Wastewater Rate Study

City of Dayton

Final Report

September 2023

Prepared by:

Oregon Association of Water Utilities

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Executive Summary:

Oregon Association of Water Utilities is pleased to present this report on the wastewater cost of service, rate design and water rate study to the City of Dayton. We are confident that the results developed, based on a cost-of-service analysis, when implemented, will result in fair sewer rates for the City's users. Secondly with equal priority, the revenue program will be in aligned with the operations of the wastewater department.

The wastewater rate study involved a review of the City's financial budget, rate structure, and usage characteristics. In addition, the study also included a review of the City's capacity in relation to the flows generated in the winter months and its relationship to water consumption.

Background:

Through the Oregon Association of Water Utilities' membership services, the City of Dayton entered into an agreement in June 2021 to update the cost of services for wastewater rates. A rate design to ensure a continued fair rate structure of user fees associated with wastewater services. A review of the capital improvement planning (both short-term and long-term) using a single line-item expense to obtain said monthly rates.

To meet the annual operating expenses required by the City's adopted budget, the City of Dayton should consider a billing format developed on a strength-based generated waste, which at the time of developing this study was not completed. Strength-based waste reviews the levels of Biological Oxygen Demands (BODs) and Total Suspended Solid (TSSs) in certain waste streams and the impact of potential added cost for treatment.

Objectives:

- Revenue sufficient to meet operations and maintenance costs, capital outlay, and debt service.
- Revenues to supply adequate operating funds and short-term capital reserves.
    - Smaller projects that can be completed within the timeframe of this study.
    - Revenues to cover the cost of short-term small projects to be completed annually.
- Create rates that are fair for all users.
- Produce rates that meet the criteria of lending agencies for future long-term capital projects and loans.
    - Large projects that are funded through low-interest loans, grants, possible principal forgiveness.

The four major processes are as follows:

Financial Planning: Revenue requirements are projected for a three-year period from FY 2022 through FY 2025. Financial planning involves the city using a single line item for the annual O&M and capital expenditures, annual debt service and reserve requirements, and capital revenue sources and the determination of required revenues from annual user rates.

Utility Fee Basis**:** Generate enough revenue through user fees to cover all the costs of running the wastewater infrastructure in theory as a business. In addition to staff time, equipment

maintenance, materials and supplies needed to provide the direct services of each utility, other costs, such as debt service payments and funding for capital improvements, must also be recovered through the rates. Utility funds are not supported by property taxes; revenue is generated from user fees.

Cost of Service: Cost of service involves the apportioning of required annual revenues to the different user classes proportionate to their contributions of flows and loadings. Since the City has not completed the Significant Users Industrial Survey (SUID), a uniform rate can be applied for all users.

Rate Design: Rate design involves the development of a fixed and variable schedule of rates for each of the different user classes to equitably recover the costs attributable to them. The units of service for sanitary sewage flow and strength are a direct measure of a customer's wastewater discharge and, therefore, a direct measure of the level of service.

Averaging Winter Water (AWW) Consumption:

The average winter water (AWW) consumption is found in residential customers during October through March. Most water used indoors during this time of year enters the sewer system as a 1:1 return factor. Since much of the water used in warmer months waters lawns and gardens and doesn't enter the sewer system, the city can use the AWW as the fairest way of deciding sewer volume. AWW use during these months is used as the wastewater use charge for the remaining part of the year from April through September. The City bills customers the AWW consumption or may apply an actual water consumption, whichever is less.

AWW provides a general measurement that is indicative of the amount of water that goes directly into the wastewater system from a SFR dwelling. If no water consumption is established, a citywide per month average will be used for the SFR dwelling. The city will recalculate the average winter water on an annual basis, during the springtime, prior to budget discussions.

Averaging Water Consumption		
Month	Units Generated	Six-month Average
October	7	6.5 units
November	5	
December	6	
January	7	
February	7	
March	7	

Sewer Cap Calculations:

In an attempt to determine sewer caps, as it relates to wastewater billing, essentially sets a cap (total volume of water), that residential (SFR) can be charged for the sewage generated. The total number of units consumed is based on the 2021 water rate study which estimated the average

water usage for all consumers was 7,100 gallons or 9.5 units. Forming the sewer cap at 6.0 units (4,488 gallons) corroborates the cap with the average winter water use.

If a customer has an unusual, high level of water consumption for a single month, then that month can be excluded from the average, recalculate the equation applying the new charges for the upcoming spring and summer months. If an individual's monthly AWW is over the sewer cap of six (6) units, then an appropriate adjusted sewer cap will (should) be established until the following annual review.

Minimum use average during the winter months billing period, accounts that have zero water consumption will be billed solely on an allowance of 6 units or 4,488 gallons per month, paying only the base rate.

Commercial and industrial accounts will not have a sewer cap applied to the accounts as the sewer flows will be centered on the current month water meter readings. The city should consider incorporating a 95 percent flow to set the billing cost.

Assumptions:

Following are the assumptions used in the study:

- Annual O&M and capital expenditures, revenues from the customer base, and reserve requirements are based on the City's adopted budget.
    - $832,530.00
- The above budget figure was adopted to secure funding for capital improvement projects and increase the 2022 budget by ≈ $300k. Additionally, the timing of the Ferry Street bridge project had finalized monies at ≈ $215K annual debt service. Adopted 2023-24 budget is:
    - $1,092,031.70 including bridge funding
- Annual average wastewater system flow is based on the City's Wastewater Treatment Plant (WWTP) "Daily Monitoring Reports".
- Annual wastewater collected at the WWTP is approximately 91.25 million gallons (MG)
- Hypothetical water sold that will eventually enter the sewer collection system 75.5 MG
    - Figure based on ninety-five percent of water sold.
- Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) strength assignment for the different user classes is currently not being used.
- Current base rates are labeled a "flat rate" with a monthly cost at $44.51 per equivalent dwelling unit, or EDU.
- Existing rate structure on EDUs total 1,027, while actual sewer connections are 877.

Annual Rate Review: Perform an annual review of current rates and compare those revenues against the cost of services to manage the city's wastewater system.

- Review basic services needed to meet system demands and the impact on the capital improvement plan (CIP), adjust wastewater rates accordingly.
- Adjust monthly user rates based on CIP or use the consumer price index (CPI) in comparison to the various scenarios, whichever is less.

- Wastewater rates are based upon water consumption. Summer wastewater rates are effective April 1 through September 30. Wastewater bills are based on the earlier winter month's average water consumption or upon actual consumption, whichever is less.
- Applying the new fixed monthly fee to SFR users, then adjust base rates for larger sized service connections to align with meter ratios, creating impartiality.
- Consider a 95 percent return factor be applied to commercial, industrial accounts for water use that is not returned as sewer flow. This step may complicate the billing and understanding of the rate structure.
- Consider using the established SFR class sewer cap at 6.0 units.
- A Significant Industrial Users Survey (SIUS) has not been performed and considered not a priority nor necessary to create added charges for total suspended solids (TSS) or biological oxygen demand (BOD).
- Other classification of users (commercial/industrial) applies a single (previous) month water usage to bill as wastewater generated from the customer.
- Update and review overall operating costs, annual changes to the CIP to develop proposed budgets.
- Review future system upgrades necessary to meet system volume limitations or added flows as the community expands.

Current Rate Structure:

The City of Dayton uses a flat rate structure based on equivalent dwelling units (EDU) based on zero gallons per unit per month. Current billing practices are monthly. Total number of EDUs is 1,027 deciphered on the basis of a single-family residence. A single-family residence is considered one EDU, while multi-family residence is considered one EDU per unit.

