Water Rate Study

City of Dayton

Final Report

July 2021

Prepared by:
Oregon Association of Water Utilities

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EXECUTIVE SUMMARY

The City of Dayton called upon the Oregon Association of Water Utilities to conduct a water rate study to determine the adequacy of the water rates in conjunction with the proposed budget for the 2021-2022 fiscal year, with subsequent adjustments for years 2022-2025. The purpose of the study was to develop financial assistance and rates that:

- Provide examples of rates which meet the projected capital and operation and maintenance (O&M) costs of the system
- Determine equitable costs among the different types of system users
- Encourage efficient use of the water
- Are relatively simple to administer, understand, and are consistent with industry standards

The rate study stems from a justification of a single expenditure line created and managed by the city's administration office and the public works department. This figure includes personnel services, materials and services, contingency funding, and capital improvement. The capital improvement costs are reviewed in this study and implemented to align system costs to future rates. The current rates are based on a formula using an equivalent dwelling unit (EDU) calculated approximately twenty plus years using 400 cubic feet (2,992 gallons). As water usage is charged per 100 cubic feet (one unit), an allowance of four units is provided in the base rate. Residential users are considered one EDU (single-family residence)(SFR).

Table 1: Current Rate Information

Service Connection Size (in.)	# of connections	Allowance (Units) [1]	Base Rate	Unit Rate Cost	Average Consumption	Typical Monthly Cost
5/8 Residential	808	4	$59.00	$3.00 [1]	5.44	$63.32
5/8 Residential - out	25	4	$64.00	$3.00 [1]	5.44	$68.32
5/8 Commercial	35	4	$59.00	$3.00 [1]	NA	NA
1.0 Commercial	29	4	$59.00	$3.00 [1]	NA	NA
1.5 Commercial	12	4	$59.00	$3.00 [1]	NA	NA
2.0 Commercial	9	4	$59.00	$3.00 [1]	NA	NA
3.0 Commercial	2	4	$59.00	$3.00 [1]	NA	NA
4.0 Commercial	2	4	$59.00	$3.00 [1]	NA	NA
Total Connections	922	NA		NA		
Total Annual Base			**$725,196.00** [2]			
Total Annual Consumption			**$117,977.16**			
Combined Base and Consumption			**$843,173.16**	**109.15%**		
Proposed Budget			**$772,483.00**			

1 – $3.00 unit rate is for 2 units, first tier in an 8-tier structure up to $6.21 per unit, 2-figured on using EDUs

The City of Dayton currently uses an EDU system to charge for water, the total number of EDUs associated with the water system is 1,022 units. Larger service connections are counted using a methodology unknown during the time of this study. Typically, an EDU is equal to an approximation of the amount of sewage generated by an average SFR. The proposed format will simply use the number of service connections the water system serves, then consider the base rate determined by the size of the meter.

The meter base rate applies a meter ratio according to American Water Works Association (AWWA) meter ratios as it relates to infrastructure replacement costs.

Current Revenues / Expenditures:

Proposed revenue requirements for fiscal year 2021-2022 are $772,483.00 dollars. The base rate revenues equal $725,196.00 or 93.88 percent of the total proposed budget. An annual adjustment to the base rate should be initiated, the last adjustment was June 1, 2016. Using the Consumer Price Index (CPI) adjustments to water rates can match fluctuations corresponding to inflation and or capital planning expenses. The existing consumption rate (a charge per unit of water) is $3.00, with an allowance of water provided in the base rate. The allowance of water included is four units or 2,992 gallons per month. All water consumed after the allowance is charged per unit, ranging from $3.00 to $6.21 per unit at the eighth tier. Consumption revenues equal 15.79 percent of the proposed budget or $117,977.16 dollars. The combination of base and consumption rates total 109.15 percent of proposed budget or $843,173.16 dollars.

User Characteristics:

Equitable fees assessed to customers begin with a determination of the type of users. For the City of Dayton, the classification of customers is categorized as follows:

- 835 - Single-family residents, residential services are 93.3 percent of total users
- 025 - Outside city services
- 059 - Classified as commercial.

Base rates were originally set up in 2010 using an EDU of measure. This structure is typically used when determining wastewater rates, yet the variation in the implementation is somewhat disordered. The primary change from the current to proposed rate format will be based on size of service connection, being the tangible unit of measure and not an EDU.

Cost Evaluations:

If the total operating expenditures were equally divided per the number of consumers, the cost per user for the city would be $69.82 per month. This simplistic approach immediately proves unfair due to the average amounts of water consumed varies among all users.

$772,483.00 divided by 12 months divided by 922 connections = $69.82

Believed as the highest priority regarding water costs, all consumers pay for those costs associated with the infrastructure that provides continued high quality, safe, clean drinking water.

When determining the cost for water, consumption should be the decisive reason and applied across the spectrum of users, (meter size and classification of the connection). This is accomplished by means of determining the price per unit and the amount of consumption per month. The intrinsic value associated with water service and the consumption of water during each billing cycle make up a fair and equitable rate for all customers.

Rates:

Water rate designs involve outlining charges necessary to generate a level of revenue to meet proposed budget forecasts for the water system. At this point, we reviewed the amount of water purchased and divided the new expenditure line to determine the cost associated with producing a single unit of water (one hundred cubic feet or 748-gallons). Using the production numbers from 2018-2020 and applying those same amounts to the new fiscal year expenditures, provides a way for the price per unit required to meet proposed expenditures. See Table 2:

Table 2: Cost per unit of production		
Annual Production of Water	Proposed Expenditures	Cost per 748 gallons (1 unit)
102,041 units (76,326,781 gallons)	$772,483.00	$6.58

The monthly allowance of water (four units) equates to $26.32 operating expense the water department incurs to deliver to each tap. With a $59.00 monthly base rate (inside residential), one can speculate the favorable revenues for the water department at these consumption levels, but an additional consideration with total consumption is necessary to consider. When the unit production cost (currently $6.58) is more than the unit sold price, at all tiers sold, an adjustment in the rate is necessary.

One main interest within this study was the equitability of usage for all customers and their charges, respectively. Fairness across the user classification is often defined in a manner that low volume consumption should pay a fair share, while large consumers should not receive a volume discount.

Several methods to determine rates can be applied to a study, with the basic approach examining the base rates versus consumption (volume) rates. It is typically suggested that the base rate cover 60 percent-75 percent of the annual fixed expenses of the water budget, allowing the balance of revenues to be generated by what is termed a *volume rate.* The City of Dayton has executed sound practices in this area as current base rates equal 93.88 percent of the proposed budget.

Existing Rates:

This first step provides a concise view of the existing rates (both base and consumption rates) which currently provides an indication of the overall revenues generated using current water rates. The City of Dayton first priority request was discerning a comparable rate for low volume users, upcoming bridge infrastructure annual expenses and an overall equitable approach to water rates. Discovered immediately were the vast discrepancies to the base rates which were designed using an EDU system and the cost associated with multi-dwelling and larger service connections. This format calculated 1,022 EDUs from 922 service connections. In an attempt to process the method behind the current conclusions, the efforts to move towards a service connection method was accepted.

Preliminary Observations:

In this example, the emphasis is not on the base rate, but how the price per unit influences, plays a role in the total proposed budget. The increase in budgetary requirements to $772,483.00 is based on sustaining capital monies for smaller annual projects, and the infrastructure bridge project. The bridge project has an annual expense at $174, 322.00

As the above proposed budget was confirmed, a review of the base rates from respective classes of users indicated a skew in relevancy according to the size of the meter. Discussions indicated an unclear reasoning behind how the base rates were established, but they may have been conceived by labeling a connection as a single-family dwelling. The oversight in this approach is the comparison of the same sized metered connection, yet the application is dissimilar.

Through this step of the process, two recommendations were provided for consideration, a) change the base rate, removing the EDU distinction and apply a meter multiplier to the base rate which will also provide the same ratio of allowance of water for the user, b) apply a simplified tiered (increase block) rate for all consumption beyond the allowances stipulated with the meter ratios. This approach affords the per unit cost for all users, regardless of the size of the service connection for the base rates. Step two applies a conservation minded approach to the consumption rates. Table 3 makes available both the current monthly base rates and the proposed base rates. See page V

All figures recommended in the water rate study provides a single monthly base rate and consumption rate. The current consumption rate is a tiered structured rate beginning at $3.00 per unit (two additional units), with seven additional tiers beginning at $1.56 -$6.21 per unit. These figures were developed and calculated to match all proposed expenses using AWWA standards, applied in a fair and equitable manner.

Meter Multiplier Base Rate:

Discoverable during the water rate study is the two levels of base rates, a) inside users and b) outside users. Derived from the estimating base rate methodologies, water usage applied to a varied number of connections would be considered inconsistent. A comparative example is looking at both single-family dwellings (one single home vs apartment dwelling). The apartment would use less water as the footprint is much smaller. Even though the similarities are evident, the total amounts of water are not.

The meter multiplier advocated for the City of Dayton uses a standard that relates a monthly cost based on replacement of a meter and adjacent infrastructure over the life of the meter. Table 3 on the following page shows a comparison of both current and recommended base rates, a meter ratio applied to each of the sized meters.

Using experienced approaches for community water systems, the base rate is calculated by establishing a rate for the majority of users (SFR) and centering the initial cost on the fixed outlays associated with the annual budget. Once applied, the base rates equal 76.97 percent of the budget.

