



Audit of Water System Operations

Rate Structure

The City of Denton's current water rate structure is designed to incentivize reductions in discretionary water usage; however, current residential consumption blocks are too large to effectively impact customer water usage.

Additional communication strategies and targeted demand reduction programs could help further decrease water demands, ultimately helping to defer costly water infrastructure capacity expansions.

Audit Team

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Audit at a Glance

Why we did this Audit:

Annually, the City collects about \$38 million in revenue from the sale of water to fund water system maintenance and improvements. Effective management of water demand through these rates is critical to efficiently utilize limited water resources and defer capacity expansion costs. This audit project was included on the City's fiscal year 2020-21 Audit Plan as approved by the City Council. This report details findings and recommendations from phase one of the project.

What we Recommend:

Recommendation 1

Adjust residential rate structure to more effectively incentivize reductions in discretionary water usage.

Recommendation 2

Consider requiring commercial irrigation systems to be separately metered.

Recommendation 3 & 4

Provide additional information to customers on the water rate structure and its intended impacts.

Recommendation 5

Consider implementing water demand reduction incentives and programs.

Recommendation 6 & 7

Formally execute a contract with the City's wholesale water customers.

What we Found:

This audit generally evaluated the City's water demand management strategies including rate structure and demand reduction programs and incentives. Findings about each of these demand reduction strategies are summarized below:

Rate Structure. In general, the City's residential rate structure is designed to encourage reductions in water demand usage through seasonal, increasing block rates; however, based on analysis of historical residential water usage, the consumption blocks appear to be too large to effectively influence customer behavior. Additional education about the rate structure may further help reduce water demands.

On the other hand, the City has created an irrigation subclass of residential and commercial customers. The irrigation rate structures of these subclasses appear to be generally effective. Additional usage of these customer subclasses, particularly on the commercial side, would allow for better monitoring of discretionary water usage for landscape irrigation.

Demand Reduction Programs and Incentives. The City has largely not established any targeted demand reduction programs or incentives. Implementation of an automated metering infrastructure (AMI) would aid the Water Department in identifying opportunities for effective water reduction programs and incentives.

Wholesale Water Customers. The City sells significant quantities of raw and treated water to the Upper Trinity Regional Water District at wholesale rates. Based on the adopted rate ordinance, these customers generally appear to be billed accurately. That being said, the City's contract with the Water District is currently expired, potentially leaving the City vulnerable if a drought or water shortage were to occur.

Introduction

The Internal Audit Department is responsible for providing: (a) an independent appraisal¹ of City operations to ensure policies and procedures are in place and complied with, inclusive of purchasing and contracting; (b) information that is accurate and reliable; (c) assurance that assets are properly recorded and safeguarded; (d) assurance that risks are identified and minimized; and (e) assurance that resources are used economically and efficiently and that the City's objectives are being achieved.

The Internal Audit Department has completed a performance audit of the City's water utility system's rate structure. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Management Responsibility

City management is responsible for ensuring that resources are managed properly and used in compliance with laws and regulations; programs are achieving their objectives; and services are being provided efficiently, effectively, and economically.

Audit Objectives, Scope, and Methodology

The Internal Audit Department has completed an audit of the City's water system rate structure. This report is intended to provide assurance that the City has effective strategies to manage water demand through rate structure and demand reduction programs and incentives.

This report is the first phase in an audit project series covering water system operations. Phase Two Distribution and Phase Three Production are expected to be published over the next few months.

Audit fieldwork was conducted during May and June 2021. The scope of review varied depending on the procedure being performed. The following list summarizes major procedures performed during this time:

- Reviewed documentation to develop criteria including industry standards, best practices, policies, and procedures;

¹ The City of Denton Internal Auditor's Office is considered structurally independent as defined by generally accepted government auditing standard 3.56.

- Analyzed the City's water rate structure and historical customer water consumption to determine if the rate structure effectively influences water demand;
- Interviewed City staff from the Finance Department and Sustainability² and Customer Service Divisions;
- Examined the City's wholesale water contracts to determine if wholesale water customers were being accurately billed;
- Evaluated the City's current water demand reduction programs and incentives to determine if they appear to impact customer water usage; and
- Conducted a benchmarking study in order to provide information on how Denton's water rate structure and demand reduction programs and incentives compare to peer municipalities.

² The Sustainability Division is currently housed within the Solid Waste Department; however, it provides education on a variety of sustainability efforts including water conservation.