Current rate for all users (residential, commercial, and industrial) is $44.51 per equivalent dwelling unit (EDUs)

- Existing EDUs total 1,027
- Service connections total 877

Table 1: Current Wastewater Rates

Current Base Rates				Adopted budget *	$ 1,092,031.70
	Residential	Commercial	Outside	Flat Rate	Allowances
5/8"- 3/4"	$ 44.51	$ 44.51	$ -	NA	800
5/8"- 3/4" out	$ -	$ -	$ 44.51		800
1"	$ 44.51	$ 50.51	$ 44.51		800
1 1/2"	$ 44.51	$ 44.51	$ -		800
2"	$ 44.51	$ 44.51	$ -		800
3"	$ 44.51	$ -	$ -		800
4"	$ -	$ 44.51	$ -		800

Current rate structure is considered a flat base rate, with no consumption rate		
Tiers	Generation Units	Tier Cost per Unit **
Tier One	NA	$ -

The variances in the billing of EDUs are the schools, and RV parks which are billed based on equations formulated during an earlier wastewater rate study. All EDUs are billed at $44.51 per, with the exception of commercial entities classified as restaurants, taverns and single laundries that are billed at $28.51 and or $50.51 per.

Proposed Rate Structure:

Based on our review of the City's existing residential and commercial/industrial rate structures, we propose the following:

Residential Class:

SFR water consumption includes two types of water usage: domestic use (water used inside the home) and irrigation use (water used in the yard). While the level of domestic water usage is expected to remain fairly stable throughout the year, fluctuation in irrigation usage could occur due to seasonal changes. Therefore, for SFR users it is appropriate to use AWW usage as a direct approximation of annual wastewater flows returned to the sewer. The six-month period from October through March is deemed as the SFR average winter water usage period. The average monthly usage during this period is used for billing purposes.

- Base charge rates for all users will be converted from EDUs to actual water service connections with single-family residential (SFR) user charges based on an average six-month winter timeframe (October 1 – March 30). The base rate will include two hundred cubic feet (2 units) (4,488) per month
- Wastewater charges for these months are based on the earlier average winter water (AWW) monthly use.
- SFR (5/8-inch by 3/4-inch) users monthly base rate will remain the same at $44.51.
    - Usage over the allowance of 6.0 units will be charged $6.00 per unit
- Meters larger than 5/8-inch by 3/4-inch will be charged based on the meter multiplier used in the water rate study 2021. See table Proposed Rate Structure
- A volume charge (if needed) is multiplied by average winter water consumption, and if the average is over six units, exceeding the sewer cap a new average will be billed until the annual review of the AWW is demonstrated.
    - Example: Six winter month allowance total 36 units, 40 units of water would create added fees for the four units above the 36 units at $7.50 per unit.
- Sewer charges for residential accounts are calculated on an average of the water billed in October through March (26,928 gallons maximum) or the actual month's water consumption, whichever is less
- Commercial user's sewer charges for general services and optional general services accounts are based on the month's water consumption for the entire year using the single monthly in arrear for the current monthly bill
- The City of Dayton applies a flow-based averaging procedure that acknowledges that some of the water used during summer months (April 1 through September 30) will not enter the wastewater system, thus applying the same averages through the spring and summer months discrepancy

- Bridge funding will create an annual debt of ≈$240,000.00 or a monthly increase of $22.81 to every wastewater service connection. This increase will be applied in a two-step, two-year process of $12.00 per month, starting in July 2023, and the second increase of $12.00 per month in July 2024.
- The table on the following page outlines the key points in this study:
    - Comparison of new rates beginning in September / October 1, 2023
    - Cost per unit for generation of wastewater over the allowed limit of 4,488 gallons
    - Distinction of unit charges per residential and commercial accounts
    - Bridge funding annual debt ($259,501.70) and monthly impacts
    - Average monthly rate for a SFR consumer for each year

Proposed Rates for 2023-24 Fiscal Year			
Discharge w/ base (100 cu. ft.)		**Residential**	**Commercial**
2.00	**5/8" by 3/4"**	$44.51	$53.41
2.80	**1"**	$62.31	$74.78
3.60	**1 1/2"**	$80.12	$96.14
5.80	**2"**	$129.08	$154.89
22.00	**3"**	$489.61	$587.53
28.00	**4"**	NA	NA
42.00	**6"**	NA	NA
Discharge Fee per Unit	**per 100 cu. ft.**	$7.50	$9.00 [1]
1 - Unit discharge fee increase (20%) to cover treatment costs from commercial, industrial waste streams			
Monthly Rate Comparison			
		Current	Proposed
Cubic Feet		Res. Water Bill	Res. Water Bill
544		$44.51	$70.31
700		$44.51	$82.01
1,000		$44.51	$104.51
Bridge Funding			
Interest		1.00%	
Approximate Annual Payment			$240,000.00
New Budget			$1,029,031.70
Monthly Cost			$22.81 [2]
2 - $22.81 will be applied two consecutive years as a monthly increase of $12.00 increase each year			
New Monthly Rate Schedule July 1 -Single Family Residential Service			
Cubic Feet		2023	2024
544		$82.31	$94.31
700		$94.01	$106.01
1,000		$116.51	$128.51
Prices reflect increase debt for funding of bridge project, but does not include annual inflationary adjustments			

Proposed Generation Fees:

Relating to the per unit generation fee, in order to better align the cost of treatment with the per unit charge, it is recommended that the City of Dayton incorporate a per unit charge at $7.50 per unit (SFR) and the commercial/industrial per unit charge from $9.00.

Conclusions:

The City of Dayton has been consistent in their application of wastewater rates with small routine incremental increases, the last being in December 2019. Current base rates produce approximately 57 percent of operating cost based on a figure $832,530.00. If the inclusion of the bridge funding debt service, the base rates produce 50.2 percent of operating costs. The Council asked to understand the impact of the bridge funding on its constituents, and the debt service analysis estimated a monthly increase of ≈ $22.81, which will be applied over a two-year timeframe, or $12.00 each year.

Analysis shows a per unit (748 gallons) treatment cost at $6.82 which includes all expenditures to manage the effluent to the lagoons, disinfection treatment and eventually through the outfall into the Yamhill River. That treatment cost is increased to $8.95 per unit when adding the funding for the Ferry Street bridge project.

Based on zero units of allowed wastewater generation, base rates should be $51.52 to meet the range of 60-75 percent of budget as fixed expenses.

The new rates will provide two units to support two positions simultaneously, a) generate added revenues through the per unit generation charges, b) allow those conservation minded users another tool to keep a lower monthly cost. Additional cost for funding of the bridge will be part of the base.

Annual adjustment based on consumer price index relating to the basket of services (water, wastewater maintenance) – averaging approximately 3.48 percent annually since 2019, the last increase in wastewater rates.

The current rate at $44.51 per SFR consumer will remain in effect due to the increase of $12.00 per month to fund the Ferry Street bridge project. The $51.52 recommended base rate should be considered in the 2024-25 budget. An alternative to the percentage rate and timeline since the last rate increase would move the base rate to a monthly 5/8-inch by 3/4-inch service connection to $49.32.

The link given allows the City of Dayton to stay abreast on changes in utility's cost as it relates to inflation pointed at the services affecting to water and wastewater.

https://www.in2013dollars.com/Water-and-sewerage-maintenance/price-inflation/2021-to-2022?amount=20

With many considerations and decisions being calculated with this rate study, it is a goal of Oregon Association of Water Utilities to aid the City of Dayton towards a sufficient wastewater rate to meet the needs of the system, supply fair rates for all consumers and to ensure the wastewater system is poised for future growth.