Table 3: Rate Comparison Current vs Proposed					
Current Base Rates					
	Residential	Commercial	Outside	Meter Multiplier	Allowances
5/8"- 3/4"	$ 59.00	$ 59.00	$ 64.00		4.00
5/8"- 3/4" out	$ -	$ -	$ 64.00		4.00
1"	$ 59.00	$ 59.00	$ 64.00		4.00
1 1/2"	$ 59.00	$ 59.00	$ -	Uses EDUs	4.00
2"	$ 59.00	$ 59.00	$ -		4.00
3"	$ 59.00	$ -	$ 64.00		4.00
4"	$ -	$ 59.00	$ -		4.00
$59.00 per EDU, Schools exception [1]					
Tiers Levels	Per Unit				
One	$ 3.00				
Two	$ 1.56				
Three	$ 2.28				
Four	$ 3.00				
Five	$ 3.83				
Six	$ 4.38				
Seven	$ 5.09				
Eight	$ 6.21				
Proposed Rates				Meter Multiplier	Allowances
	Residential	Commercial	Outside		
5/8"- 3/4"	$ 48.87	$ 48.87	$ 58.65	1.0 - 1	2.00
5/8"- 3/4" out	$ -	$ 53.76	$ 58.65	1.0 - 1	2.00
1"	$ 68.42	$ 68.42	$ 82.11	1.4 - 1	2.80
1 1/2"	$ 87.97	$ 87.97	$ 105.57	1.8 - 1	3.60
2"	$ 141.73	$ 141.73	$ 170.08	2.9 - 1	5.80
3"	$ 537.61	$ 537.61	$ 645.13	11.0 - 1	22.00
4"	$ 684.23	$ 684.23	$ 821.08	14.0 - 1	28.00
Meter size will determine base rate [2]					
Tiers Levels	Per Unit [3]				
One	$ 3.00				
Two	$ 4.50				
Three	$ 6.00				
Four	NA				
Five	NA				
Six	NA				
Seven	NA				
Eight	NA				
1 - EDUs (equivalent dwelling units) beginning resolution is unsubstantiated					
2 - American Water Works Association standard for meter multiplier (replacement costs)					
3- Beginning tier levels for 5/8'-3/4" meter are 2, 4 and 8 units					

Water Rate Study

Introduction:

In September 2020, the City of Dayton authorized Oregon Association of Water Utilities to review current water rates. The purpose of this study is to develop examples of financial strategies and rates that:

- Provide adequate revenue to meet the operation and maintenance costs, capital improvement costs, as well as review contingency funding
- Determine and distribute costs among the various consumer types
- Are relatively simple to understand and implement, being consistent with industry practices

It is Oregon Association of Water Utilities' privilege to provide this level of rate study assessment as a member service to the City of Dayton. When conducting a rate study, the best results are based on the most accurate data obtained, equity among the consumers, and revenues that meet demands and allow the water system to operate per state regulations.

After careful review of the written materials provided by the city's staff, along with discussions with key personnel, some points are necessary to mention to maintain continuity, they are:

- Changes in necessary monies for capital improvement
- Creation of a contingency fund for emergency purposes
- Existing expenditures based on billing unit of 748 gallons
- Monthly costs based on the number of active meter connections or 100 cubic feet (ccf)

After an extensive evaluation of current budget numbers regarding this rate study, it appears that modifications in the existing water rates are necessary to create a fair and equitable structure. The last formal rate review (adjustment) was effective June 1, 2016.

Reserves have been created for future capital replacement projects, contingencies, and for major maintenance and repairs. System Development Charges (SDCs) will not be part of this study, but it is recommended that they be reviewed on a regular basis.

A recommended contingency fund for emergencies may be 10 to 20 percent of the operational portion of the budget. This single line item ($50,000.00) is 6.9 percent of the 2021-22 budget. These contingencies do not need to be expanded if not essential to match future necessities. It is advisable to carry unused contingencies and other revenues not expended over to the next year's working capital expense line item. The following fiscal year set aside a new contingency figure for the next budget cycle. The City's water rate adjustment was arbitrarily applied when it was deemed necessary. Oregon Association of Water Utilities will recommend an annual adjustment based on the basket of services entailing water, sewer operations and maintenance.

Several water rates examples and options for the City of Dayton's Council to review are included in this report. In addition to the general expectations of a water rate study, Oregon Association of Water Utilities considers policies, ordinances, and customer relations as factors in the development of water rates. Special interests, political climate, and an ease of understanding also play roles in the formation of rates.

Oregon Association of Water Utilities utilizes the information provided by the water system that is most pertinent when performing a water rate study. The information includes the existing/adopted budget that consists of revenues necessary for O&M, personnel, contingency, capital outlay, loan debt service, and loan debt reserve fund if required. We also consider policies, practices, resolutions, and ordinances that have been adopted from an operational view, not a legal review or opinion. The system figures are based upon as close an estimate as can be determined from the existing records and future needs as discussed and outlined in the proposed budget. This has been provided in a one single budget expense figure at $772,483.00 dollars.

Table 1: Proposed Budget Information

Personnel and Materials Services:	$537,661.00	69.60%
	Sub-total:	$537,661.00
Contingency Reserve/Transfers: [1]	$50,000.00	6.47%
Annual Debt Service:	$174,322.00	22.57 %
Capital Outlay: [2]	$10,500.00	1.36%
	Total Expenditures:	$772,483.00

Additional pertinent information is as follows: approximately 922 active connections with an approximate ninety percent of customers are classified residential. Also included in the calculation of rates is the amount of averaged water produced at approximately a) 87.75 million gallons (MG) or 117 thousand hundred cubic feet (ccf) annually, b) amount of averaged water sold at 76.32 MG, or 102 thousand ccf, and c) amount of averaged unaccounted for water at 11.4 MG. The remaining unaccounted-for water at 13 percent is a significant achievement, as most public water systems strive for 15 percent or less unaccounted-for water.

Originally, the primary purpose for a formal water rate study was to assist the City in developing a structure that establishes a format that appeared balanced for all users. While reviewing revenues and expenditures, the primary emphasis was directed at a) fair and equitable rates for all users, b) assure no single classified group supplements another group, c) low volume usage customers would maintain a relatively set monthly rate.

The concept with emphasizing annual short-term projects is in providing funding of maintenance for projects often tabled for a later time. This step coordinates completion of projects for the water system

during the timeframes the City Council adopts resolutions for monies allocated for such. The City's approach to short-term (low cost) projects is balancing monthly revenues against necessary maintenance.

Annual production and delivery of water provides insight as to the efficiency of the water system when correlating deliverables against the total operating expenses. Viewed as cost per unit of water, 748 - gallons, the water system can determine the actual system cost as it relates to each consumer in each billing cycle.

Table 2, Cost per unit for delivery is figured on a running average of all water produced over a *given period*. When water is not accounted for through meter readings, it is seen as a 100 percent loss associated with the expenditure cost for that unit. The exception to this is when operations can provide accurate water use for water expending duties and other maintenance tasks. This water is then considered non-billable water used rather than unaccounted for water. Water that cannot be sold should be considered potential lost revenues.

Table 2: Cost per Unit for Delivery			
Total Expenditures: Used in this study			$772,483.00
Water Production: 87.7 million gallons (102,041 ccf) units			
Unaccounted for Water: 11.4 million gallons (15,000 ccf) units			13.04%
Average cost per single unit (748 gallons)			
Expense per gallon	0.0088	Current rate per 748 gallons	Potential Revenue
Expense per unit	$8.80 (1,000 gals)	$6.58	$98,700.00 [1]
1 – Figure based on sales of all 15K units of unaccounted water, which is unlikely to occur.			

Rate structures vary from utility to utility, but generally include three elements. First, is consideration of the classification of customers served, i.e., residential, commercial, and industrial. Second, all customers have an established frequency in billing, third, the schedule of charges will be identified and assessed.

For water utilities using a cost-of-service approach, the level of the utility's rates is a direct reflection of the utility's costs and customer's demands. The above table outlines this approach to reveal how water deliverables affects the overall revenue required.

Setting the base rate per size of connection, multiply by the number of connections and then multiply by 12 (12 months/yr.) forecasts an amount that can be considered as revenue income to help ensure that most "fixed" annual expenditures are covered.

It is normally suggested that the base rate covers 60-75 percent of the annual water budget. This allows for the balance of revenues to be generated by what is termed a *volume rate.* The metered amount of water can be charged by a unit measurement in gallons or cubic feet. The meters, measure in 748-gallon units and a dollar amount can be charged per said unit.

In table 3, the City of Dayton's revenues are derived from: the size of the connection, the allowance of water given in the base rate, if applicable, base and volume unit rates, the average monthly consumption per meter size, and the total approximate monthly cost. To recover the difference in revenues not earned in the base rate, the volume (consumption) rate income should meet the total revenue requirements when added to the base rate income.

Table 3: Current Rate Information

Service Connection Size (in.)	# Of connections	Allowance (units)	Base Rate	Unit Rate Cost [1]	Average Consumption	Typical Monthly Cost
5/8" Residential	868 [2]	4	$59.00	$3.00	5.44	$63.32
1" Residential	29 [3]	4	$59.00	$3.00	10.00	$71.24
1.5" Commercial	12		$59.00	$3.00		
2" Commercial	9	4	$59.00	$3.00		
3" Commercial	2	4	$59.00	$3.00		
4" Commercial	2	4 [4]	$59.00	$3.00		
Total Connections	922					
Total Annual Base			**$654,396.00**			
Total Annual Consumption *			**$119,869.73**			
Combined Base and Consumption			**$774,265.73**	**100.23 %**		
Proposed Budget			**$772,483.00**			

1 – Unit cost is tier one, with an additional seven tiers ($1.56 - $6.21), 2 – small number of users are outside city limits – base rate = $64.00, 3 – Users are considered residential or commercial accounts, **4-** larger customers are allowed 4 units per established EDU, ***** - all units assumed to be sold at $1.50 to balance budget

When developing a rate structure that meets the water system requirements, the rate study results, suggestions, and final decision to be fair to all customers will outline following key points.

