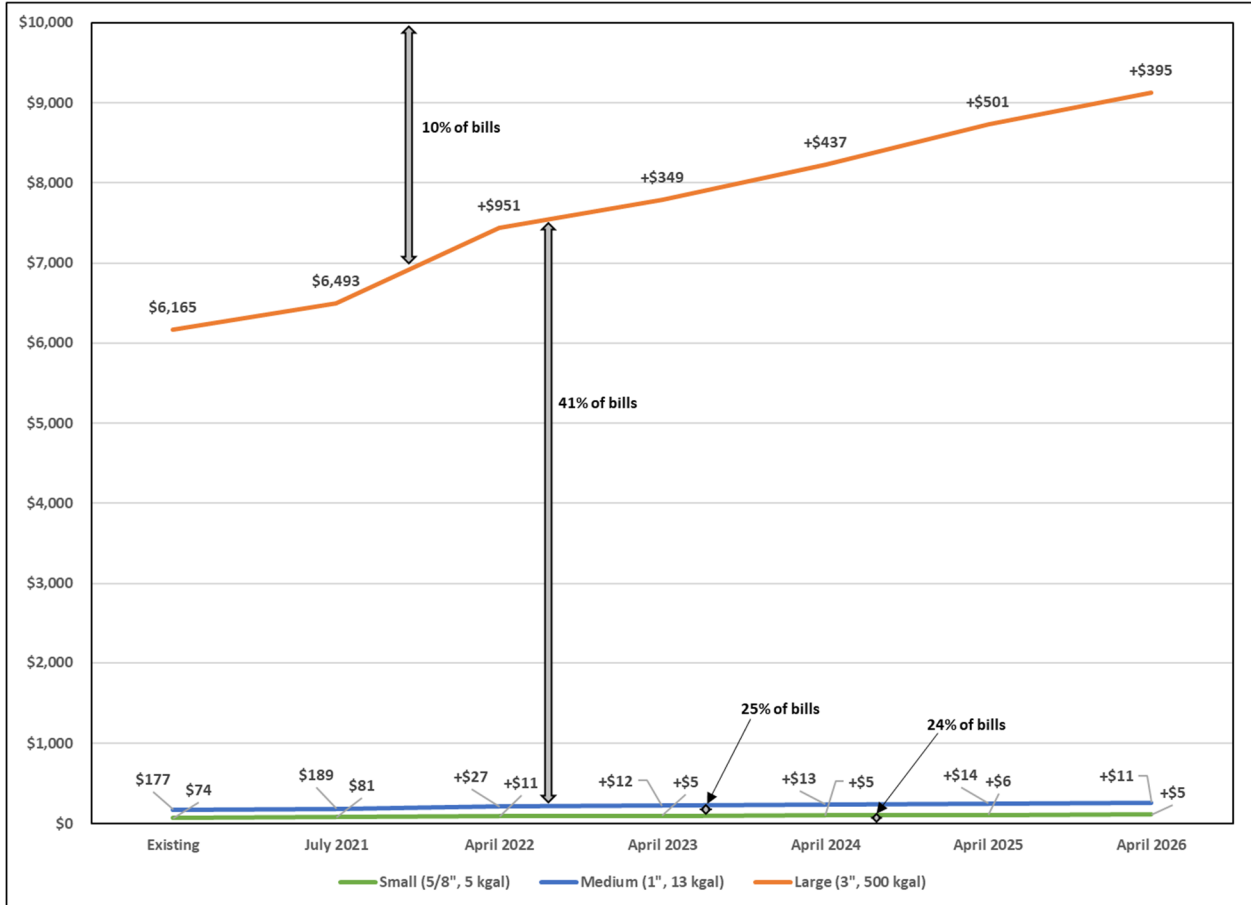


Figure ES.8 Multifamily Residential Monthly Combined Bill Impact

Figure ES.9 illustrates the impact of the recommended rates, as well as the recommended adjustments to be made each April 1 during the study period independent of the automatic adjustments governed by the Master Ordinance and Ordinance 2010-305, on the combined water and wastewater bill for commercial and industrial customers with varied meter sizes and usage levels. The incremental percentage of commercial and industrial bills is shown between usage levels.