Wastewater Rate Study

Introduction:

In the summer of 2021, the City of Dayton authorized the Oregon Association of Water Utilities to review current wastewater rates and decide upon any adjustments to be considered. This study coincides with aspects of system operations and capital improvement planning. Procedures to conduct a wastewater summary began during late summer in conjunction with the review and modification in the City of Dayton's water rates.

The approach of this study includes financial strategies and rates that:

- Adjust current wastewater utility revenues due to inflation, operations and maintenance modifications, and capital improvement planning
- Review capital expenses as they relate to operational costs of the wastewater system and adopted Capital Improvement Plan projects
- Are relatively simple to understand and implement, being consistent with industry standards and practices

The rate summary proposal is based upon all expenditures placed into a single total line item. These budgeted amounts are obtained from the City of Dayton' documents. This figure includes personnel services, materials and services, contingency funding, and capital improvement. During the process and discussions with the City Council, it was asked to review the wastewater rates when adding the bridge funding costs to the overall budget or per service connection.

Oregon Association of Water Utilities is pleased to present this wastewater rate study to the City of Dayton. When conducting a rate study, the consideration that the best results are based on the most correct data obtained, equity among the consumers and revenues that sustain a budget allowing the wastewater system to be managed according to State regulations.

Assumptions:

- Annual O&M and capital expenditures, revenues from the customer base and reserve requirements are based on the City's adopted budget
- Annual average wastewater system flow is based on the City's annual report on projected flows
- Wastewater strength assignment for the different user classes has been concluded as non-applicable as the city has no need for a Significant Industrial Users Survey. (SIUS)
- Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) strength assignment for the different commercial/industrial SIC classes were not part of this wastewater rate study

Billing for sewer service coincides with the volume of wastewater a user will discharge to the sewer system. Discharge is measured by comparing water usage over a specific period as it relates to the classification of generator. These measurements aid in defining the difference of the discharge of sewage by the users and the total volume of wastewater received at the wastewater treatment plant (WWTP). The variance between the two consists of the inflow and infiltration. Inflow and infiltration (I&I) are defined as groundwater and stormwater that enter a sewer system.

Wastewater Fees:

User fees are a result of monthly charges of all residences, businesses and other users that are connected to the sewer system. These fees are instituted by resolution and can be changed to account for an increase in expenditure related to system management.

User fees can be based on the metered volume of water consumed by the users. This is contrary to the equivalent dwelling unit (EDU) method that aims to appoint sewer rates based on the types of users, strength of waste stream and impact of flows.

Using water meters to decide the wastewater charges, a fair approach in recovering sewer system costs is applied uniformly to all users. Flat fees and unmetered connections should be avoided when deciding total revenues. Large water users pay a larger part of the wastewater systems costs, since a higher volume is waste stream would be generated. Currently, the City of Dayton has a uniformed class of users and the variation in wastewater flows strengths is negligible.

To decide metered rates for wastewater, the City must be able to standardize consumption usage during the winter months (October through March). The amount of water recorded at the meter during these months will be applied (ratio 1:1), considered the return factor to the discharge side of the sewer system during the remaining year.

Since the sewer customers are mostly residential, and in theory, water usage is uniformed the amount of water consumed can be matched with the same amount of generated wastewater, which can be applied to the operational cost divided by the number of connections. The City of Dayton has understood the consistency of the wastewater as it relates to BODs and TSSs, using metered volume of water is a more practical approach.

Written materials provided by the City of Dayton and discussions with personnel support the key points necessary to meet the following goals:

- Establish revenues to meet budgeted expenditures
- Changes in necessary monies for capital improvement
- Creation of a contingency fund for emergency purposes
- Existing revenues based on water meter readings as outlined in section Costs of Services
- Apply industry standards for adjustments in revenue/expenditure relations

One point of discrepancy is the comparison of actual influent into the Wastewater Treatment Plant (WWTP) and how the units of measure are derived. Currently, the City of Dayton's wastewater system is made up of 877 connections, all inside the city limits.

Current wastewater fees are stipulated in EDUs, formulated using eight units at 748 gallons per unit or a total allowance at 5,984 gallons (8 units). This single figure is skewed in the determination as the majority of users (SFR) customers will not consume 5,984 gallons of water, unlikely generating the same amount of wastewater, particularly during the winter months.

Wastewater System:

The City of Dayton manages a wastewater system that serves approximately fifty percent of all available acreage both inside the City limits and potential growth within the urban growth boundary. The collection system is designed into various basin areas that follow the topography of the landscape and its drainage patterns. Four pump stations aid the sewage to be delivered to the four facultative lagoons. [1]

Review of the daily monitoring reports, dating from 2015 through 2019, the average daily flows are approximately 0.179 MGD with the maximum single day flow at 1.228 MGD, December 2015. Dry weather timeline, May through October, show average daily flows for the five-year period to equate to 0.207 MGD, while the wet weather period daily average is 0.505 MGD.

Flows into the WWTP can be summarized by those fluids being generated by users connected to the system and the I&I from rainfall or groundwater. Treatment costs are directly associated with flows (total volume) and solid loading through the WWTP.

Water - Wastewater Relationship

When discussing wastewater rates, an applicable correlation and implementation of said rates is assumed as one with the water service. Billing for sewer service is based on the volume of wastewater a user will discharge to the sewer system. Discharge is measured by comparing water usage each month and billing on a one-to-one ratio of said usage. These measurements aid in defining the difference of the discharge of sewage by the users and the total volume of wastewater received at the WWTP.

One point of discrepancy is the comparison of actual influent into the WWTP and how the units of measure are derived. An EDU is considered 5,984 gallons, and an SFR dwelling is counted as one EDU in the current base rate.

With this study, the City of Dayton will be using service connections and the wastewater system is made up of 877 connections, with 93.3 percent as residential connections and the remaining 6.7 percent commercial connections.

1 – Wastewater Facilities Plan – Westech Engineering, Inc.

Using figures from the 2021 Water Rate Study, an average 76.3 MG (102 thousand units) of water is sold each year, which a small percentage (≈ 5) of water not entering the sewer system. Total average flows into the WWTP account for 91.25 MG annually or 0.25 MG daily.

Approximately 14.9 MG can be labeled as inflow and infiltration (I&I) and is mentioned to make aware that a surplus sixteen percent of total flows can be associated with I&I.

The 2021 Water Rate Study a Single Family Residential (SFR) dwelling is allowed two units (1,496 gallons) of water in the monthly base rate with the average monthly water usage at 5.44 units or ≈ 4,000 gallons.

A fair approach for all customers, the sewage allowance in the wastewater monthly base rate will be two units, or 1,500 gallons. This allowance directly looks at the low volume water users and applies a monthly rate that will be consistent each month throughout the year. A sewer cap of six units (4,500 gallons) will be applied to all users that indicates an AWW average greater than six units.

The wastewater base rates will be established through two points of focus, a) percentage of fixed expenses applied to the SFR user, which will establish the larger sized (one-inch and larger) services monthly charge as it relates to the meter multiplier, b) the SFR will use a six-month average winter water (AWW) consumption flow to set monthly rate for the remainder of the fiscal year, while the larger service connections will use water meter readings per month.

This study does not include reviewing commercial users in comparison to a single-family resident or the review of monthly water consumption per user classification. This rate structure coordinates the City current billing for water over the allotment of two units (1,496 gallons), which corresponds to 5/8-3/4-inch meter service connections, while larger sized connections apply a meter cost ratio. With this wastewater rate structure, aligning the two units will better sustain costs associated with low volume customers.