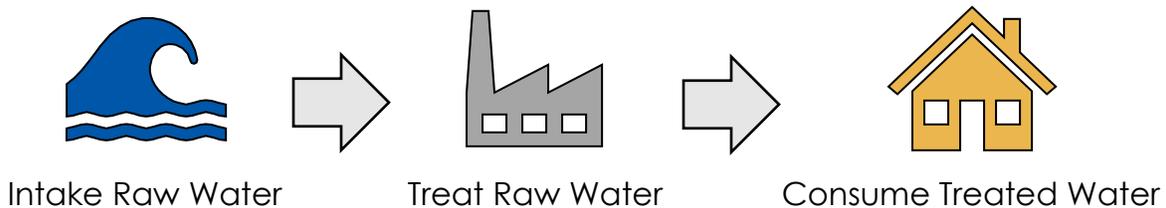
Findings & Analysis

The City of Denton currently owns and operates a municipal water utility, which produces and delivers water to its customers. In order to sell water, the City must obtain water rights from the Texas Commission on Environmental Quality, which permits usage of raw water from the State of Texas's rivers, lakes, and aquifers. Currently, the City has obtained the rights to use about 8.8 billion gallons of raw water annually and has used an average of 7.1 billion gallons of water annually over the last five years.

The City then pumps raw water through its two water treatment plants which have the combined capacity to treat about 50 million gallons of water a day. Water treatment facilities must be equipped to meet peak daily demand, which can often be much higher than the average daily demand.

The treated water is then pumped out to the City's customers who generally pay for the volume of water they consume per the City's adopted rate ordinance. This process is broadly illustrated in Figure 1:

Figure 1: Water System Operations Process



As the City continues to grow, water demand will increase, requiring the City to obtain additional water rights and invest in costly production capacity expansions. For that reason, the City must be able to monitor and manage water demand in order to efficiently and economically utilize its limited water resources.

This audit generally evaluated the City's water demand management strategies including rate structure and demand reduction programs and incentives.

Residential Rates do not Effectively Discourage Discretionary Use

Water demand is primarily managed through rate setting, as economic theory suggests that the higher the price for a good, the lower the quantity demanded. In general, the City has three significant classes of water consumers, which are each charged different rates for water. Annual usage for these customer classes is summarized in Table 1.

Table 1: Summary of Average Annual Treated Water Consumption

Category	Avg. Annual Customers	Avg. Annual Consumption (Million Gallons)	Avg. Consumption/ Customer (Million Gallons)
Residential	41,000	2,890.23	0.07
Commercial	6,000	2,439.05	0.39
Wholesale	2	88.85	44.45
Total:	47,000	5,997.94	0.13

Each of these classes is charged using a different rate structure, which will be further explored throughout this report. For residential customers, the City has implemented seasonal, block rates as shown in Table 2:

Table 2: Residential Rate Structure (FY20-21)

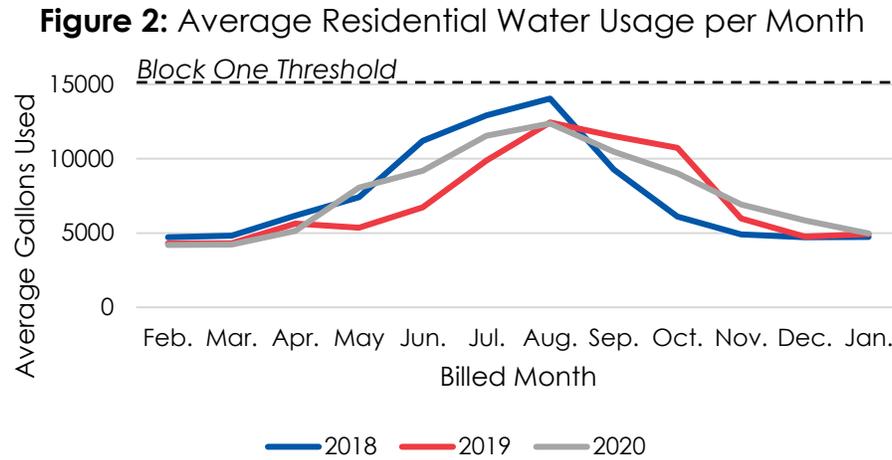
Gallons Consumed	Price Per 1,000 Gallon		Price Increase
	Winter	Summer	
0 – 15,000	\$4.05	\$4.05	NA
15,001 – 30,000	\$4.05	\$5.76	42%
30,001 – 50,000	\$4.05	\$7.95	38%
Above 50,000	\$4.05	\$10.64	34%

In order for this type of rate structure to be effective, best practices suggest:

- Consumption blocks should be designed to impact discretionary usage, so the first block should typically cover the amount of water needed for normal household health and sanitary needs; and
- Price increases between blocks should be no less than 25 percent of the previous block.