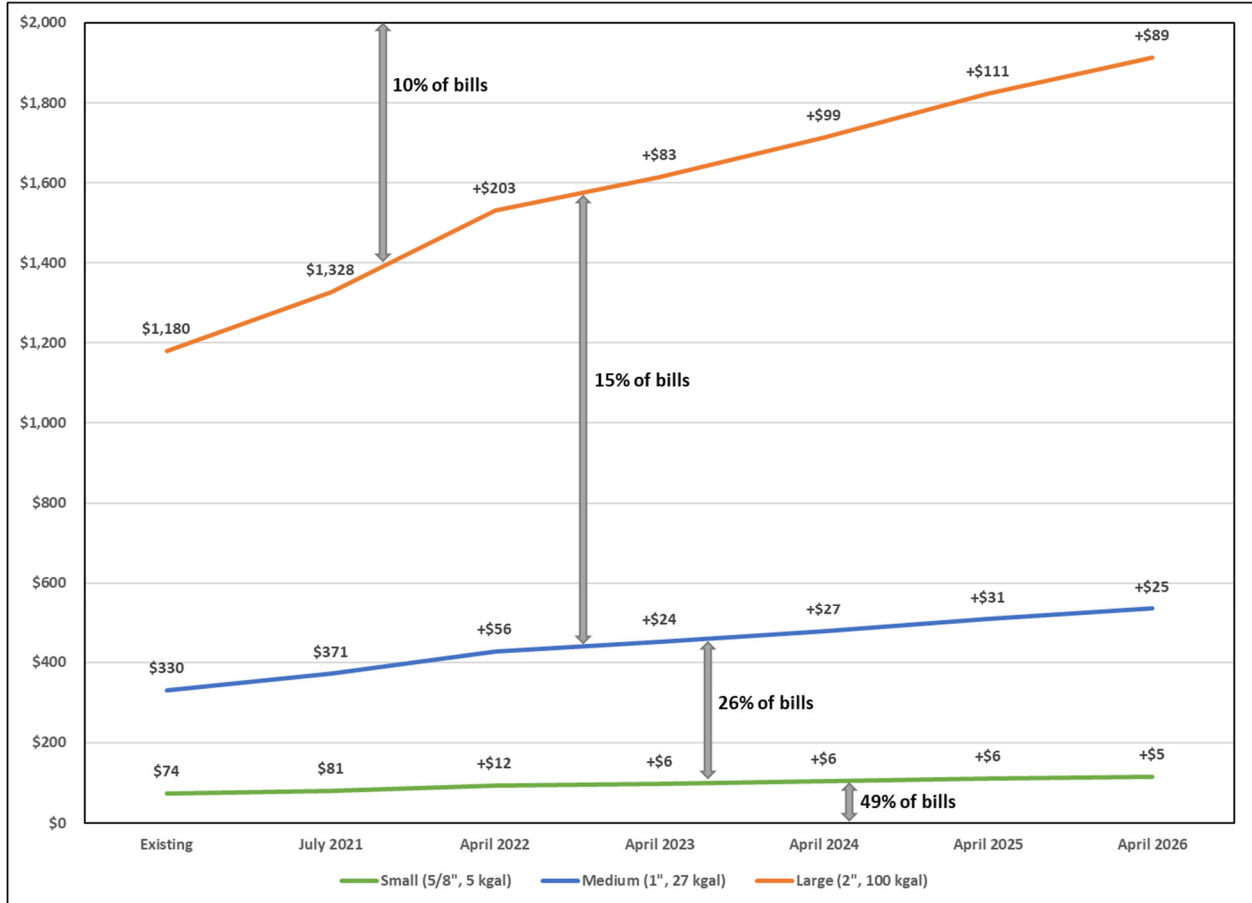


Figure ES.9 Commercial/Industrial Monthly Combined Bill Impact

Figure ES.10 illustrates the percentage of single-family residential customers with varying levels of monthly bill adjustments for the proposed rate schedule effective July 1, 2021.