The meter cost ratio will apply to setting up wastewater rates and allowances of added generated wastewater. This method will coordinate the wastewater rates with the new water rate structure as it relates to base rates and allowances. Due to the potential strength of the waste stream generated by future commercial customers, the city could implement a zero allowance on all commercial / industrial accounts to better fund treatment costs associated with the higher strength wastewater generated.

The City of Dayton receives approximately 7.6 million gallons per month of wastewater with 6.3 million gallons registering through water meters. The added flows, assumed from I&I, account for an added sixteen percent that must be treated per Federal and State rules.

The added wastewater generated does not necessarily increase added costs on a one-to-one ratio associated with treatment, but it will affect the total operating expenditures for the wastewater department. Stormwater may dilute the TSS, and BOD strengths found in some of the wastewater generated.

The System Data spreadsheets (2) outline total documented flows, total budget based on personnel, materials, annual debt service, contingency funding, and capital improvement figures. Budget figures are displayed in the table.

Current base (fixed) rates account for 56 percent of total adopted budget, not including the expenses for the funding of the bridge upgrade. The first spreadsheet shows the original figures associated with the wastewater rate study.

The second spreadsheet shows the impact of the base rates in alliance with the current rate structure. Essentially, the $25.00 monthly increase was added to the existing monthly rates over a two-year cycle, or $12.00 monthly.

System Data Spreadsheets

Wastewater Rate Study
for
City of Dayton

System Data

For Year: 2023-24
Date completed: August-23

	Gallons (annual)	100 Cu Ft. (annual)	Average Daily Flows	
Wastewater Influent [1]	91,250,000	121,992	250,000	
Water Sold [2]	76,326,781	102,041		
Potential Infiltration [3]	14,923,219	19,951		16.35%

2022-2023

	Dollars
Personnel / Materials	$ 517,664.00
Transfers	$ 171,000.00
Contingency	$ 54,866.00
Capital Outlay	$ 348,501.70
Total Proposed Budget	$ 1,092,031.70

Cost per Gallon	Cost Per 1000 Gals	Cost Per 100 Cu.Ft.
$0.0120	$11.97	$8.95
Potential Treatment Cost [4]	$ 178,593.19	$ 178,593.19

Connection Information Base Rate Only

Size	# of connections Residential	Commercial	Other	
5/8" x 3/4"	824	30	0	City Owned
5/8" x 3/4"			3	2
1"	6	2		5
1 1/2"	1	6		10
2"	2	1		1
3"	1	1		
4"		0		Total Connections
6"				877

Total EDUs
1,027

Current Rate information (base)

	Residential	Commercial	Other	
5/8"	$44.51	$44.51		
3/4"			$44.51	
1"	$44.51	$50.51	$44.51	
1 1/2"	$44.51	$44.51		
2"	$44.51	$44.51		
3"	$44.51			Connections
4"		$44.51		Base Rate Revenues
6"				$468,033.12

EDUs
Base Rate Revenues

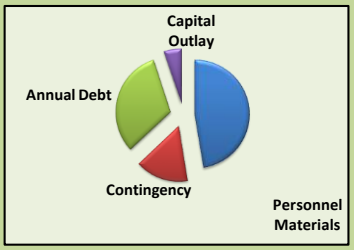
Current Generation Rate Per Single Family Residence [5]	Residential	Commercial	Other	
	544	4,069		$548,541.24
	Cubic Feet	Gallons		

Percentage of budget without any flow-based fees

Operating Budget Outline

Personnel / Materials	$517,664.00	47.40%
Contingency	$171,000.00	15.66%
Capital Outlay	$348,501.70	31.91%
Annual Debt Service	$54,866.00	5.02%
		Base Rate % Total Cost
TOTAL OPERATING EXPENDITURES	$1,092,031.70	42.86%

Notes:
1- Figure of WWTP flows from questionnaire
2- Water sold from Water Rate Study 2021
3 - Inflow and infiltration is relative to precipitation
1027 Equivalent Dwelling Units (EDUs)
4 - Potential treatment cost is measured at a 1:1 ratio, which is unlikely. Added influent is stormwater, groundwater
5 - Average monthly water consumed by SFR dwelling
$1,092,031.70 reflects increase of ≈$260K added debt service for bridge funding



User Classification and Loading:

In a Cost-of-Service Study, the City is currently a flat monthly fee to produce revenues to cover costs associated with the wastewater system. Aligning the wastewater fees using a water consumption method to figure out total flows and treatment costs associated with managing the wastewater system will be a newer approach. Residential users have similar characteristics and therefore, assumed to have identical discharge parameters. The commercial and industrial user waste strengths vary based on the type of business that generates the waste, displaying added parameters, total suspended solids (TSS) and biological oxygen demand (BOD) loadings. Currently, the city has never had to complete a Significant Industrial Users Survey (SIUS) to decide if there are any high strength waste generator connection to the sanitary system.

Single-Family Residential Usage:

The residential classifications are homogenous in that all the users are assumed to have the same TSS and BOD strengths. Since all residential accounts are considered the same TSS and BOD strengths, they each have a single wastewater rate that includes all three parameters and are based on metered water usage. However, the volume of wastewater flows can vary among the individual users depending upon water usage. The specific variation of the SFR water usage possibly includes significant irrigation usage for yard and garden areas while MFR water usage includes exceptionally low irrigation usage since most MFR users have a small yard area, if any. Usually, MFR complexes that have large common green areas and pools have separate irrigation meters.

One method to differentiate actual water usage to wastewater generation is looking at average winter water (AWW) months usage and applying the average volume of purchased water during October through March and applying the same figures to the monthly wastewater generation for the entire year. This will increase the level of responsibility of staff to ensure routine meter reading is completed within a narrow timeline. The AWW consumed during the “winter months” will be the basis for the remaining year.

With the SFR user class, the monthly charges will be centered on three points, a) the allowance of water (gallons included with the base rate), b) the AWW usage that sets the total monthly costs, and c) a sewer cap applied so the user will have maximum cost per month.

The previous three (6) winter (October 1 – March 31) months’ average shall determine the monthly volume charge, which will remain the same each month, for the next six-month period beginning with the customer's July billing statement. If the AWW is above the six-unit sewer cap, then the six-month average, i.e., 8-units, would be the normal charge for the remaining year, or when the winter review would establish a higher or lower average.

Examples:

- Two (2) units allowed, (matches earlier water rate study) with base fee at $44.51
- 6.0 units (AWW) generated will be charged for the base fee plus four additional units
    - $44.51 base fee plus four (3.4) additional units at $6.50 per or $70.31
- If Council adopts a $12.00 “Bridge Funding Fee”, additional cost will be applied to the $70.31 for a total of $82.01
- If a SFR user generates greater than 6.0 units, the monthly costs remain at $82.01
- Wastewater charges for April 1 through September 30 are based on the earlier average winter’s water (AWW) monthly use.

Multi-Family Residential: MFR

- MFRs, having a single meter with multiple units will be classified as commercial
- MFRs having a single meter per unit will be categorized as an SFR and will be allotted 2,000 gallons (2 units).
- Any MFR considered commercial classification will have no allowance or sewer cap.
- Sewer rates will be based on the previous month’s water consumption.