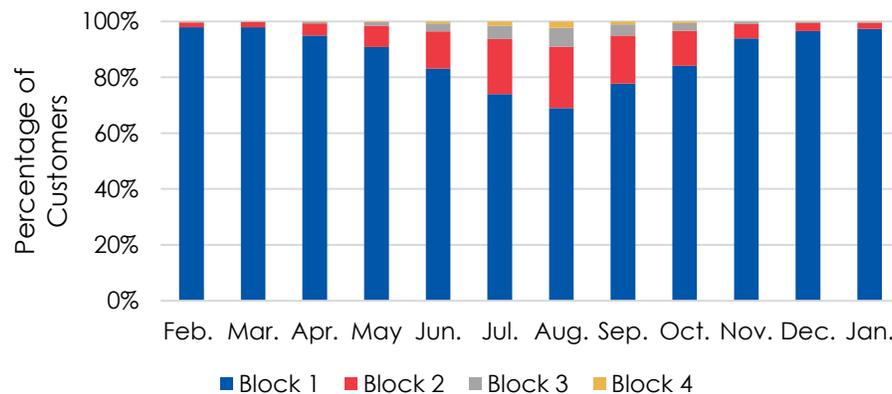
What We Found

- The City's residential consumption blocks appears to be too high to effectively impact discretionary water usage.
 - Based on analysis of historical residential water consumption data from 2018 through 2020, the average monthly usage per customer never exceeds the 15,000-gallon Block One threshold as shown in Figure 2 on the next page. Similarly, the average monthly usage per customer is about 7,600 gallons.
 - In addition, the average monthly residential usage during winter months was almost 5,200 gallons – almost a third of the City's current Block One consumption threshold. Best practices generally use the winter month average as an indicator for the amount of water needed for normal household health and sanitary needs.



- o Furthermore, while best practices would suggest that the rate increases between each of the City's consumption blocks would be effective price signals, very few residential customers ever consume water at Block Three and Block Four levels even during the summer months as shown in Figure 3.

Figure 3: Percentage of Residential Water Customers by Block



- Based on a review of the City's utility rate books from fiscal year 2018-19 through fiscal year 2020-21, the residential consumption block thresholds have not been changed in at least three years.
 - o Based on discussion with Finance Department staff, the residential block rate structure was evaluated as part of the City's most recent Water and Wastewater cost of service study. As part of this study, the block rate structure was identified as an area for improvement; however, adjustments were not recommended for the fiscal year 2021-22 budget year due to prioritizing changes in response to Winter Storm Uri.

- In addition, based on a review of ten peer cities,³ the majority had a lower Block One consumption threshold than the City of Denton, with an average threshold of almost 11,000 gallons.

Why It Matters

Effective management of water demand is critical to long-term deferral of costly water system capacity expansions.⁴ While the City's current residential rate structure appears to be designed to manage water demand by discouraging discretionary water usage, the consumption blocks appear to be too large to effectively incentivize customer behavior.

Similarly, block rate structures – if designed correctly – are generally considered to more equitably distribute the cost of maintaining and expanding water system infrastructure, as those customers who use more water – and drive peak demand – are required to cover a larger portion of the cost.

Recommendation:

1. Adjust the residential consumption block thresholds to more effectively incentivize reductions in discretionary water usage. Consumption block thresholds should ideally coincide with differing usage patterns and price increases between each block should reflect the marginal cost of discretionary water demands to allocate supply costs equitably.

Water Department Comments: *The residential rate structure was evaluated as part of the Water and Wastewater cost of service study that was recently completed by the City. Based on the findings, adjustments to the block rate structure were not recommended for the upcoming fiscal year (21-22). Staff will take into consideration the recommendations while reviewing and updating the cost of service study in the future.*

Finance Department Comments: *A change to the residential block structure was contemplated in the Water and Wastewater Cost of Service Study. Staff plans to present rate structure changes for PUB and City Council considerations during the FY 2021-2022 budget presentations.*

³ Detailed results of the peer city benchmarking study can be seen in Appendix B.

⁴ For example, the City's planned 30 million gallons per day expansion of the Ray Roberts Water Treatment plant is projected to cost \$89.3 million.

Expanded Use of Commercial Irrigation Meters Would Increase Demand Management Flexibility

According to industry standards, lawn irrigation is generally the largest driver of discretionary water usage during summer months. Based on best practices, a water utility with a summer peak/winter average daily demand ratio greater than 1.6 generally has the potential for substantial water savings if landscape irrigation demand management strategies are implemented.

The City of Denton has established a subclass of both the residential and commercial customer types for separately metered irrigation systems. These rates are outlined in Table 3.