- Total revenues generated by base rates.
- Total gallons of water associated with the base rates.
- The price per unit that establishes equitability among all consumers.
- Amount of available water for sale and the price per unit.
- Total revenues generated by volume (consumption) rates.

When the above points are defined Oregon Association of Water Utilities can utilize the gathered information, and apply it to various scenarios, providing a method to better understand the effects from an assortment of various rate approaches.

Cost Evaluations:

If the total operating expenditures are equally segregated per the number of connections, the cost per connection for the City of Dayton would be $69.82 per month.

$772,483.00 divided by 12 months divided by 922 users = $69.82 per month

Believed as the highest priority regarding water costs, all consumers pay for those costs associated with the infrastructure that provides continued high quality, safe, clean water. When determining the cost for water, equity centered on water consumption should be applied across the spectrum of users, (meter size and classification of the connection) and this is accomplished by means of determining the price per unit and the amount of consumption per month. The intrinsic value associated with water service and the consumption of water each billing cycle make up a fair and equitable rate for all customers.

Rate Study Approach:

Many diverse and competing models can be applied to any rate study, but when they are not well understood and evaluated, they can cause confusion among those that are affected by a change in the water utility rates. It is the goal of this water rate study to bridge key elements and provide an informational tool for the City Council to draw on in selecting an appropriate rate structure, one that is easily adopted and understood by your customers.

Examples shown in this rate study are based on a single line budget to operate and maintain the City's water system**.** While there are many approaches to determining a monthly consumer's cost, this rate study that builds on a methodical style with the following points:

- Affordability Index – rates allowed by the affordability index and historical monthly costs
- System Data – information relevant to the study
- Existing Rates – current revenues and expenditures, speculation of gains and losses.
- Multi-meter Costs Rate – conservation mindset

The varied points will show base rates established, what percentage of revenues is generated from said base rates, and how consumption charges make up any revenue deficits. Examples provide both an amount of water included in the base rate. As the examples are presented, it will become evident that no single method satisfies all the requirements for every community.

Alternative rate structures identify aspects in rate studies that assist in highlighting the dynamics of the water system. Although rate structures are generally composed of three components, who is charged, how often and how much, additional attention is centered on the structure's consumption charge. Typically, there are four basic types of consumption charges: declining block, uniform block, inclining block, and seasonal.

As rates are adjusted, policy rates are the responsibility of the utility decision makers. Even though public involvement is not required to design and approve water rates, it is important to keep the public relations door open by allowing for comment at a public meeting, and following proper procedures for adopting policies, resolutions, or ordinances. This should take place prior to adopting rate policy by ordinance or

resolution. The level of impact on the consumer, and the values and views of the decision makers play a key role in sustaining rates that will meet the operation and maintenance of the City's water system, all the while maintaining and building customer trust.

Factors that affect actual total forecasted revenues include the following: water conservation, weather, economic conditions, number of actual billable customers, etc. These are mentioned points to consider when forecasting revenue needs to meet budgeted expenditures. A conservative decision may be made to adopt rates that exceed expected revenues by ten percent.

The following information is designed to illustrate methods of approach that will expand the various examples and highlight specific points of relevancy. The focus with this water rate study is to build on all levels of understanding, create a fair and equitable approach for all consumers, and provide a rate structure frame for revenues for the water system to continue to operate.

Affordability Index:

One measurement of the impact of water cost for the median household incomes (MHI) of the area is the affordability index, a tool that federal and state agencies review to determine loan interest rates, loan fees, any percentage of principal forgiveness (if possible), loan repayment periods and the effect on the single-family residential user. These concerns may impact economically disadvantaged areas. For certain loan processes to continue, a review of the index may establish a pre-determined rate for a specific amount of water each month. For this rate study using the 2020 Median Household Income at $59,688.00 and the 2020 Affordability Index of 1.25% ($/Mo) for the 97714-zip code area, equates to $62.17 for a monthly water bill.[1] See Table 4

Table 4: Median Household Income Information

Zip Code	Certified Population 2016	U.S. Census Population 2010	Annual Growth	MHI 2019	2019 Affordability Index 1.25%
97714	2635	2534	1.14%	$59.688 *	$62.17

Information obtained from US Census Bureau American Community Survey 2018 – inflation adjusted for 2019, * - Average Household income - $58,132 for Dayton service area

Historical Rates:

With the initial onset of figures, the City of Dayton water rates are $59.00 base rate (single equivalent dwelling unit (EDU) per month for a 5/8-inch by 3/4-inch service connection and $3.00 per unit (748 gallons) as a tier one consumption rate for all users. This structured format is labeled an increase block rate which sends a price signal to the customer based on varied usage, and the unit cost increases with higher consumptions.

The city has used an annual adjustment of $1.00 to the base rate with no consumption rate adjustment added. Since 2015, the average annual inflation rate for water and sewer services is 3.27 [1] percent or approximately $1.92 increase.

1 -https://www.in2013dollars.com/Water-and-sewerage-maintenance/price-inflation/2015-to-2021?amount=54

System Data:

Information compiled in the "System Data" spreadsheet (see next page) outlines those factors that influence the required monthly revenues based on the annual proposed operating budget. Water produced, water sold, and water losses are criteria that affect the rates charged. Relating the volumes of water to the operating expenses will define the cost per unit, either 1,000 gallons or 100 cubic feet (748 gallons).

The number of connections, the size of connections, and the monthly rates determine if a surplus or deficit in revenues is associated with the current rate structure. One important factor to consider is the amount of water allowed with the base rate. A larger allowance of water included in the base rate will lower the price per unit within the base, thus providing water at a higher cost per unit to deliver beyond an allowance. All the information will relate to how much of the percentage of total expenditures is generated from the base rate. Consumption rates will be included in the existing rate spreadsheet. **(See Table 5: System Data)**

Table 5: System Data			
Total Gallons Produced		117,347 ccf	
Total Gallons Sold		102,041 ccf	
Cost per Unit (748 gallons)		$6.58	
Base Rate Revenues		$654,396.00	
Total Operating Budget	$772,483.00	% Total Budget	84.71%

Additional information that relates to the initial review of the figures associated with the City of Dayton's water rate study are:

- Current base rates are figured based on EDUs totaling 1,022
- Discretion of EDUs is based on SFR (multi-dwellings considered one EDU per dwelling)
- Current base rates equal 84.71 percent of proposed budget (standard 60-75 percent)
- Proposed base rates figured on service connection size totaling 922
- Proposed base rates will be applied using 65 percent of proposed budget for monthly charge
- Current base rates require all units of water to be sold at $2.15 minimum
- Current base rates adjusted annually adding $1.00 to the base rate
- Proposed annual adjustments will follow the Consumer's Price Index (CPI)
    - Applying the baskets of services for water, wastewater operations and maintenance
- Current tiered rates equate to eight levels - $1.56 to $6.21 per 100 cubic feet
- Proposed rates will outline a tiered structure using three levels - $3.00 to $6.00
- Average usage among all users is 9 units, among SFR dwellings is 5.44 units

System Data spreadsheet:

Water Rate Study
for
City of Dayton

System Data

For Year:	2021-2022
Date completed:	June-21

	Gallons (annual)	100 Cu. Ft. (annual)		
Amount of Water Produced	87,775,798	117,347	3 year average	
Amount of Water Sold	76,326,781	102,041		
Non-Revenue Water	11,449,017	15,306		13.04%

	Dollars		Cost per Gallon	Cost Per 1000 Gals	Cost Per 100 Cu.Ft.
Personnel / Materials	$537,661.00				
Contingency	$50,000.00				
Debt Service	$174,322.00	Added bridge debt	$0.00880	$8.80	$6.58
Capital Outlay	$10,500.00				
Total Annual Budget	$772,483.00		Non-Revenue Costs	$ 100,758.65	$ 100,758.65

Connection Information
Base Rate Only

only connections, not EDUs being figured

Size	# of connections Residential	Commercial	Outside	
5/8"- 3/4"	808	35	0	22 Public connection under "Commercial"
5/8"- 3/4" out			25	
1"	24	4	1	
1 1/2"	1	11		
2"	2	7		
3"	1		1	
4"		2		Total Connections
6"				922

Current Rate information (base)

	Residential	Commercial	Outside	
5/8"- 3/4"	$59.00	$59.00	$64.00	Need EDU totals
5/8"- 3/4" out			$64.00	
1"	$59.00	$59.00	$64.00	
1 1/2"	$59.00	$59.00		
2"	$59.00	$59.00		
3"	$59.00		$64.00	
4"		$59.00		Base Rate Revenues
6"				$ 654,396.00

Current Consumption Rate
Bse rate = 400 Cubic Feet)

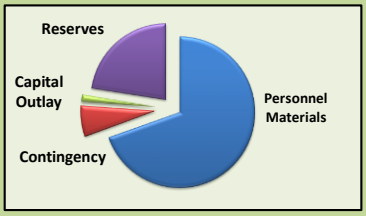
Per 100 Cu. Ft.	$3.00	$3.00	$3.00

Operating Budget Outline

Personnel / Materials	$537,661.00	69.60%
Contingency	$50,000.00	6.47%
Capital Outlay	$10,500.00	1.36%
Annual Debt Service	$174,322.00	22.57%
		Base Rate % Total Cost
TOTAL OPERATING EXPENDITURES	$772,483.00	84.71%

Percentage of budget without any consumption revenue

Notes:
1 meter (unknown) put under commercial heading (5/8-inch), 2-meters (1-inch),
922 billable service connections, 1022 EDUs
22-Public meters added to commercial column
400 cubic feet (2,992 gallons) allowance per month per EDU
8-Tier structure from 401 cu.ft. through 6,000 cu.ft. - same unit charge for outside users



Existing Rates:

The "Existing Rates" spreadsheet details much of the same information as the system data spreadsheet, yet expands the details on how the base rates, consumption rates and the allowance of water included in the base rate (if applicable) effect overall budget. Since the City of Dayton provides an allowance of water in the base rate, the consumption charge begins once the allowance is consumed. This factor will reveal the amount of revenue (or potential revenue) and the overall effect on the total revenues generated from water sales. Aligning the base rate revenue with the consumption revenue will determine any surpluses or deficits of the current rate structure. Included at the bottom of the "Existing rate spreadsheet" are supposed residential figures of monthly rates supported by three hypothetical levels of monthly consumption.