Commercial Usage:

Typically, there is significant variability in both the volume of wastewater flows and loadings strengths, among the different types of commercial/industrial users such as food service establishments, retail stores, and supermarkets. Therefore, to ensure fair determination of wastewater service charges, the City uses separate unit rates applied to flow, TSS, and BOD loadings of users. As the City’s SIUS was never a state mandate, there will be no differentiations among commercial and residential users. The City should consider developing a future outline showing parameters of normal strength waste (SFR, MFR) as well as commercial or public entities that the City decides to contribute sewage of a quality type consistent with that of domestic waste. Parameters for commercial high loading waste should be included as a guide the City can use in the future.

Commercial – Industrial:

- Meters larger than 5/8-inch by 3/4-inch will be charged a base rate founded on the meter multiplier used in the water rate study 2021. See table Proposed Rate Structure page VI.
- No winter average is considered for either commercial or industrial customers, actual water usage from the previous month will be the defining factor for the sewer bill.
- The City of Dayton is using a flow-based procedure that acknowledges that some of the water used during summer months (April 1 through September 30) will not enter the wastewater system. These spring and summer months should adopt a 95 percent return factor of the previous month’s water bill to be applied to the spring-summer-fall cycle.

Example:

- Winter months (November through January) water usage at 100 percent of water meter read from previous month and billed as wastewater
- February through October, water usage at 95 percent of water, optional, meter read from previous month and billed as wastewater.

Revenue Requirements:

Revenue requirements from rates are the total of all expenditures, including reserve requirements for debt service. The City has a few principal sources of revenue to recover operating costs which include the base rate and unit generation rate. The annual revenue requirements for the wastewater operation and maintenance budget were proven at $832,530.00 dollars, prior to the addition of an annual bridge funded payment at $259,501.70. Total annual required revenues to fund all expenses is $1,092,031.70

Existing Rate Structure:

The City's existing wastewater rate structures for the community include a fixed base fee associated with equivalent dwelling units (EDUs). These EDUs offer 800 cubic feet (5,984 gallons) which is approximately twice the total gallons than is normally generated per user per month.

The current structure is considered a "flat rate" which does not review total volumes of generated wastewater. Looking at water metered charges, a fair system in recovering sewer system costs is used. Flat fees and unmetered connections should be avoided when figuring out total revenues. Large water users pay a larger part of the wastewater systems costs. Through higher rates and metered billing, using a meter multiplier, this can help in meeting budgetary requirements.

Base – Generation Fees:

In the existing rate structure, the base fee is identical for every user class including the commercial accounts. Residential or single family residential (SFR) fee is $44.51, multi-family residential fee is $44.51 per unit and commercial accounts have a base rate of $44.51 which includes 5,984 gallons (eight-units) of wastewater discharged. Restaurants and taverns have a small added fee for the assumed increase in wastewater generation.

The sewer flows (generation) wastewater treatment cost per unit equates to $8.95 or $0.01197 per gallon. The existing base rates match approximately 42 percent of the adopted budget.

The City of Dayton has been diligent with managing wastewater rates in the aspect of annual rate adjustments. A small incremental annual adjustment is a recommended best management practice that the city can Implement.

See Existing Spreadsheets:

Wastewater Rate Study

for

City of Dayton

Existing Rates

For Year:	2023-24
Date completed:	August-23

	100 Cu. Ft. (Annual)	Million Gallons (Annual)	Gals per day / Connection
Wastewater Influent [1]	121,992	91,250,000	
Water Sold [2]	102,041	76,326,781	238.44
Potential Infiltration	19,951	16.35%	

	Dollars
Annual Operating Budget	$1,037,165.70
Contingency	$54,866.00
Total Annual Budget	$1,092,031.70

Monthly Cost per Connection: $103.77

Treatment Costs
Per 1,000 gallons: $ 11.97
Per 100 Cubic Feet: $ 8.95

Connection information

Size	# of connections Residential	Commercial	Other
5/8" by 3/4"	824	30	0
5/8" by 3/4"	0	0	3
1"	6	2	0
1 1/2"	1	6	0
2"	2	1	0
3"	1	1	0
4"	0	0	0
6"	0	0	0
Discharge allowed - Sewer Base	0	0	0

EDUs: 1,027
Total Connections: 877

Current Rate information

	Residential	Commercial	Other
5/8" by 3/4"	$44.51	$44.51	$0.00
5/8" by 3/4"	$0.00	$0.00	$44.51
1"	$44.51	$50.51	$44.51
1 1/2"	$44.51	$44.51	$0.00
2"	$44.51	$44.51	$0.00
3"	$44.51	$0.00	$0.00
4"	$0.00	$44.51	$0.00
6"	$0.00	$0.00	$0.00
Discharge Cost Rate per 100 cu. ft.	$0.00	$0.00	$0.00

$ 45,711.77

Current Base Revenue

	Residential	Commercial	Other	Totals
5/8" by 3/4"	$36,676.24	$1,335.30	$0.00	$ 38,011.54
5/8" by 3/4"	$0.00	$0.00	$133.53	$ 133.53
1"	$267.06	$101.02	$0.00	$ 368.08
1 1/2"	$44.51	$267.06	$0.00	$ 311.57
2"	$89.02	$44.51	$0.00	$ 133.53
3"	$44.51	$0.00	$0.00	$ 44.51
4"	$0.00	$0.00	$0.00	$ -
6"	$0.00	$0.00	$0.00	$ -
Total/month	$37,121.34	$1,747.89	$133.53	$ 39,002.76
Base Rate Totals 12 mo. Total	$445,456.08	$20,974.68	$1,602.36	$468,033.12
% of operating budget	40.79%	1.92%	0.15%	42.86%
				$ 548,541.24
				50.23%
Wastewater allowed in base rate Total/month	0	0	0	0
12 mo. Total	0	0	0	0

The two percentages show revenues from service connections and EDUs, showing a discrepancy of 9.69 percent

Total Wastewater in Base Rate [3]	12 mo. Total	0	0.00%	Monthly Increase [4] $59.26
Additional Discharge (units)	102,041		Generation Rates	
	Potential Additional Costs			0.00%
I&I Units	19,951			
		Total Revenue Generated		$468,033.12
		Annual Gain/(Shortfall)		($623,998.58)
				-57.14%

Notes:

1- influent recorded at wastewater treatment plant

2- water sold, taken from water rate study in 2021

3- 82.51 percent of all water collected is in alllowance with base rate

4- monthly increase per connection with current budget or $79.11 monthly charge

The two percentages show revenues from service connections and EDUs, showing a difference of 9.69%

Typical Residential Water Bill		
Gallons	Generation	Residential Wastewater Bill
2,992	5.44	$44.51
4,069	7.00	$44.51
8,976	10.00	$44.51

Bridge Funding Scenario:

To better understand the impact of large, scaled projects, funding of the bridge, its support of water and wastewater infrastructure improvements, the $7.5M project's cost anticipates an annual debt service payment to the community at ≈ $240,000.00 dollars.

Looking at various scenarios, using low interest loan monies, possible grants, terms of repayment, the City reviewed a detailed option of a single monthly increase for all users or dispersed the additional cost proportioned by both base rates and generation rates.

The timing of the wastewater rate study and the completion of bridge funding paperwork, a decision was to keep the funding of the bridge as a single line item, removing the added monthly cost from the annual expenses incurred by the wastewater department.

The completion date of the bridge upgrade and the first loan payment due is speculated to commence late 2024. The estimated monthly cost associated with all users is $22.81 per month. The Council will be asked to implement a two-step increase at $12.00 per step to align proper funding with the completion of the bridge project.