Table 3: Irrigation Customer Rate Structure (FY21)

Gallons Consumed	Winter Price Per Gallon		Summer Price Per Gallon	
	Residential	Commercial	Residential	Commercial
0 – 15,000	\$4.05		\$5.76	
15,001 – 30,000	\$4.05	\$4.34	\$7.95	\$6.00
Above 30,000	\$4.05		\$10.64	

What We Found

- Based on daily water flow data received from the City's Water Department, between 2018 and 2020, the City has the potential for water savings if landscape irrigation demand management strategies are implemented. These ratios can be seen in Table 4.

Table 4: Landscape Irrigation Potential Savings Indicator

Season	Maximum Daily Flow	Average Daily Flow
Winter	22.65 mg	14.82 mg
Summer	36.84 mg	23.78 mg
Summer Peak/Winter Average Ratio:		2.48

- Based on analysis of historical residential irrigation customer consumption, consumption thresholds appear to be more effective than the regular residential thresholds as average residential irrigation customer usage during the summer months is about 14,600 gallons. That being said, this rate structure is likely not having a significant impact on water demands as only about 200 residential irrigation customers exist.
- Based on analysis of historical commercial irrigation customer consumption, this subclass consumes almost 10 percent of all treated and billed water annually.

- The increase between the winter and summer commercial water irrigation rate is about 38 percent, well above the best practices suggested 25 percent increase, suggesting that it would adequately signal customers to reduce water demands during the summer.
- Commercial irrigation customers constitute almost 19 percent of the commercial customer class. According to Water Department staff, separate water meters may be installed for commercial customers upon request. There is currently no requirement to separately meter commercial irrigation systems.

Why It Matters

The City of Denton currently charges commercial customers a flat rate for each thousand gallons of water consumed. This practice appears to be reasonable, as it is more difficult to determine what level of water usage is discretionary due to the diversity of commercial customers. That being said, landscape irrigation is generally considered discretionary water usage and is a key driver in peak water demands.

Requiring separate water meters for commercial irrigation systems would allow the City and customers to more accurately monitor water used for landscape irrigation, creating additional rate structure flexibility and potentially allowing for more equitable cost allocation.

Recommendation:

2. Consider requiring commercial customers to separately meter their irrigation systems.

Water Department Comments: *Requiring commercial customers to separately meter their irrigation system may help in monitoring the discretionary water use and allow for more equitable cost allocation but it may put additional burden (cost) on the overall water utility operation as well as the customer. The commercial customers (existing as well as new) will incur additional expense for installing or retrofitting an additional meter as well and conduct annual testing of the additional meter and the water utility will incur costs for monitoring and maintenance of additional infrastructure. Also, the water savings achieved by implementing this recommendation may be low.*

A compromise may be to work with the development team to institute this requirement for new construction projects. In addition, existing connections could be required to install irrigation meters when undergoing significant improvements and remodels.

Communication of Residential Rate Structure Could be Improved

According to best practices, in order to effectively communicate efforts to reduce water demand through rate structure, utilities should:

- Educate customers about the rate structure;
- Use billing software that allows the customer to compare water use on their bill with average water use for their customer class;
- Provide customers with their individual water use for the last 12-months; and
- Clearly indicate the rate structure on the water bill.

What We Found

- Based on a review of the City's standard residential customer utility bill, there is no explanation of how the billed amount is calculated including the shift from winter to summer rates nor the block rate structure. In addition, the bill does not include information on the average water use for the residential customer class.
 - Each bill does include a 12-month historical water usage graph, which may help customers identify unusual or unexpected spikes in their usage.
- That being said, the City does annually mail a utility rate brochure to all customers in October of each year, which includes an explanation of the residential seasonal, block rate structure. This brochure, and those for several past fiscal years, can also be found online at the City's website.

Why It Matters

Without knowledge of the water rate structure, including the consumption blocks and seasonality, it is unlikely that a customer will understand how they are being charged for water usage, ultimately hindering any demand reduction strategies in place. Additionally, ensuring that customers understand limitations on water resources and the costs of additional capacity expansion is critical to explaining water demand reduction strategies, otherwise customers may not understand why they are being charged more for higher water consumption.

Currently, the City does not regularly provide clear information to customers on why water rates are designed to discourage water usage. Similarly, while some communication efforts are made to educate customers about the water rate structure, this information is not provided regularly as part of customer bills and is generally disbursed in October, just after the seasonal, block rates are no longer in effect. More regular communications educating customers about the rate

structure and its connection to water resource limitations that are timed just before the peak water demand season may help to reduce customer water usage.