Table 6: Existing Rates			
Total # of EDUs	**1,022**		
Total Production of Water (annual ccf.)	**117,347** [a]	**Sold Water (Annual ccf)**	**102,041** [b]
Consumption Charge per Unit (1 - ccf)	**$3.00** [1]	**Total Billable Units**	**102,041**
Base Rate Revenues [2]	**$725,196.00**	**Revenue Percent**	**93.88%**
Consumption Rate Revenues	**$117,977.16**	**Non-Revenue Water**	**15,306**
Total Revenues	**$843,173.16**	**% Of Total Budget**	**109.15%**
Total Proposed Budget	**$772,483.00**	**Budget Shortfall**	**NA**
Findings			
Cost Per Unit	**$6.58** [3]	**Allowed Units**	**49,056 (48%)** [4]
Water Allowance Revenues	**$336,033.60**	**% Of Total Budget**	**43.50%**
1- Averaged price sold among user groups at tier one, 2- Figure based on current base rates per month, 3- Cost per unit calculates total operating budget by total units in production, 4 – Allowed units is total units provided in allowance compared to total units produced,			

The average residential consumer purchases approximately 5.44 units or 4,000 gallons per month, which equates to a water charge of $63.32 per month. The average usage for all customers (residential, commercial, and industrial) is nine units per month.

Existing Rates spreadsheet:

Water Rate Study
for
City of Dayton

Existing Rates

For Year:	2021-2022
Date completed:	March-21

	Annual Gals	Annual Units	
Amount of Water Produced	87,775,798	117,347	
Amount of Water Sold	76,326,781	102,041	
Unaccounted for Water	11,449,017	15,306	13%

	Dollars
Annual Operating Budget	$598,161.00
Debt Service	$174,322.00
Total Annual Budget	$772,483.00

Cost per 1,000 gallons	
$	8.80

Cost per 100 Cubic Feet	
$	6.58

Connection information

Size	# of Equivalent Dwelling Units		
	Residential	Commercial	Outside
5/8"- 3/4"	850	23	0
5/8"- 3/4" out	0	0	25
1"	24	4	1
1 1/2"	1	11	0
2"	50	7	0
3"	1	0	1
4"	0	24	0
6"	0	0	0
Consumption w/ base			
Unit of Water = 100 cu.ft.	4	4	4

Total EDUs: 1,022

Current Rate information

	Residential	Commercial	Outside
5/8"- 3/4"	$59.00	$59.00	$64.00
5/8"- 3/4" out	$0.00	$0.00	$64.00
1"	$59.00	$59.00	$64.00
1 1/2"	$59.00	$59.00	$0.00
2"	$59.00	$59.00	$0.00
3"	$59.00	$0.00	$64.00
4"	$0.00	$59.00	$0.00
6"	$0.00	$0.00	$0.00
Consumption Charge - T1 per 100 cu.ft.	$3.00	$1.56	$3.00

Current Base Revenue

	Residential	Commercial	Outside	Totals
5/8"- 3/4"	$50,150.00	$1,357.00	$0.00	$ 51,507.00
5/8"- 3/4" out	$0.00	$0.00	$1,600.00	$ 1,600.00
1"	$1,416.00	$236.00	$64.00	$ 1,716.00
1 1/2"	$59.00	$649.00	$0.00	$ 708.00
2"	$2,950.00	$413.00	$0.00	$ 3,363.00
3"	$59.00	$0.00	$64.00	$ 123.00
4"	$0.00	$1,416.00	$0.00	$ 1,416.00
6"	$0.00	$0.00	$0.00	$ -
Total/month	$54,634.00	$4,071.00	$1,728.00	$ 60,433.00
Base Rate Totals 12 mo. Total	$655,608.00	$48,852.00	$20,736.00	$ 725,196.00
% of operating budget	84.87%	6.32%	2.68%	93.88%

Water with base charge	Total/month	3,704	276	108	4,088
	12 mo. Total	44,448	3,312	1,296	49,056
Total Water Included in Base Rate	12 mo. Total	49,056	48.07%	24,528	$ 73,584.00
Available Units to be sold				28,457	
Consumption Rate Revenues					$ 44,393.16

	Potential Lost Revenue Cost			
Non-Revenue Units	11,449	$75,367.47		
			Total Revenue Generated	$ 843,173.16
			Annual Gain/Shortfall	$ 70,690.16
				109.15%

Notes:

- Speculation all water sold at $3.00 per unit generates 20.58 % of budget or $111K
- Total Units available for sale is lower due to total # of EDUs increased
- Billing by EDUs increases total revenues by ten percent
- If all water sold at $1.00 per unit, revenues would match budget

Typical Residential Water Bill

Units of Water	Residential Water Bill
5.44	$63.32
6.00	$65.00
8.00	$71.00

Preliminary Observations:

Expanding on "existing rates" using the figures provided by the city, some discoveries will be noted to enhance and support the methodology of a new rate structure.

- Approximately thirteen percent of production water is considered "non-accounted" water which for water system operations is in line with State's guideline. This amount of water equates to approximately 15,000 units of non-revenue water that correlates to $98,700.00 of costs associated with water production and operations
- With base rate revenues totaling 93.88 percent, this figure is substantially higher than typical percentages seen with other communities. This is likely associated with how the methodology is applied using EDUs as a counting format. This format creates an additional one-hundred units of billing which accounts for $70,800.00 is annual revenues
- When using the number of service connections (922 total) and applying the current base rate ($59.00) revenues equal 84.71 percent
- Current consumption rate at $3.00 per unit (Tier 1) and based on 5.44 units generates 15.27 percent, or surplus revenues equals 109.15 percent
- Current consumption rates (Tier one) when utilized with the new proposed base rates will remain the same, with a variation towards when a tier begins and ends
- When determining total revenue from consumption rates, the $3.00, $1.56, apply to the average usage. There are six additional tiers, increasing from $0.55 to $1.12 randomly with the last tier beginning at 6,000 cubic feet (44,880 gallons)
- The new proposed water rates for the City of Dayton will simplify the consumption rates using only three tiers, reduced from eight tiers
- Allowances (4 units per EDU) of water account for 48 percent of total water produced, while the base rates equate 93.88 percent of total budget
- Proposed budget will recommend units of water allowance in correlation with meter size, beginning with two units of allowance for a 5/8-inch by 3/4-inch meter
- Preliminary Observations spreadsheet show the current rate structure (Equivalent Dwelling Units) and revenues generated from both base and consumption rates
- The second spreadsheet specifies the current rate structure (Service Connections) and the revenues generated from both the base and consumption rates

Preliminary Observation Spreadsheets:

Preliminary Observations

Rate Study
for

City of Dayton

For Year: 2021-2022
Date completed: March-21

	Gallons MG	Units	Units / Month
Amount of Water Produced	87,775,798	117,347	9,779
Amount of Water Sold	76,326,781	102,041	
Unaccounted for Water	11,449,017	13.04%	

	Dollars
Annual Operating Budget	$598,161.00
Annual Debt Service	$174,322.00
Total Annual Budget	$772,483.00

Monthly Cost per Connection
$62.99

Connection information

Size	# of connections Residential	Commercial	Outside
5/8"- 3/4"	850	23	0
5/8"- 3/4" out	0	0	25
1"	24	4	1
1 1/2"	1	11	0
2"	50	7	0
3"	1	0	1
4"	0	24	0
6"	0	0	0
Consumption w/ base (cu.ft.)	4	4	4

Cost per 1,000 gallons
$ 8.80
Cost per 100 Cubic Feet
$ 6.58

Equivalent Dwelling Units
1,022

Current Rate (base)

	Residential	Commercial	Outside
5/8"- 3/4"	$59.00	$59.00	$64.00
5/8"- 3/4" out	$0.00	$0.00	$64.00
1"	$59.00	$59.00	$64.00
1 1/2"	$59.00	$59.00	$0.00
2"	$59.00	$59.00	$0.00
3"	$59.00	$0.00	$64.00
4"	$0.00	$59.00	$0.00
6"	$0.00	$0.00	$0.00