Base rates should consistently be estimated to range from 60-75% of the adopted annual budgets, which currently comes to 42 percent, and the size of the City of Dayton should be approximately 65 percent.

Initially presented were a set of base rate figures that moved the base rate dollars closer to the standard operating range, increasing the base rate from $44.51 to $51.42. This monthly cost includes two units of wastewater at the base rate with an additional cost of $6.50 per unit with a cap at 6 units per month.

A comparison of the above figures to a simple implementation of the $12.00 increase will minimize the impact of the overall wastewater cost for the SFR user. Collection of specific data points will allow for future development of wastewater rates to best align with the goals presented in this wastewater rate study. Those goals are:

- Adjust current wastewater utility revenues due to inflation, operations and maintenance modifications, and capital improvement planning
- Review capital expenses as they relate to operational costs of the wastewater system and adopted Capital Improvement Plan projects
- Are relatively simple to understand and implement, being consistent with industry standards and practices

Bridge Funding Spreadsheet:

Wastewater Rate Study

for

City of Dayton

Bridge Scenario

For Year:	2023-24
Date completed:	August-23

	100 Cu. Ft. (Annual)	Million Gallons (Annual)	Gals per day / Connection
Wastewater Influent [1]	121,992	91,250,000	
Water Sold [2]	102,041	76,326,781	238.44
Potential Infiltration	19,951	16.35%	

	Dollars
Annual Operating Budget	$688,664.00
Contingency	$54,866.00
Total Annual Budget	$1,092,031.70

Monthly Cost per Connection: $103.77

Treatment Costs	
Per 1,000 gallons	
$	11.97
Per 100 Cubic Feet	
$	8.95

Connection information

Size	# of connections			
	Residential	Commercial	Other	
5/8" by 3/4"	824	30	0	
5/8" by 3/4"	0	0	3	
1"	6	2	0	
1 1/2"	1	6	0	
2"	2	1	0	
3"	1	1	0	
4"	0	0	0	EDUs
6"	0	0	0	1,027
				Total Connections
Discharge allowed - Sewer Base	2	0	2	877

Current Rate information

	Residential	Commercial	Other
5/8" by 3/4"	$44.51	$53.41	$0.00
5/8" by 3/4"	$0.00	$0.00	$80.94
1"	$62.31	$74.78	$0.00
1 1/2"	$80.12	$96.14	$0.00
2"	$129.08	$154.89	$0.00
3"	$489.61	$587.53	$0.00
4"	$0.00	$0.00	$0.00
6"	$0.00	$0.00	$0.00
Discharge Cost Rate (per 100 cu. ft.)	$7.50	$9.00	$9.00

Current Base Revenue

	Residential	Commercial	Other	Totals
5/8" by 3/4"	$36,676.24	$1,602.36	$0.00	$ 38,278.60
5/8" by 3/4"	$0.00	$0.00	$242.81	$ 242.81
1"	$373.88	$149.55	$0.00	$ 523.44
1 1/2"	$80.12	$576.85	$0.00	$ 656.97
2"	$258.16	$154.89	$0.00	$ 413.05
3"	$489.61	$587.53	$0.00	$ 1,077.14
4"	$0.00	$0.00	$0.00	$ -
6"	$0.00	$0.00	$0.00	$ -
Total/month	$37,878.01	$3,071.19	$242.81	$ 41,192.01
Base Rate Totals 12 mo. Total	$454,536.12	$36,854.28	$2,913.74	$ 494,304.14
% of operating budget	41.62%	3.37%	0.27%	45.26%

Wastewater allowed in base rate

Total/month	1,668	0	6	1,674
12 mo. Total	20,016	0	72	20,088

Total Wastewater in Base Rate [3]: 12 mo. Total 20,088 — 19.69%

Additional Discharge (units): 81,953

Generation Rates: $614,648.63

Potential Additional Costs: 56.28%

I&I Units: 101,904 — $912,210.59

Total Revenue Generated: $1,108,952.78

Annual Gain/(Shortfall): $16,921.08

1.55%

Notes:

1- influent recorded at wastewater treatment plant

2- water sold, taken from water rate study in 2021

3- 82.51 percent of all water collected is in alllowance with base rate

4- monthly increase per connection with current budget or $103.77 monthly charge

Typical Residential Water Bill		
Gallons	Generation	Residential Wastewater Bill
2,992	5.44	$70.31
4,069	7.00	$82.01
8,976	10.00	$104.51

Cost of Service Evaluation:

If the total operating expenditures were equally segregated according to the number of service connections, the revenue necessary per connections required by the authority would be $103.77 per month.

$1,092,031.70 divided by 12 months divided by 877 service connections = $103.77

When deciding cost for wastewater, fairness (residential compared to business) based upon the treatment of wastewater expenses are applied, and this is carried out by figuring out the price per unit and the amount of generation per month. Other factors, such as strength of waste stream measured in BOD and TSS can affect treatment costs. Believed to be one of the highest priorities about wastewater rates, is that consumers should pay for their costs associated with services rendered.

If the City of Dayton looked at adopted budgets as a single line item of total required revenues, the figure can be calculated against the number of total units being processed. The adopted budget used in this wastewater study was originally $832,530.00 but was increased to $1,092,031.70 (revenues essential from user rates) and the average annual volume of wastewater treated at the WWTP is 91.25 MG (7.6 MG/mo.).

The 91.25 MG converted to 100 cubic feet equates to 121,992 units of wastewater. This figure is taken from the wastewater daily monitoring reports for 2016-2019 is 16 percent higher than the wastewater generated by customers. Customer generated wastewater, in line with total meter reading (water sales) sees 102,041 units of water sold. The treatment costs per unit is:

Financial Review:

- Current base rates equal 50 percent using EDUs, 43 percent using service connections
    - MFR charged per unit.
    - Hotels, Motels charged per unit/room.
- Generation rates from consumers equal zero percent, no surcharge on excess waste.
- Capital outlay is figured at $348,000.00 in preparation for future upgrades to support the existing wastewater system with ≈$240K for bridge funding. These monies account for only 54 percent of the entire adopted budget.

Technical Review:

- Total connections 877 billed monthly, average water consumption 5.44 units.
- Average monthly (actual) discharge per connection 5.44 units. (4,069 gallons.)
- Average annual influent into WWTP = 91.25 MG (2016-2019).
- Total average monthly influent into WWTP = 7.61 MG.
- Consumer generated average monthly influent = 6.36 MG.
- Treatment cost per unit, total influent = $6.82 per unit or $0.0091 per gallon.
- Treatment cost with Bridge funding = $8.95 per unit or $0.01197 per gallon.

Note: The discrepancy of consumer generated annual flows compared to total annual WWTP flow measurements is figured on the infiltration and inflows of groundwater and confirmed from WWTP operations. Infiltration and inflows account for an added 16 percent of total sewer flows.

Capital improvement planning, and the funds necessary to complete future upgrades, stem from recommended improvements outlined in the City of Dayton Capital Improvement Plan (CIP). The City has been working diligently in obtaining alternative funding for the upcoming planning cycle focused on expenses associated with the bridge funding upgrades.

Capital Improvement planning priority is based on a two-fold purpose, as capital improvements (increased capacities) or as a maintenance item (support existing capacities). With CIP, discrepancies between estimated and actual costs for construction projects will vary, depending upon several factors. These variations in construction costs may lengthen or shorten the timeline in which to continue, affecting the allotment of funds. Alternative funding in the forms of grants can also play a significant role towards completion of prioritized upgrades

An annual review of the projects completed, projects not completed and those not listed, but developed over time will aid in figuring out the single line item dedicated to meeting the goals in CIP planning.