Recommendations:

3. Include information about how residential water bills are calculated with customer utility bills, especially when the block rate structure is in effect.

Customer Service and Public Affairs Department Comments: *The City currently produces and distributes a rate information brochure to all customers in October. More descriptive information regarding rate structure can be incorporated into this publication with other information being included in the city website, Citizen Connection publication, and/or a billing insert as needed. Space constraints may make it prohibitively difficult to include valuable information on the bill itself.*

Water Department Comments: *We will work with the Customer Service Division to implement this recommendation.*

4. Consider providing customers with information about utility rates and the benefits of water demand reduction strategies before the peak water demand season.

Public Affairs and Customer Service Department Comments: *The City currently produces and distributes a water quality report to all customers in May (before the peak season). More descriptive and compelling conservation information can be distributed concurrently with this publication with other information being included in the city website and social media.*

Water Department Comments: *We will work with the Customer Service Division to implement this recommendation.*

Demand Reduction Programs are Largely Reactionary

According to best practices, water utilities may create incentives or programs to encourage water demand reduction. These types of incentives or programs are generally most effective if the water utility understands its customer base and conducts a thorough assessment of end-use water efficiency measures.

What We Found

- The City has generally not provided incentives for individual water use reduction behaviors.
 - According to Sustainability Division staff, the City has offered some water-efficient plumbing fixtures to residents for free in the past as part of their sustainability education classes. The effects of these efforts have generally not been monitored.
 - Based on a review of ten peer cities, six do not appear to offer any type of financial incentive for individual water use reduction behaviors; however, the remaining four generally offer rebates or utility bill credits for the installation of water-efficient plumbing fixtures.
- The City has established a program to conduct on-site water audits for customer properties upon request or in response to high-bill complaints. Changes in water usage after a water audit is conducted from fiscal year 2016-17 through fiscal year 2018-19 are summarized by month in Table 5.

Table 5: Water Audit Usage Change Analysis

Audit Month	Audits	Avg. Change	Usage Increases	Usage Decreases
Jan.	4	106%	3	1
Feb.	1	196%	1	0
Mar.	7	141%	6	1
Apr.	6	83%	6	0
May	3	29%	3	0
Jun.	7	-13%	2	5
Jul.	9	23%	3	6
Aug.	5	-21%	1	4
Sep.	8	-57%	1	7
Oct.	6	-54%	0	6
Nov.	6	-32%	2	4
Dec.	1	-26%	0	1
All:	63	19%	28	35

- Based on this analysis, there is not a clear pattern indicating that water audits are an effective water demand reduction tool. Still, based on discussion with Sustainability Division staff, they may be an effective way to educate customers about the City's water rate design.

Why It Matters

Water demand reduction incentives or programs can be effective ways to target certain undesirable end-use water behaviors and improve overall water system efficiency. Implementation of these types of programs could further help the City reduce water demands and defer water system capacity expansions.

On the other hand, current water metering practices may hinder the City from conducting the type of detailed end-use water analysis that would be needed to effectively identify opportunities for targeted demand reduction programs and incentives. Implementation of automated metering infrastructure (AMI) could provide needed additional usage data to effectively create and monitor these kinds of programs.

Recommendation:

5. Consider implementing water demand reduction programs and incentives in order to further encourage water usage reduction. If incentive programs are created, impacts on water demand should be monitored to ensure the desired reductions are occurring. Implementation of automated metering infrastructure would aid these efforts.

Water Department Comments: *As recommended, water demand reduction programs and incentives can be considered to encourage water usage reduction after the City selects and implements the Automated Metering Infrastructure (AMI) system. The system will help monitor water demand and ensure that desired reductions are occurring. The Water Department is currently working with a consultant to select the AMI system and develop an implementation plan.*

Wholesale Customers Accurately Billed; Contract Is Expired

Based on a review of the City's historical water consumption, about 75 percent of billed water usage is charged to wholesale raw water customers, who use an average of 4.6 billion gallons of raw water annually – just over half of the City's 8.8 billion gallons of raw water rights.

In addition, the City's two wholesale treated water customers are its largest single consumers of treated water, together using about 88.9 million gallons of treated water each year.