Consumption Charge per 100 cu.ft. $3.00

Current Base revenue

	Residential	Commercial	Outside	Totals
5/8"- 3/4"	$50,150.00	$1,357.00	$0.00	$ 51,507.00
5/8"- 3/4" out	$0.00	$0.00	$1,600.00	$ 1,600.00
1"	$1,416.00	$236.00	$64.00	$ 1,716.00
1 1/2"	$59.00	$649.00	$0.00	$ 708.00
2"	$2,950.00	$413.00	$0.00	$ 3,363.00
3"	$59.00	$0.00	$64.00	$ 123.00
4"	$0.00	$1,416.00	$0.00	$ 1,416.00
6"	$0.00	$0.00	$0.00	$ -
Total/month	$54,634.00	$4,071.00	$1,728.00	**$ 60,433.00**
12 mo. Total	$655,608.00	$48,852.00	$20,736.00	**$ 725,196.00**
% of operating budget	84.87%	6.32%	2.68%	**93.88%**

		Residential	Commercial	Outside	
Water with base charge	Total/month	3,704	276	108	**4,088**
	12 mo. Total	44,448	3,312	1,296	**49,056**
Typical 5/8" Usage (gals)	9				

		Residential	Commercial	Other	
Total Water Included in Base Rate	12 mo. Total	44,448			
0.06%	12 mo. Total		3,312		Total Base Revenue
	12 mo. Total			1,296	$ 725,196.00
Available water to be sold				52,985	$ 158,955.45
Consumption Revenues		Potential Annual Revenues		114.46%	$ 884,151.45
			Total Revenue Generated		$ 111,668.45
			Annual Gain/(Shortfall)		14.46%

Notes:
Current rates using EDUs as the approach for setting rates
Cost per unit delivery to the tap = $6.58

Typical Residential Water Bill

Units of Water	Res. Water Bill
5.44	$63.32
6.00	$65.00
9.00	$74.00

Water Rate Study
for
City of Dayton

Preliminary Observations

For Year:	2021-2022
Date completed:	June-21

	Annual Gals	Annual Units	
Amount of Water Produced	87,775,798	117,347	
Amount of Water Sold	76,326,781	102,041	
Unaccounted for Water	11,449,017	15,306	13%

	Dollars
Annual Operating Budget	$598,161.00
Designated Reserves	$174,322.00
Total Annual Budget	$772,483.00

Cost per 1,000 gallons	
$	8.80

Cost per 100 Cubic Feet	
$	6.58

Connection information

Size	# of connections			
	Residential	Commercial	Outside	
5/8"- 3/4"	808	35	0	
5/8"- 3/4" out	0	0	25	
1"	24	4	1	
1 1/2"	1	11	0	
2"	2	7	0	
3"	1	0	1	
4"	0	2	0	
6"	0	0	0	
Consumption w/ base				Total Connections
Unit of Water = 100 cu.ft.	4	4	4	922

Current Rate information

	Residential	Commercial	Outside
5/8"- 3/4"	$59.00	$59.00	$64.00
5/8"- 3/4" out	$0.00	$0.00	$64.00
1"	$59.00	$59.00	$64.00
1 1/2"	$59.00	$59.00	$0.00
2"	$59.00	$59.00	$0.00
3"	$59.00	$0.00	$64.00
4"	$0.00	$59.00	$0.00
6"	$0.00	$0.00	$0.00
Consumption Charge - T1 per 100 cu.ft.	$3.00	$3.00	$1.56

Current Base Revenue

	Residential	Commercial	Outside	Totals
5/8"- 3/4"	$47,672.00	$2,065.00	$0.00	$ 49,737.00
5/8"- 3/4" out	$0.00	$0.00	$1,600.00	$ 1,600.00
1"	$1,416.00	$236.00	$64.00	$ 1,716.00
1 1/2"	$59.00	$649.00	$0.00	$ 708.00
2"	$118.00	$413.00	$0.00	$ 531.00
3"	$59.00	$0.00	$64.00	$ 123.00
4"	$0.00	$118.00	$0.00	$ 118.00
6"	$0.00	$0.00	$0.00	$ -
Total/month	$49,324.00	$3,481.00	$1,728.00	**$ 54,533.00**
Base Rate Totals 12 mo. Total	$591,888.00	$41,772.00	$20,736.00	**$ 654,396.00**
% of operating budget	76.62%	5.41%	2.68%	**84.71%**

Water with base charge	Total/month	3,344	236	108	3,688
	12 mo. Total	40,128	2,832	1,296	44,256

Total Water Included in Base Rate	12 mo. Total	44,256	43.37%		
Available Units Tier One				22,128	57,785
Available Units Tier Two				35,657	$ 122,009.16
	Potential Lost Revenue Cost				15.79%
Non-Revenue Units	11,449	$75,367.47			
					$ 776,405.16
			Annual Gain/Shortfall		$ 3,922.16
					100.51%

Notes:

Base rates using # of service connections as the approach for setting rates

4 units per user/per month = 44,256 units of water allowance or 43.37 percent

Tier One/Two at respective $ per unit equals balanced budget

Typical Residential Water Bill

Units of Water	Residential Water Bill
5.44	$63.32
6.00	$65.00
10.00	$71.24

Meter Multiplier:

With the study, a suggestion to change the water rate structure from EDUs to service connections using meters as the primary method of setting water rates, key points are provided to better understand the approach. Generally, meter ratios are designed from two separate theories, where meter multiplier cost ratios are used when assigning elements of costs specifically related to meters, and meter capacity ratios, are most often used when estimating the potential demand requirements from a single customer.

Customer costs by equivalent meter-and-service ratios recognize that meter-and-service costs vary, depending on considerations such as size of service pipe, materials used, locations of meters, and other local characteristics for various sized meters as compared to 5/8-inch by 3/4-inch meter service. With a 5/8-inch by 3/4-inch meter being the starting point and using a one-to-one ratio, increasing the size of the meter increases those ratios as they relate to the cost for repair and replacement. Table 7 provides specific ratios.

Table 7: Meter Cost Equivalencies / Dollar Ratios

Size (inches)	Equivalent Cost Meter Ratio	Equivalent Dollar Ratios
5/8 - 3/4	1.1	$1.00
1.0	1.4	$1.40
1.5	1.8	$1.80
2.0	2.9	$2.90
3.0	11.0	$11.00
4.0	14.0	$14.00
6.0	21.0	$21.00

Using Table 7, an example of a two-inch meter equivalency to the 5/8-inch by 3/4-inch meter correlates as being 2.9 times more costly to repair and or replace during the service life than a 5/8-inch by 3/4-inch meter. If a 5/8-inch by 3/4-inch meter service costs the consumer $10.00 per month, then a two-inch meter has a monthly rate at $29.00.

Using this approach in determining costs associated with various meter sizes, removes the distinction of class categorization, i.e., residential, commercial, or industrial. This approach places the emphasis on the size of meter and not user type. The size of the meter is the focus in determining appropriate monthly base rates.

Another focal point using a meter cost ratio is when a water allowance is given as part of the monthly base charge; said allowances will increase proportionately with the cost ratios, a significant difference from the capacity ratio, especially as it relates to the larger meters. A two-unit allowance for a 5/8-inch by 3/4-inch meter would translate to (two-units multiplied by 2.9) 5.8 units of water allowance. The ratios are an American Water Works Association standard.

The city has done well with keeping the water rates in line with expenses. With applying the meter equivalency structure, this technique again, merges two methods into a single set of rates. Setting the rate for a 5/8-inch by 3/4-inch meter and aligning the cost to meet 60-75 percent of total expenditures will automatically synchronize the larger meters and their respective monthly base costs. Using the

meter-multiplier cost ratio, the city's efforts on routine rate adjustments will allow the meter multiplier to be applied to the existing 5/8-inch by 3/4-inch meter base rate, then follow the ratios for applying base costs for the larger users.

Calculating all water provided in the base rate will better determine the amounts of available water to be sold. Water provided in the base rate is subtracted from the total water produced. Non-billable water is also subtracted from the category of available water.

The meter multiplier begins at determining the base rates solely on fixed operating expenses which are typically 60-75 percent of a water budget. Applying a 65 percent foundation to the 5/8-inch by 3/4-inch meter, we see a monthly connection rate established at $48.87, currently the monthly charge at $59.00 dollars.

Using the meter multiplier approach to base rates, and applying the same theory to allowances of water, a decrease unit number from 49,056 to 24,151 units. The remaining available water being 76 percent (77,890 units) should be sold at a minimum of $2.30 per unit.

Total base rate revenues obtained when the larger meters are formulated using the meter cost ratio decreases base rate revenues down from 93.88 percent to 76.97 percent. The remaining 23.03 percent of the proposed budget will be generated by water sales. Table 8 Meter Multiplier Costs provide specifics as it relates to the implementation of new rates base on meter size.

Table 8: Meter Multiplier Costs			
Total # of Connections	**922**	**Allowance**	**Two units [1]**
Base Rate	**$48.87 [2]**	**Annual Base Revenue**	**$594,565.59**
Total Allowance of Water (gals.)		**24,151 units (18.06 MG)**	
Available Water for Sale (gals.)		**77,890 units (58.26 MG)**	
Required Balance of Revenues	**$177,917.41**	**Total Billable Units**	**77,890**
Consumption Rate per Unit	**$2.30**	**Annual Consumption Revenue**	**$179,146.89**
		Total Revenues	**$773,712.47**
			$1,229.47
Typical Monthly Cost (5/8" meter) (gals.) [3]		**5.44 units (4,000 gals.)**	**$56.79**
1- unit is 748 gals or1,496 gallons per month, 2 – 5/8-inch by 3/4-inch meter service inside city limits, 3 – inside city users			

MM Cost Spreadsheet:

MM Cost

Rate Study
for

City of Dayton

For Year: 2021-2022
Date completed: June-21

	Annual Units		
Amount of Water Produced	117,347		
Amount of Water Sold	102,041		
Unaccounted for Water	15,306	13.04%	

	Dollars
Annual Operating Budget	$598,161.00
Annual Debt Service	$174,322.00
Total Annual Budget	$772,483.00

Connection Information	Size	# of connections Residential	Commercial	Outside	
	5/8"- 3/4"	808	35	0	
	5/8"- 3/4" out	0	0	25	
	1"	24	4	1	
	1 1/2"	1	11	0	
	2"	2	7	0	
	3"	1	0	1	
	4"	0	2	0	Total Connections
	6"	0	0	0	922
Consumption w/ base (gal.)		See Units Allowed (100 cu.ft.)			