Preliminary Observations:

With the City of Dayton, cost for treatment is $8.95 per unit, which associates to $48.68 of expenditures per month founded on the average usage at 5.44 units, assuming the water becomes wastewater, therefore it must be treated. Since the City collects approximately 42.86 percent of total budget from the base rate, which uses 1,027 units to achieve its goal when there are 877 units defined as connections. The 1,027 units is a measurement defined on parameters that are subjective and unsubstantiated. While restructuring the rates using service connections, a review to supply an allowance and the impact on the overall monthly charge but keeping in mind the overall revenues from both base and generative (produced wastewater) rates.

With this point, the best approach to wastewater billing continues to be based on monthly water usage that includes both a fixed monthly base rate and a per unit flow rate. Essentially the water meters will be the measurement for the wastewater bill.

If the city made no decision to restructure the rates (increase), a charge a per unit rate at $7.61 for any unit (100 CF, 748 gallons) that flows past the water meter after two units, SFR only. This does not include the $12.00 dollars per month, per user to fund the bridge project.

See Preliminary Observations spreadsheet

Preliminary Observations

Wastewater Rate Study
for

City of Dayton

For Year: 2023-24
Date completed: August-23

	Annual Cu. Ft.	Units / Month	
Wastewater Collected	121,992	10,166	
Amount of Water Sold	102,041		
Potential Infiltration	19,951	16.35%	Inflows / Infiltration

	Dollars
Annual Operating Budget	$688,664.00
Contingency	$54,866.00
Capital Outlay	$348,501.70
Total Annual Budget	$1,092,031.70

Connection information

Size	# of connections Residential	Commercial	Other	Cost Per 100 Cubic Feet
5/8" by 3/4"	824	30	0	
5/8" by 3/4"	0	0	3	
1"	6	2	0	
1 1/2"	1	6	0	$ 8.95
2"	2	1	0	
3"	1	1	0	
4"	0	0	0	
6"	0	0	0	
				Connections
Discharge w/ base (ccf)	2	0	0	877
Discharge w/ base (gals.)	1,496	0	0	

Average water usage = 5.44 units

Size	Residential	Commercial	Other
5/8" by 3/4"	$44.51	$44.51	$0.00
5/8" by 3/4"	$0.00	$0.00	$44.51
1"	$44.51	$50.51	$44.51
1 1/2"	$44.51	$44.51	$0.00
2"	$44.51	$44.51	$0.00
3"	$44.51	$0.00	$0.00
4"	$0.00	$44.51	$0.00
6"	$0.00	$0.00	$0.00

Generation Charge	per 100 cu. ft.	$7.61		

Current Base revenue

	Residential	Commercial	Other	Totals
5/8" by 3/4"	$36,676.24	$1,335.30	$0.00	$ 38,011.54
5/8" by 3/4"	$0.00	$0.00	$133.53	$ 133.53
1"	$267.06	$101.02	$0.00	$ 368.08
1 1/2"	$44.51	$267.06	$0.00	$ 311.57
2"	$89.02	$44.51	$0.00	$ 133.53
3"	$44.51	$0.00	$0.00	$ 44.51
4"	$0.00	$0.00	$0.00	$ -
6"	$0.00	$0.00	$0.00	$ -
Total/month	$37,121.34	$1,747.89	$133.53	$ 39,002.76
12 mo. Total	$445,456.08	$20,974.68	$1,602.36	$ 468,033.12

% of operating budget		40.79%	1.92%	0.15%	42.86%
Wastewater included in Base	Total / units / Mo.	1,668	0	0	1,668
	Total / 12 mo.	20,016	0	0	20,016

Typical 5/8" Discharged (gals) [2]: Average H2O Usage per Connection = 5.44

		Residential			
Total Wastewater In Base Rate	12 mo. Total	20,016	Commercial		
16.41%	12 mo. Total		0	Other	
121,992	12 mo. Total			0	Total Consumption $
Additional Units	82,025	Charge per Unit [3]		$7.61	$ 624,211.40

Notes:		
	Total Revenue Generated	$ 1,092,244.52
Proposed rates set on service connection, water meter readings	Annual Gain/(Shortfall)	$ 212.82
Cost per unit received for treatment and discharge = $8.95	Typical Residential Water Bill	
2- total wastewater units allowed discharged per month per connection	Gallons	Cubic Ft. Used / Res. Wastewater Bill
3- Additional charge per unit required to meet budget at $6.25	4,069	5.44 / $70.69
Water = 2 units in allowance, wastewater = 0, increase to 2 units monthly	5,236	7.00 / $82.56
	7,480	10.00 / $105.39

The current base rate links revenues with 42.86 percent of the adopted budget, where normal fixed operating expenses are typically 60-75 percent of a utility budget. Applying a 65 percent founded on base rates to the 5/8-inch by 3/4-inch meter, we see a monthly connection rate proven at $67.45, currently the monthly charge at $44.51 dollars. When all the sized meters; using a meter multiplier are incorporated into the rate structure, the revenue percentage will be 68.45 percent of the adopted budget. This single step was considered too large of an increase, particularly when the consumption costs are not included in the total monthly bill.

Meter Multiplier Cost:

A meter multiplier is used to compare smaller water meters (3/4-inch) to larger sized meters as it relates to the replacement cost over the life span of the meter and infrastructure to support the service. Most service laterals for sewers (Residential/Commercial) are four-inch diameter. Industrial service laterals are typically sized according to the quantity of flow produced by the industry; usually 6-inch or 8-inch is needed. Quantities of flow decide the size of the infrastructure required thus added replacement costs.

Applying a meter multiplier to decide water rates, wastewater base rates can use the same formatted structure and support the idea of supplementing those expenses for larger infrastructure through said base rates. Using a meter multiplier forms a foundation in fairness that sustains a generally lower monthly rate, particularly for those users who are consistent is wastewater generation.

A cost-based review of this new structure shows this foundation incurs the exact unit cost per user regardless of the ending usage. Consumers have the ability to manage their monthly expenses as it relates to consumption and therefore wastewater generation.

Points using the Meter Multiplier:

- Base rate set using a 50 percent fixed operating expense
- 5/8-inch by 3/4-inch meter monthly rate increases from $ 44.51 to $51.42
- Volume cap of wastewater set at six (6) units for a 5/8-inch by 3/4-inch
- There will be no volume cap for larger service connections
- Overage charge after 2 allowed units will be surcharged at $7.50 per unit (SFR)
- Overage charge for 1” through 3” service connections will follow meter ratios as it relates to allowances

Comparative costs of both current and proposed rates can be found in the table on the next page. Proposed base rates for larger service connections are justified by supplying the same allowance in the base rate as it relates to the meter ratios used in deciding the monthly costs. Monthly costs figure 50 percent of expenses to be fixed, sets the 5/8-inch by 3/4-inch service to the monthly cost, then extend the ratio to the larger meters. Other revenues will be generated from the overage charges. Total revenue figures are based on the sale of all 102,041 units of water annually, which is the average discovered while completing the water rate study 2021.