The rate structure for the City's four wholesale water customers is shown in Table 6 on the next page:

Table 6: Wholesale Water Customer Rates

Customer	Water Type	Volume Charge	Facility Charge	Demand Charge/MGD
Sanger	Raw	\$0.0275	NA	NA
Sanger	Raw	\$0.7578	NA	NA
Sanger	Treated	\$0.6100	\$288.72	\$667,879
Krum	Treated	\$0.6100	\$288.72	\$667,879

What We Found

- Based on a review of wholesale water usage and bills for the last six months (i.e. October 2020 through March 2021), wholesale water customers appear to be accurately billed based on the adopted utility rates.
- That being said, the largest component of the wholesale treated water rate is an annual demand charge which is spread out evenly across each monthly bill. This demand charge is based on the peak daily rate of flow for each wholesale treated water customer. According to Customer Service staff, this peak rate of flow is periodically forecasted by the Upper Trinity Water District, which is then used to calculate the demand charge.
 - According to Customer Service staff, the peak rate of flow forecasts have not been updated since 2017. In order to evaluate if the 2017 projects are still appropriate, the average rate of flow for each wholesale treated water customer was calculated for the previous twelve months and compared to the 2017 projections. The results of this test are summarized in Table 7.

Table 7: Upper Trinity Regional Water District Flow Projections Evaluation

Member	Projected (2017)		Actual (2020)
	Peak ROF	Average ROF	Average ROF
Sanger	0.50 mgd	0.20 mgd	0.27 mgd
Krum	0.20 mgd	0.10 mgd	0.11 mgd

- Based on the results of this test, the 2017 rate of flow projections may be inaccurate for current billing, especially for Sanger.
- Based on a review of contract documents provided by the Water Department, the City's wholesale water contract expired in 2012. At that time, Water Department staff informally agreed to continue charging the Upper Trinity Regional Water District at the same rates specified in the original contract but did not formally execute a new agreement or contract.
 - According to City Staff, the City has been working on a new wholesale water contract with the Upper Trinity Regional Water District since

October 2020; however, a new agreement has not been executed due to staff turnover.

- In the interim, the Water Department Director has sent a letter to the Executive Director of the Upper Trinity Regional Water District offering to sell a set volume of the City's raw water to the District for the 2021-2022 water year.

Why It Matters

The City of Denton's wholesale water customers are the City's largest single consumers of water. For this reason, it is important that the City have an adequate, valid contract in place to ensure water demand from these customers is effectively managed and the City is protected in times of drought or water shortage. In addition, these customers must be accurately billed to ensure the City is appropriately recovering the cost of these services.

Recommendations:

6. Require the Upper Trinity Regional Water District to provide peak rate of flow projections annually. Consider verifying these rate of flow projections each year to further ensure that wholesale treated water customers are billed accurately.

Water Department Comments: *Staff will work with Upper Trinity Regional Water District staff to develop and implement a process that would require submittal of peak rate flow projections annually.*

7. Formally execute a contract with the City's wholesale water customers. Consider reassessing the wholesale water rates as part of this effort to ensure the City is adequately recovering the cost of these services.

Water Department Comments: *Water Department Staff has been actively working on revising and executing the contract/agreement with the Upper Trinity Regional Water District for the last few months. It is one of the top priorities for Water Department Staff.*

Finance Department Comments: *Staff agrees with the recommendation and is working with the Water Department to execute a formal wholesale contract.*

Appendix A: Management Response Summary

The following summarizes the recommendations issued throughout this report. The auditors found that staff and the Departments were receptive and willing to make improvements where needed. Management has provided their response to each recommendation.

1	<p><i>Adjust the residential consumption block thresholds to more effectively incentivize reductions in discretionary water usage.</i></p>	Concur	<p>Expected Completion: Based on Council Direction</p> <p>Responsibility: Finance Department</p>
<p>Water Department Comments: The residential rate structure was evaluated as part of the Water and Wastewater cost of service study that was recently completed by the City. Adjustments to the block rate structure are included in the findings and will be presented to PUB and the City Council for consideration in July.</p> <p>Finance Department Comments: A change to the residential block structure was contemplated in the Water and Wastewater Cost of Service Study. Staff plans to present rate structure changes for PUB and City Council considerations during the FY 2021-2022 budget presentations.</p>			
2	<p><i>Consider requiring commercial customers to separately meter their irrigation systems.</i></p>	Partially Concur	<p>Expected Completion: NA</p> <p>Responsibility: NA</p>
<p>Water Department Comments: Requiring commercial customers to separately meter their irrigation system may help in monitoring the discretionary water use and allowing for more equitable cost allocation but it may put additional burden (cost) on the overall water utility operation as well as the customer. The commercial customers (existing as well as new) will incur additional expense for installing or retrofitting an additional meter as well and conduct annual testing of the additional meter and the water utility will incur costs for monitoring and maintenance of additional infrastructure. Also, the water savings achieved by implementing this recommendation may be low.</p> <p>A compromise may be to work with the development team to institute this requirement for new construction projects. In addition, existing connections could be required to install irrigation meters when undergoing significant improvements and remodels.</p>			