Units Allowed		Residential	Commercial	Outside	Meter Multiplier In Use
2.0	5/8"- 3/4"	$48.87	$48.87	$58.65	5/8" = 1.0
2.0	5/8"- 3/4" out	$53.76	$53.76	$58.65	3/4" = 1.1
2.8	1"	$68.42	$68.42	$82.11	1" = 1.4
3.6	1 1/2"	$87.97	$87.97	$105.57	1 1/2" = 1.8
5.8	2"	$141.73	$141.73	$170.08	2" = 2.9
22.0	3"	$537.61	$537.61	$645.13	3" = 11.0
28.0	4"	$684.23	$684.23	$821.08	4" = 14.0
42.0	6"	$1,026.35	$1,026.35	$1,231.62	6" = 21.0
Consumption Charge	per 100 cu.ft.	$2.30			

Current Base Revenue		Residential	Commercial	Outside		Totals
	5/8"- 3/4"	$39,489.91	$1,710.58	$0.00	$	41,200.49
	5/8"- 3/4" out	$0.00	$0.00	$1,466.21	$	1,466.21
	1"	$1,642.15	$273.69	$82.11	$	1,997.95
	1 1/2"	$87.97	$967.70	$0.00	$	1,055.67
	2"	$283.47	$992.14	$0.00	$	1,275.60
	3"	$537.61	$0.00	$645.13	$	1,182.74
	4"	$0.00	$1,368.46	$0.00	$	1,368.46
	6"	$0.00	$0.00	$0.00	$	-
	Total/month	$42,041.12	$5,312.57	$2,193.45	$	49,547.13
	12 mo. Total	$504,493.40	$63,750.79	$26,321.39	$	594,565.59

% of operating budget		65.31%	8.25%	3.41%	76.97%
Water with base charge	Total/month	1,720	217	75	2,013
	12 mo. Total	20,645	2,609	898	24,151
Typical 3/4" Usage		Percentage of Allowed Water			24%

Water Consumption		Residential	Commercial	Other	Total Base Revenue	
	12 mo. Total	20,645	2,609	898	$	594,565.59
Available Water to be Sold				77,890	$	179,146.89
Consumption Revenues		Potential Annual Revenues			$	773,712.47
			Total Revenue Generated		$	1,229.47
Cost per 100 c.f.	$6.58		Annual Gain/(Shortfall)			0.16%

Notes:
Lower allowance of water provides a lower minimum unit cost

Typical Residential Water Bill	
Gallons Used	Res. Water Bill
5.44	$56.79
6	$58.07
10	$67.27

Increase Consumption Rate:

The approach taken in this example is a schedule of rates applicable to blocks of increasing usage in which the usage in each succeeding block is charge a higher unit rate. Currently the City of Dayton has this formatted structure. Increasing block rates are designed based on the customer classification determined by similar usage patterns. The design of the increased block rate will be categorized by the size of the meter. Each successive block rate "may" be applicable to a greater volume of water delivery than the preceding block(s). Not every block tier could be uniformed.

This style of rates requires applying a judgment and utility policy regarding the number of blocks, the point at which one block ends and the next block begins, and the relative price levels of the blocks.

An example of this structure is: four-inch meter service has a 14.0-1 ratio to a 5/8-inch by 3/4-inch meter. If a 5/8-inch by 3/4-inch meter is allowed two units of water per month in the base rate, a four-inch meter is allowed 28 units of water per month. To eliminate the "judgement" factor for consideration in applying successive block volumes, each subsequent block(s) can be set in step with the previous block. The total number of tiers considered for an increase block formation will vary from one service provider to another, but normal design is configured using three tiers. The base rate and allowance of water reflect a representation of the actual usage that will determine the various set points of each block.

Conservative in nature, this method towards water rates creates an incentive to save water. Understand, that normal water consumption, if reduced by this approach, should later return to levels prior to the rate change. One facet regarding this method of setting water rates is the fact that the total revenues are calculated from the average consumption figures and not on the expectancies of greater water sales.

Table 9: Tier Rate Recommendations

1	2	4	5	6	7	8
Meter Size	Mo. Base Rate	Allowances	With Base Rate	Tier One $3.00 per	Tier Two $4.50 per	Tier Three $6.00 per
	Base Rate	With Base Rate	With Base Rate	Tier One Range [C]	Tier Two Range [C]	Tier Three Range [C]
5/8"	$ 48.87	2	2	2.1 - 4.0	4.1 - 8.0	8.1 +
5/8" [A]	$ 58.65	2	2	2.1 - 4.0	4.1 - 8.0	8.1 +
[B]	Applied tier adjustments for outside city users			$3.60	$5.40	$7.20
1"	$ 68.42	2.8	2.8	2.9 - 5.6	5.7 - 11.2	11.3 +
1.5"	$ 87.97	3.6	3.6	3.7-7.2	7.3 - 14.6	14.6 +
2"	$ 141.73	5.8	5.8	5.9 - 11.6	11.7 - 23.2	23.2 +
3"	$ 537.61	22	22	22.1 - 44.2	44.3 - 88.4	88.4 +
3" [D]	$ 645.13	22	22	22.1 -44.2	44.3 - 88.5	88.4 +
[B]	Applied tier adjustments for outside city users			$3.60	$5.40	$7.20
4"	$ 684.23	28	28	28.1 - 56.2	56.3 - 112.4	112.4 +

A - service connection base rate for outside city limits - (27 total users)

B - Tiered rates for outside users synchronized with inside user increases

C - Typical start-stop points at each step of the tiered structure.

Table 9 – Tier Rate Recommendations shares a format that outlines the accepted base rates and allowances, plus offers a set of ascending steps of adjustment for each sized meter in service. Note the outside city service users have the same ascending steps, but cost per unit is reflective of the original price per unit, implementing a twenty percent surcharge for delivery of water beyond the city limits.

Costs per unit are usually set according to actual usage of like groups. The group that usually sets the foundation will likely be the majority users, single family residences. In the analysis performed using the meter-multiplier example, proves if all available units can be sold at $2.30 per unit, revenues will match the proposed budget.

The initial outline for a tier rate structure was to implement a tier format that is similar to existing tiers yet simplify the structure from the current eight tiers. A three-tier structure should be more than adequate to curtail excesses usage, generate funds for both short and long-term projects, be easily understood and interact with the current billing software.

Table 10 depicts the monthly base rate with the associated meter size and service area (inside or outside) city limits. It also includes the three-tier increased block rate for those respective services.

Table 10: Monthly Water Rates

Inside City Limits		Outside City Limits	
Meter Size	Monthly Base Rate	Meter Size	Monthly Base rate
5/8-inch by 3/4-inch	$ 48.87	5/8-inch by 3/4-inch	$ 58.65
1.0"	$ 68.42	1.0"	$ 82.11
1.5"	$ 87.97	1.5"	NA
2.0"	$ 141.73	2.0"	NA
3.0"	$ 537.61	3.0"	$ 645.13
4.0"	$ 684.23	4.0"	NA

Tiers Cost per Unit	
Base rate - includes two units fo 5/8-inch by 3/4-inch	
Larger meter services use meter ratio - See Table 7 - page 14 to set units for larger meters	
Tier One	**Tier One**
$3.00 per 100 cubic feet	$3.60 per 100 cubic feet
Tier Two	**Tier Two**
$4.50 per 100 cubic feet	$5.40 per 100 cubic feet
Tier Three	**Tier Three**
$6.00 per 100 cubic feet	$7.20 per 100 cubic feet
Steps associated with each tier is in Table 9 -Columns 6 through 8	

Table 11 provides the stair step arrangement for implementation of the recommended increased block structure, showing when one rate ceases and the next rate commences.