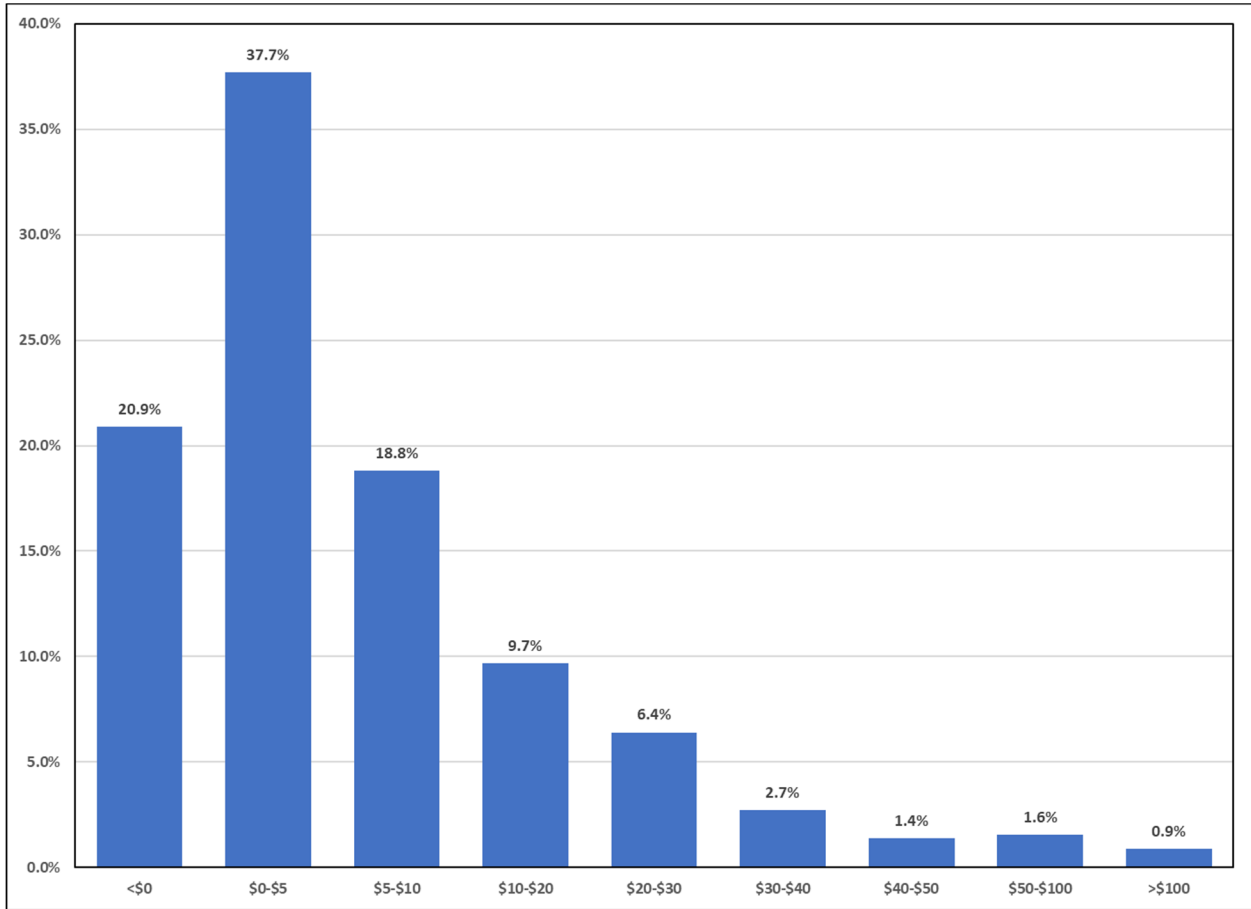


Figure ES.10 Distribution of July 2021 Monthly Combined Bill Impacts for Single Family Residential Customers

### ES.8 Recommendations

Carollo recommends implementation of the July 1, 2021, water and wastewater rates and future adjustments as proposed in this Executive Summary and described below:

- Water sales revenue increases by 9.0 percent on July 1, 2021, by 7.5 percent on April 1, 2022, and April 1, 2023, and by 6.0 percent on April 1, 2024, April 1, 2025, and April 1, 2026.
- Wastewater user charge revenue increases by 20.0 percent on July 1, 2021, by 18.5 percent on April 1, 2022, by 6.0 percent on April 1, 2023, April 1, 2024, April 1, 2025, and by 4.5 percent on April 1, 2026.