3	<p><i>Include information about how residential water bills are calculated with customer utility bills, especially when the block rate structure is in effect.</i></p>	<p>Concur</p>	<p>Expected Completion: November (annually)</p>
<p>Customer Service and Public Affairs Department Comments: The City currently produces and distributes a rate information brochure to all customers in October. More descriptive information regarding rate structure can be incorporated into this publication with other information being included in the city website, Citizen Connection publication, and/or a billing insert as needed. Space constraints may make it prohibitively difficult to include valuable information on the bill itself.</p>			<p>Responsibility: Director of Public Affairs & Customer Service, Customer Service Manager, Communications Manager</p>
<p>Water Department Comments: We will work with the Customer Service Division to implement this recommendation.</p>			
4	<p><i>Consider providing customers with information about utility rates and the benefits of water demand reduction strategies before the peak water demand season.</i></p>	<p>Concur</p>	<p>Expected Completion: June (Annually)</p>
<p>Public Affairs and Customer Service Department Comments: The City currently produces and distributes a water quality report to all customers in May (before the peak season). More descriptive and compelling conservation information can be distributed concurrently with this publication with other information being included in the city website and social media.</p>			<p>Responsibility: Director of Public Affairs & Customer Service, Communications Manager</p>
<p>Water Department Comments: We will work with the Customer Service Division to implement this recommendation.</p>			
5	<p><i>Consider implementing water demand reduction programs and incentives in order to further encourage water usage reduction.</i></p>	<p>Concur</p>	<p>Expected Completion: 2 to 5 years</p>
<p>Water Department Comments: As recommended, water demand reduction programs and incentives can be considered to encourage water usage reduction after the City selects and implements the Automated Metering Infrastructure (AMI) system. The system will help monitor water demand and ensure that desired reductions are occurring. The Water Department is currently working with a consultant to select the AMI system and develop an implementation plan.</p>			<p>Responsibility: Water Department</p>
6	<p><i>Require the Upper Trinity Regional Water District to provide peak rate flow projections annually.</i></p>	<p>Concur</p>	<p>Expected Completion: 6 months</p>

Water Department Comments: Staff will work with Upper Trinity Regional Water District staff to develop and implement a process that would require submittal of peak rate flow projections annually.

Responsibility:
Water
Department

7	Formally execute a contract with the City's wholesale water customers.	Concur	Expected Completion: September 2021
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Water Department Comments: Water Department Staff has been actively working on revising and executing the contract/agreement with Upper Trinity Regional Water District for last few months. It is one of the top priorities for Water Department Staff.

Responsibility:
Water
Department

Finance Department Comments: Staff agrees with the recommendation and is working with the Water Department to execute a formal wholesale contract.

Appendix B: Peer City Benchmarking Study Results

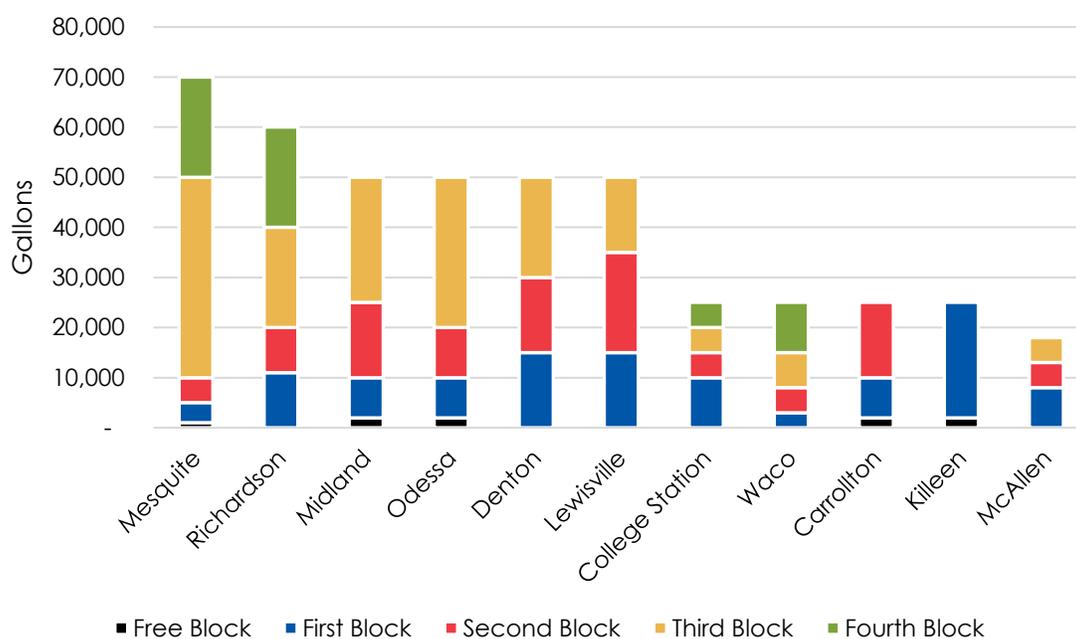
Based on an evaluate of population, population growth, income per capita, and estimated college enrollment, the following ten cities were included as part of a water utility rate benchmarking study. As part of this study, the residential and commercial rate structures of each city as well as the source of their treated water was identified as shown in Table 8.