Table 11: Tier Structure				
Inside - Outside City Limits				
Meter Size	**Base**	**Tier One**	**Tier Two**	**Tier Three**
5/8-inch by 3/4-inch	2.00	2.10	4.10	8.0 +
1.0"	2.80	2.90	5.60	11.3 +
1.5"	3.60	3.70	7.30	14.6 +
2.0"	5.80	5.90	11.70	23.2 +
3.0"	22.00	22.10	44.30	88.4 +
4.0"	28.00	28.10	56.10	112.4 +

The following pages depict the three simplified classifications of users as a) inside city customers, b) commercial customers and c) outside city customers. Even though the base rates are centered on meter size, the spreadsheets outline specifics as it relates to current categories of users. Information is:

- Total number of users per category
- The base rate for each sized meter and its impact towards total budget
- Charges per unit of consumed relating to the three tiers
- Varied monthly customer costs from allowances to 336 units
- Annual revenues and percentage of budget at each of the three tiers
    - All three categories must be added together to obtain each levels contribution to the final budget

See spreadsheets Ascending Rates for Inside, Commercial and Outside City Consumers

Ascending Rate for Consumers "Inside City"

Connection Information

Size	# of inside connections by size Meter Cost Multiplier Factor			Base Rate Information	
5/8"- 3/4"	808	1.00		$48.87	Monthly Base Revenue
5/8"- 3/4" out		1.10		$53.76	
1"	24	1.40		$68.42	$42,041.12
1 1/2"	1	1.80		$87.97	
2"	2	2.90		$141.73	Annual Base Revenue
3"	1	11.00	Total #	$537.61	
4"	0	14.00	Connections	$684.23	$504,493.40
6"	0	21.00	836	$1,026.35	65.31%

Total Proposed Budget:

$ 772,483.00

	Allow	Tier 1 Cost / 1 ccf	Tier 2 Cost / 1 ccf	Tier 3 Cost / 1 ccf		COST TO CONSUMER AT EACH TIER			Consumption Monthly Revenue	Total Consumption Monthly Revenue
5/8"	2.0	$3.00	$4.50	$6.00	NA	$6.00	$18.00	$12.00	$324.60	$ 5,161.20
3/4"	2.0	$3.00	$4.50	$6.00	NA	$6.00	$18.00	$48.00	$955.80	$ 15,483.60
1"	2.8	$3.00	$4.50	$6.00	NA	$8.40	$25.20	$67.20	$2,548.80	$ 12,201.60
1 1/2"	3.6	$3.00	$4.50	$6.00	NA	$10.80	$32.40	$86.40	Consumption	Total Consumption
2"	5.8	$3.00	$4.50	$6.00	NA	$17.40	$52.20	$139.20	Annual Revenue	Annual Revenue
3"	22.0	$3.00	$4.50	$6.00	NA	$66.00	$198.00	$528.00	$3,895.20	$ 61,934.40
4"	28.0	$3.00	$4.50	$6.00	NA	$84.00	$252.00	$672.00	$11,469.60	$ 185,803.20
6"	42.0	$3.00	$4.50	$6.00	NA	$126.00	$378.00	$1,008.00	$30,585.60	$ 146,419.20
		Tier Change Levels				Monthly Customer Costs				$394,156.80
5/8"	Included	4.0	8	10	$48.87	$54.87	$72.87	$84.87		Base + Consumption
3/4"	Included	4.0	8	16	$53.76	$59.76	$77.76	$125.76		Annual Revenue
1"	Included	5.6	11.2	22.4	$68.42	$76.82	$102.02	$169.22	65.31%	$ 504,493.40
1 1/2"	Included	7.2	14.4	28.8	$87.97	$98.77	$131.17	$217.57	8.02%	$ 566,427.80
2"	Included	11.6	23.2	46.4	$141.73	$159.13	$211.33	$350.53	24.05%	$ 752,231.00
3"	Included	44.0	88	176	$537.61	$603.61	$801.61	$1,329.61	18.95%	$ 898,650.20
4"	Included	56.0	112	224	$684.23	$768.23	$1,020.23	$1,692.23	73.33%	$ 566,427.80
6"	Included	84.0	168	336	$1,026.35	$1,152.35	$1,530.35	$2,538.35	Based on Tier 1	73%
	Cubic Feet begin in relationship to meter multiplier									$ (206,055.20)
	1 Unit = 100 cu. ft. or 748 gallons									

Ascending Rate for Consumers "Commercial"

Connection Information

Size	# of outside connections by size	Meter Cost Multiplier Factor		Base Rate Information	
5/8"- 3/4"	35	1.00		$48.87	Monthly Base Revenue
5/8"- 3/4" out	0	1.10		$53.76	
1"	4	1.40		$68.42	$5,312.57
1 1/2"	11	1.80		$87.97	
2"	7	2.90		$141.73	Annual Base Revenue
3"	0	11.00	Total #	$537.61	
4"	2	14.00	Connections	$684.23	$63,750.79
6"	0	21.00	59	$1,026.35	8.25%

Total Proposed Budget:

$ 772,483.00

	Allow	Tier 1 Cost / 1 ccf	Tier 2 Cost / 1ccf	Tier 3 Cost / 1ccf		COST TO CONSUMER AT EACH TIER			Consumption Monthly Revenue	Total Consumption Monthly Revenue
5/8"	2	$3.00	$4.50	$6.00	NA	$6.00	$18.00	$12.00	$324.60	$ 652.20
3/4"	2	$3.00	$4.50	$6.00	NA	$6.00	$18.00	$48.00	$973.80	$ 1,956.60
1"	3	$3.00	$4.50	$6.00	NA	$8.40	$25.20	$67.20	$2,560.80	$ 3,957.60
1 1/2"	4	$3.00	$4.50	$6.00	NA	$10.80	$32.40	$86.40	Consumption	Total Consumption
2"	6	$3.00	$4.50	$6.00	NA	$17.40	$52.20	$139.20	Annual Revenue	Annual Revenue
3"	22	$3.00	$4.50	$6.00	NA	$66.00	$198.00	$528.00	$3,895.20	$ 7,826.40
4"	28	$3.00	$4.50	$6.00	NA	$84.00	$252.00	$672.00	$11,685.60	$ 23,479.20
6"	42	$3.00	$4.50	$6.00	NA	$126.00	$378.00	$1,008.00	$30,729.60	$ 47,491.20
		Tier Change Levels				**Monthly Customer Costs**				**$78,796.80**
5/8"	Included	**4**	**8**	**10**	**$48.87**	**$54.87**	**$72.87**	**$84.87**		Base + Consumption
3/4"	Included	**4**	**8**	**16**	**$53.76**	**$59.76**	**$77.76**	**$125.76**		Annual Revenue
1"	Included	**6**	**11.2**	**22.4**	**$68.42**	**$76.82**	**$102.02**	**$169.22**	8.25%	$ 63,750.79
1 1/2"	Included	**7**	**14.4**	**28.8**	**$87.97**	**$98.77**	**$131.17**	**$217.57**	1.01%	$ 71,577.19
2"	Included	**12**	**23.2**	**46.4**	**$141.73**	**$159.13**	**$211.33**	**$350.53**	3.04%	$ 95,056.39
3"	Included	**44**	**88**	**176**	**$537.61**	**$603.61**	**$801.61**	**$1,329.61**	6.15%	$ 142,547.59
4"	Included	**56**	**112**	**224**	**$684.23**	**$768.23**	**$1,020.23**	**$1,692.23**	9.27%	**$ 71,577.19**
6"	Included	**84**	**168**	**336**	**$1,026.35**	**$1,152.35**	**$1,530.35**	**$2,538.35**	Based on Tier 1	9%
	Cubic Feet begin in relationship to meter multiplier									**$ (700,905.81)**
	1 Unit = 100 cu. ft. or 748 gallons									

Ascending Rate for "Outside City"

Connection Information

Size	# of connections by size	Meter Cost Multiplier Factor		Base Rate Information	
5/8"- 3/4"	0	1.00		$58.65	Monthly Base Revenue
5/8"- 3/4" out	25	1.00		$58.65	
1"	1	1.40		$82.11	$2,193.45
1 1/2"	0	1.80		$105.57	
2"	0	2.90		$170.08	Annual Base Revenue
3"	1	11.00	Total #	$645.13	
4"	0	14.00	Connections	$821.08	$26,321.39
6"	0	21.00	27	$1,231.62	3.41%

Total Proposed Budget:

$ 772,483.00

		Tier 1	Tier 2	Tier 3					Consumption	Total Consumption
	Allow	Cost / ccf	Cost / ccf	Cost / ccf		COST TO CONSUMER AT EACH TIER			Monthly Revenue	Monthly Revenue
5/8"	2	$3.00	$4.50	$6.00	NA	$6.00	$18.00	$12.00	$324.60	$ 224.40
3/4"	2	$3.00	$4.50	$6.00	NA	$6.00	$18.00	$48.00	$973.80	$ 673.20
1"	3	$3.00	$4.50	$6.00	NA	$8.40	$25.20	$67.20	$2,560.80	$ 1,795.20
1 1/2"	4	$3.00	$4.50	$6.00	NA	$10.80	$32.40	$86.40	Consumption	Total Consumption
2"	6	$3.00	$4.50	$6.00	NA	$17.40	$52.20	$139.20	Annual Revenue	Annual Revenue
3"	22	$3.00	$4.50	$6.00	NA	$66.00	$198.00	$528.00	$3,895.20	$ 2,692.80
4"	28	$3.00	$4.50	$6.00	NA	$84.00	$252.00	$672.00	$11,685.60	$ 8,078.40
6"	42	$3.00	$4.50	$6.00	NA	$126.00	$378.00	$1,008.00	$30,729.60	$ 21,542.40
		Tier Change Levels			Monthly Customer Costs					$32,313.60
5/8"	Included	4	8	10	$58.65	$64.65	$82.65	$94.65		Base + Consumption
3/4"	Included	4	8	16	$58.65	$64.65	$82.65	$130.65		Annual Revenue
1"	Included	6	11.2	22.4	$82.11	$90.51	$115.71	$182.91	3.41%	$ 26,321.39
1 1/2"	Included	7	14.4	28.8	$105.57	$116.37	$148.77	$235.17	3.76%	$29,014.19
2"	Included	12	23.2	46.4	$170.08	$187.48	$239.68	$378.88	4.80%	$ 37,092.59
3"	Included	44	88	176	$645.13	$711.13	$909.13	$1,437.13	7.59%	$ 58,634.99
4"	Included	56	112	224	$821.08	$905.08	$1,157.08	$1,829.08	4.80%	$ 37,092.59
6"	Included	84	168	336	$1,231.62	$1,357.62	$1,735.62	$2,743.62	Based on Tier 2	4.80%
	Cubic Feet begin in relationship to meter multiplier									$ (735,390.41)
	1 Unit = 100 cu. ft. or 748 gallons									

Annual Rate Adjustments:

The City of Dayton has worked diligently in developing water rates that are both sustaining to the water department to perform the necessary operations, and also mindful of the consumers. Each year the City would add a dollar with the emphasis on comparing current revenues to necessary expenses.