Water monthly service charge based on meter size and uniform for single family residential, multifamily residential, commercial/industrial, and irrigation customers. Other customer types pay monthly service charges based on meter size that differ based on the customer type and service provided.



For single family residential customers, Carollo recommends a four-tier inclining block water rate structure with a conservation credit for customers who use 3,000 gallons or less in a month:

- Block 1 – First 6,000 gallons;
- Block 2 – Next 6,000 gallons;
- Block 3 – Next 8,000 gallons; and
- Block 4 – Over 20,000 gallons.

Figure ES.11 compares the existing and proposed volume water rate structures for single family residential customers.

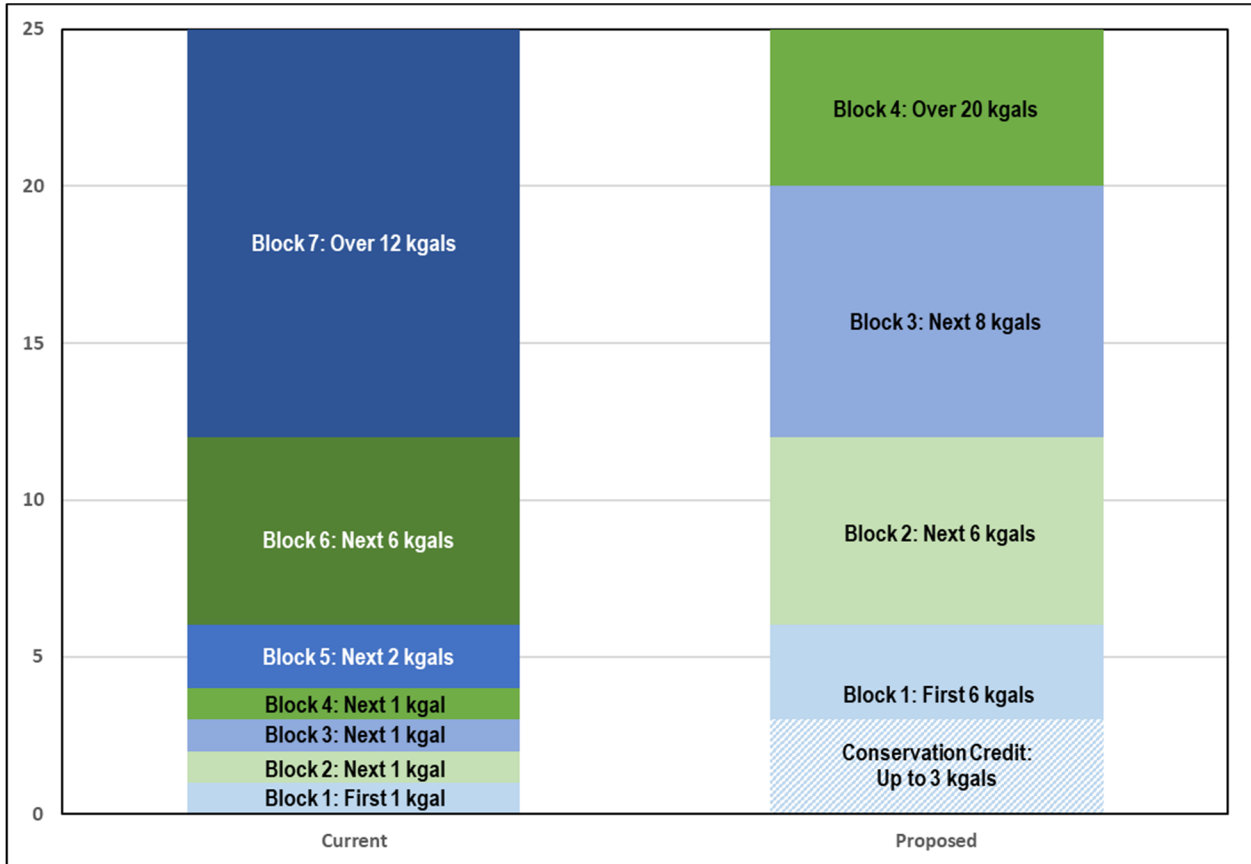


Figure ES.11 Existing and Proposed Single Family Residential Volume Water Rate Structures

For wastewater, Carollo recommends simplifying the single-family residential rate structure to two tiers:

- Block 1 – First 3,000 gallons; and
- Block 2 – Over 3,000 gallons.