Table 8: Peer City Water Utility Rate Structure Summary

City	Population	Treated Water Source	Rate Structure	
			Residential	Commercial
Killeen	149,103	Wholesale	Inclining Block	Flat
McAllen	143,433	Treatment Plants	Inclining Block	Budget
Mesquite	142,816	Wholesale	Inclining Block	Same as Residential
Midland	142,344	Treatment Plant	Inclining Block	Same as Residential
Denton	138,541	Treatment Plants	Seasonal Inclining Block	Flat
Waco	138,183	Treatment Plants	Inclining Block	Flat
Carrollton	136,879	Wholesale	Seasonal Inclining Block	Flat
Richardson	120,981	Wholesale	Inclining Block	Same as Residential
Odessa	120,568	Treatment Plant	Inclining Block	Inclining Block
College Station	116,218	Treatment Plant	Inclining Block	Flat
Lewisville	106,586	Treatment Plant & Wholesale	Inclining Block	Flat

The residential inclining block rate structure of each city is illustrated in Figure 4 below:

Figure 4: Summary of Peer City Residential Block Rate Structure



While all the reviewed peer cities use some form of an inclining block rate structure, only one other city, Carrollton, uses this structure seasonally like Denton. It should be noted that five of the benchmark cities include some usage of water for free as part of the water service fixed cost.

The following table compares the prices of each peer cities water rate structure. In general, Denton has the highest price increase from its first to last consumption block; however, the volumetric charge for a very high usage bill is just above the average volume charge of about \$145 for all peer cities.

Table 9: Residential Rate Volumetric Price Comparison

City	First Block Price/1000G	Total Price Increase from First to Last Block	Volume Charge for:		
			5,000 Gallons ⁵	10,000 Gallons ⁶	30,000 Gallons ⁷
Killeen	\$3.17	19%	\$9.51	\$25.36	\$98.15
McAllen	\$1.45	41%	\$7.25	\$12.50	\$54.70
Mesquite	\$6.58	24%	\$26.32	\$61.72	\$210.32
Midland	\$6.11	121%	\$18.33	\$48.88	\$223.33
Denton	\$4.05	163%	\$20.25	\$40.50	\$147.15
Waco	\$2.66	144%	\$14.64	\$32.95	\$138.25
Carrollton	\$3.39	68%	\$10.17	\$27.12	\$123.77
Richardson	\$6.61	37%	\$33.05	\$66.10	\$211.75
Odessa	\$5.26	21%	\$15.78	\$42.08	\$164.58
College Station	\$2.75	120%	\$13.75	\$27.50	\$123.75
Lewisville	\$3.39	13%	\$10.17	\$27.12	\$95.67
Average:	\$4.13	70%	\$16.29	\$37.44	\$144.67

Finally, the following list presents the demand reduction programs and incentives that the reviewed peer cities currently employ. Cities not included in the list do not have any formal, advertised demand reduction programs or incentives.

- Carrollton:
 - Rebate of up to \$5,000 for commercial customers who purchase and install water-saving equipment.

- Odessa:
 - Rebate for installation of high-efficiency toilets; and
 - Rebate for installation of hot water recirculation pumps.

⁵ 5,000 gallons represents Denton's average residential customer winter usage.

⁶ 10,000 gallons represents Denton's average residential customer summer usage.

⁷ 30,000 gallons represents Denton's very high usage residential customers as on average only three percent of customers exceed this usage during a month.

- College Station:
 - Rebate for purchase of rain barrels.

- Lewisville:
 - Utility bill credit for purchase and installation of low-flow toilets;
 - Utility bill credit for purchase and installation low-flow showerheads;
 - Utility bill credit for purchase and installation high efficiency washing machines;
 - Utility bill credit for purchase of rain barrels;
 - Utility bill credit for purchase and installation of rain and freeze or moisture sensors;
 - Utility bill credit for adjusting their irrigation system as recommended by a licensed irrigation system inspector; and
 - Utility bill credit for purchase and installation of a smart irrigation controller.