A viable alternative towards comparing revenues against expenditures is the "consumer price index" (CPI) that can extract specific costs associated with inflation that pertains to water and sewer operating expenses. This indicator provides a estimate of the buying power of the current dollar compared to previous years. Looking at water and sewerage maintenance prices and inflation stipulates specific costs as it relates to the previous year(s) and can be quite different from the overall CPI, or overall inflation rate.

The link below offers the city a method to follow the CPI as it relates to water and sewer inflation and apply any adjustment to the base rate. The past ten-year cycle has averaged CPI is 4.04 percent annually.

https://www.in2013dollars.com/Water-and-sewerage-maintenance/price-inflation/2010-to-2020?amount=20

Key indicators that will adjust the operational cost for the fiscal year is the listing of capital improvement plans to be completed within a given timeframe. Annually, this single budgeted line item will vary with each year's analysis, as projects are completed, tabled to the subsequent year, or rescinded. Employing a set figure for capital improvement planning maintains consistency in the budget. A major impact to budgeting is the inevitable large project that is usually projected over a timeline of a loan repayment program. Large projects are usually the component that increase rates significantly, causing uneasiness for most involved with establishing the annual budget.

Summary:

There are various arrangements that can be used to reach an acceptable water rate that meets budgetary requirements. The uniqueness of communities creates challenges that may or may not work from community to community. Whatever the cost associated with providing water from the source to the consumer's tap, usually varies from one water system to another. The variables associated with other water systems sometimes cannot apply to the City of Dayton. A new water system completed without any debt owed is rarely seen. The age of a water system plays a bigger role in determining future cost since rebuilding is often more expensive than new development.

The importance of looking at the future regarding system growth and repair, or replacement of aging components, and determining an evaluation of costs can be difficult at times. Proposed costs are usually lower than actual costs due to various circumstances. It is important for public relations and communications to play a role in preserving consumer confidence in both water quality system operations and management.

Covered facts discovered in the initial assessment were two: a) the set base rates created an unequal cost per unit of water delivered to the customer, b) the price differentiation in the unit price for 748 gallons of water (one hundred cubic feet), from $1.56 to $6.21 per unit charge as compared to $6.58 production unit cost.

Pertaining to the examples presented in this rate study, the City of Dayton has chosen a two move towards a meter multiplier base rate and simplify the existing tiered structure from eight to three levels.

The following are recommendations:

- Begin an annual review of prioritized smaller projects and costs associated with
  - Apply the findings against the short-term capital improvement set asides
  - Adjust projects to match single line-item funding, or adjust capital improvement figures
- Review CPI figures and adjust the "base rate" according to the inflation index for water and sewerage maintenance, using the single past year as the criteria

These suggestions create formality in the water rates using absolute ratios to apply base rates allowing the City to adjust the rates in the future. Using one of the industry standards of having the base rate meet 60-75% of proposed budget, the City has performed exquisitely in maintaining fixed cost revenues.

Water Consumption - Monthly Rate Comparison								
Connection Size		5/8-3/4	5/8-3/4 out	1.0	1.5	2.0	3.0	4.0
Base Rate Water Allowance		**2**	**2**	**2.8**	**3.6**	**5.8**	**22**	**28**
Base Rate		**$48.87**	**$58.65**	**$68.42**	**$87.97**	**$141.73**	**$537.61**	**$684.23**
Consumer Class								
Residential		808	0	24	1	2	1	0
Commercial		35	0	4	11	7	0	2
Outside		0	25	1	0	0	1	0
Monthly Usage and Hypothetical Cost at Various Consumption Levels								
Tier Rates	**Tier One**	**$3.00**		**Tier Two**	**$4.50**		**Tier Three**	**$6.00**
Consumption Levels								
2.00		$ 48.87	$ 58.65	$ 68.42	$ 87.97	$ 141.73	$ 537.61	$ 684.23
4.00		$ 54.87	$ 64.65	$ 72.02	$ 89.17	$ 141.73	$ 537.61	$ 684.23
5.44		$ 61.35	$ 68.97	$ 76.34	$ 93.49	$ 141.73	$ 537.61	$ 684.23
5.80		$ 62.97	$ 70.59	$ 85.52	$ 94.57	$ 141.73	$ 537.61	$ 684.23
7.20		$ 69.27	$ 76.89	$ 91.82	$ 100.87	$ 145.93	$ 537.61	$ 684.23
8.00		$ 74.07	$ 81.69	$ 95.42	$ 104.47	$ 148.33	$ 537.61	$ 684.23
11.60		$ 95.67	$ 103.29	$ 120.32	$ 120.67	$ 159.13	$ 537.61	$ 684.23
12.21		$ 99.33	$ 106.95	$ 123.98	$ 123.42	$ 161.88	$ 537.61	$ 684.23
13		$ 104.07	$ 111.69	$ 128.72	$ 126.97	$ 165.43	$ 537.61	$ 684.23
14.40		$ 112.47	$ 120.09	$ 137.12	$ 133.27	$ 171.73	$ 537.61	$ 684.23
15.11		$ 116.73	$ 124.35	$ 141.38	$ 137.53	$ 174.93	$ 537.61	$ 684.23
16.6		$ 125.67	$ 133.29	$ 150.32	$ 146.47	$ 181.63	$ 537.61	$ 684.23
17		$ 128.07	$ 135.69	$ 152.72	$ 148.87	$ 183.43	$ 537.61	$ 684.23
18		$ 134.07	$ 141.69	$ 158.72	$ 154.87	$ 187.93	$ 537.61	$ 684.23
19		$ 140.07	$ 147.69	$ 164.72	$ 160.87	$ 192.43	$ 537.61	$ 684.23
21.16		$ 153.03	$ 160.65	$ 177.68	$ 173.83	$ 202.15	$ 537.61	$ 684.23
23		$ 165.27	$ 172.89	$ 189.92	$ 186.07	$ 211.33	$ 543.73	$ 684.23
29.31		$ 201.93	$ 209.55	$ 226.58	$ 222.73	$ 247.99	$ 562.06	$ 688.16
35		$ 236.07	$ 243.69	$ 260.72	$ 256.87	$ 282.13	$ 579.13	$ 705.23
39.58		$ 263.55	$ 271.17	$ 288.20	$ 284.35	$ 309.61	$ 592.87	$ 718.97
44.00		$ 290.07	$ 297.69	$ 314.72	$ 310.87	$ 336.13	$ 606.13	$ 732.23
50.83		$ 331.05	$ 338.67	$ 355.70	$ 351.85	$ 377.11	$ 643.50	$ 752.72
56		$ 362.07	$ 369.69	$ 386.72	$ 382.87	$ 408.13	$ 666.76	$ 768.23
60		$ 386.07	$ 393.69	$ 410.72	$ 406.87	$ 432.13	$ 684.76	$ 786.23
66.72		$ 426.39	$ 434.01	$ 451.04	$ 447.19	$ 472.45	$ 715.00	$ 816.47
70		$ 446.07	$ 453.69	$ 470.72	$ 466.87	$ 492.13	$ 729.76	$ 831.23
75		$ 476.07	$ 483.69	$ 500.72	$ 496.87	$ 522.13	$ 752.26	$ 853.73
80		$ 506.07	$ 513.69	$ 530.72	$ 526.87	$ 552.13	$ 774.76	$ 876.23
92.36		$ 580.23	$ 587.85	$ 604.88	$ 601.03	$ 626.29	$ 830.38	$ 931.85
112.00		$ 698.07	$ 705.69	$ 722.72	$ 718.87	$ 744.13	$ 948.22	$1,020.23
140.00		$ 866.07	$ 873.69	$ 890.72	$ 886.87	$ 912.13	$ 1,116.22	$1,236.23
400.26		$ 2,427.63	$ 2,435.25	$ 2,452.28	$ 2,448.43	$ 2,473.69	$ 2,677.78	$2,797.79

The preceding chart is a hypothetical monthly cost associated with various levels of consumption. It provides a generic outline on specific levels of water consumption associated with routine usage coupled with the tiers established in the water rate study for the year 2021-2022.

The City of Dayton has requested the Oregon Association of Water Utilities to suggest how to conclude an annual adjustment for the city's monthly water rates, which is accomplished by using the CPI. The aspect of water rates determination relative to future cost can be difficult to forecast.

As the City chooses to implement the proposed rates, the homework in tallying up water produced figures, water sales, unaccounted for water, and expenditures will begin to confirm that the "in theory" ideas presented in this study meet the "reality" of water system operational costs and revenues generated during the subsequent year. The City has been proactive in understanding the mentioned items of sales, production, and expenditures, knowing the importance of the resource that is provided to its community.

As collected evidence presents itself during the subsequent year, the Oregon Association of Water Utilities will return, if called upon, to review and confirm the effectiveness of the chosen scenario. With numerous considerations and decisions being calculated with this rate study, it is an objective of Oregon Association of Water Utilities to assist the City of Dayton in water rates that meet the needs of the water system, provide fair and equitable rates for all consumers, and to ensure the water system is poised for future growth.