Figure ES.12 compares the existing and proposed volume water rate structures for single family residential customers.

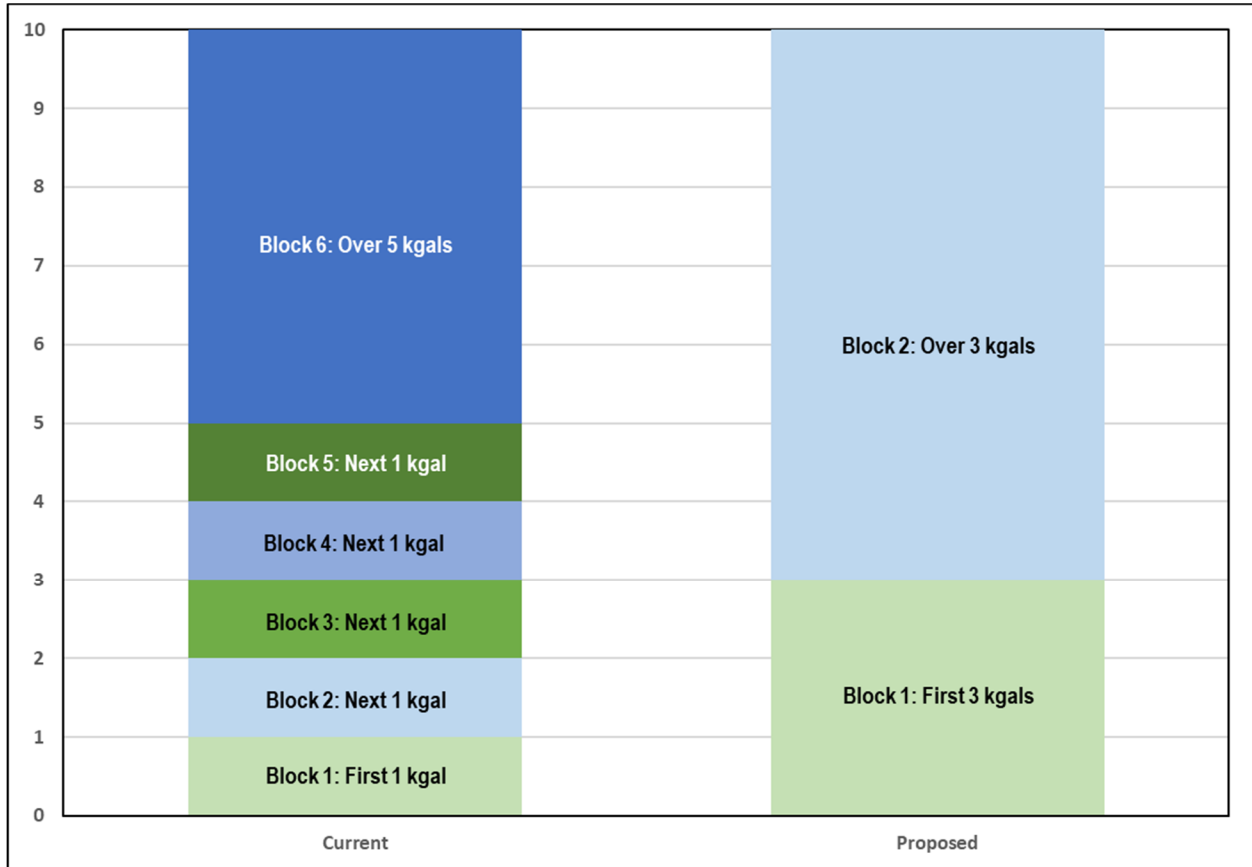


Figure ES.12 Existing and Proposed Single Family Residential Volume Wastewater Rate Structures

Carollo recommends a uniform rate per 1,000 gallons for both water and wastewater for multifamily residential and nonresidential customers.

Finally, Carollo recommends Houston Water update this cost of service rate study within five years to maintain revenue sufficiency and equity among customers.