Table 1: Current vs Proposed Wastewater Rates - SFR

Current Base Rates				Adopted budget *	$ 1,092,031.70
	Residential	Commercial	Other	Flat Rate	Allowances
5/8"- 3/4"	$ 44.51	$ 44.51	$ -		800
5/8"- 3/4" out	$ -	$ -	$ 44.51		800
1"	$ 44.51	$ 50.51	$ 44.51		800
1 1/2"	$ 44.51	$ 44.51	$ -	NA	800
2"	$ 44.51	$ 44.51	$ -		800
3"	$ 44.51	$ -	$ -		800
4"	$ -	$ 44.51	$ -		800
Current rate structure is considered a flat base rate, with no consumption rate					
Tiers		Generation Units		Tier Cost per Unit **	
Tier One		NA		$ 468,033.12	
Proposed Rates				Uses Water	Allowances [2]
	Residential	Commercial	Other		
5/8"- 3/4"	$ 44.51	$ 53.41	$ -	1.0 - 1	200
5/8"- 3/4" out			$ 80.94	1.0 - 1	NA
1"	$ 62.31	$ 74.78	$ -	1.4 - 1	NA
1 1/2"	$ 80.12	$ 96.14	$ -	1.8 - 1	NA
2"	$ 129.08	$ 154.89	$ -	2.9 - 1	NA
3"	$ 489.61	$ 587.53	$ -	11.0 - 1	NA
4"	$ -	$ -	$ -	14.0 - 1	NA
Tiers		Consumption Units - 3/4-inch [3]		Tier Cost per Unit [4]	
Tier One		6.01 +		$ 7.50	
Monthly Rate Comparison					
	Current		Proposed		Difference [5]
Cubic Feet	Res. Water Bill		Res. Water Bill		
544	$ 44.51		$ 70.31		$ 25.80
700	$ 44.51		$ 82.01		$ 37.50
1,000	$ 44.51		$ 104.51		$ 60.00

* - adopted budget includes inserting $260K towards preparation of bridge project in 2024, or $13.00 per service connection per month

** - Rates per unit are inside city service, no outside city limits serviced

1 - American Water Works Association standard for meter multiplier (replacement costs)

2 - Overage charges begin after allowance has been consumed, per meter size and allocation of water, SFR only

3 - Tier charge begins after 2 unit allowance, with max unit cap at 6 units, SFR only. Commercial, no cap, matches water meter readings

4 - Generation rate set at $6.50 for any wastewater generated above the allowance

5 - Cost difference for a monthly user, using 3/4-inch service, average usage among group 5.44 units or 544 cubic feet (4,000 gallons)

Bridge Information	
$6 Million Loan	
Interest @ 1%	
Annual Payment	$ 213,114.62
Monthly Cost Per Service Connection	$ 22.81
New Budget	$ 1,092,031.70

Monthly Rate Comparison w/ $12.00 Bridge Funding			
	Current	Proposed	Difference [5]
Cubic Feet	Res. Water Bill	Res. Water Bill	
544	$ 57.51	$ 83.31	$ 25.80
700	$ 57.51	$ 95.01	$ 37.50
1,000	$ 57.51	$ 117.51	$ 60.00

In the spreadsheet on the next page, we see the analysis of the revenues from the joint monthly base rates, ($494,304.14) using the meter multiplier and the generation of more wastewater, those revenues associated with ($612,128.63). A projected total of $1,106,432.78 delivers monies that will meet the adopted 2023-24 budget.

MM Cost

WasteWater Rate Study
for
City of Dayton

For Year: 2023-24
Date completed: August-23

	Cubic Feet				
Wastewater Collected	121,992				
Amount of Water Sold	102,041				
Potential Infiltration	19,951	16.35%			
	Dollars				
Annual Operating Budget	$1,037,165.70				
Contingency	$54,866.00		# of connections		
Total Annual Budget	$1,092,031.70	Residential	Commercial	Other	
Connection Information	Size				
	5/8" by 3/4"	824	30	0	
	5/8" by 3/4"	0	0	3	
	1"	6	2	0	
	1 1/2"	1	6	0	
	2"	2	1	0	
	3"	1	1	0	
	4"	0	0	0	
	6"	0	0	0	877
Discharge w/ base (100 cu. ft.)		See Allowed Units in Base Rate			

Discharge w/ base (100 cu. ft.)		Residential	Commercial	Other	Meter Multiplier In Use
2.00	5/8" by 3/4"	$44.51	$53.41	$0.00	5/8" = 1.0
2.00	5/8" by 3/4"	$0.00	$0.00	$80.94	3/4" = 1.1
2.80	1"	$62.31	$74.78	$0.00	1" = 1.4
3.60	1 1/2"	$80.12	$96.14	$0.00	1 1/2" = 1.8
5.80	2"	$129.08	$154.89	$0.00	2" = 2.9
22.0	3"	$489.61	$587.53	$0.00	3" = 11.0
28.0	4"	$0.00	$0.00	$0.00	4" = 14.0
42.0	6"	$0.00	$0.00	$0.00	6" = 21.0
Discharge Fee per Unit	per 100 cu. ft.	$7.50	$9.00	$9.00	Basis on Exist Rates

Current Base Revenue		Residential	Commercial	Other		Totals
	5/8" by 3/4"	$36,676.24	$1,602.36	$0.00	$	38,278.60
	5/8" by 3/4"	$0.00	$0.00	$242.81	$	242.81
	1"	$373.88	$149.55	$0.00	$	523.44
	1 1/2"	$80.12	$576.85	$0.00	$	656.97
	2"	$258.16	$154.89	$0.00	$	413.05
	3"	$489.61	$587.53	$0.00	$	1,077.14
	4"	$0.00	$0.00	$0.00	$	-
	6"	$0.00	$0.00	$0.00	$	-
	Total/month	$37,878.01	$3,071.19	$242.81	$	41,192.01
	12 mo. Total	$454,536.12	$36,854.28	$2,913.74	$	494,304.14
% of operating budget		41.62%	3.37%	0.27%		45.26%
Wastewater included in Base	Total/month	1,702	0	0		1,702
	12 mo. Total	20,424	0	0		20,424
Typical 3/4" Usage	5.44					
		Residential				
Wastewater Generation	12 mo. Total	20,424	Commercial			
	12 mo. Total		0	Other		
	12 mo. Total			0		
	Water Generation	40,375	Additional Wastewater	81,617		
		Potential Annual Revenues			$	612,128.63
			Total Revenue Generated		$	1,106,432.78
Cost per 100 c.f.	$8.95		Annual Gain/(Shortfall)		$	14,401.08
						101.32%

Notes:
- $79.11 minimum charge per service connection to meet budget
- Base rate increase from $44.51 to $ 51.42 = $6.91
- Maximum two units allowed, matching the water rate study in 2021
- $6.00 per unit charge, single tier for all overages for SFR
- $7.20 per unit charge, single tier for all overages for other users

Typical Residential Water Bill

Gallons	Units Consumed	Res. wastewater Bill
2,992	5.44	$70.31
4,069	7.00	$82.01
8,976	10.00	$104.51

Annual Review:

User fees are monthly charges of all residences, businesses and other users that are connected to the sewer system. These fees are set by resolution and can be modified to account for an increase in operations and maintenance costs.

A consideration for the SFR dwelling that is not a rental unit, a six-month (October through March) basis for deciding an average monthly wastewater flow, which will base the 100 percent return of the winter water usage to the sewer system. For each SFR dwelling, the winter month's water usage should be revised annually July 1 and this usage is the basis for monthly sewer flows charges for the following twelve months. A change in the monthly base rate does not automatically change the unit generation cost. Consideration of each of the rates is dependent on the fluctuation in expenses in capital improvement planning.

A routine review of the commercial customer's water consumption will uncover any changes in sewer flows for this classification of users. This classification of city customers' wastewater bills should follow the single month in arrears when potable water is consumed, then applied to the wastewater flows. Due to the types of businesses the City serves, the majority of metered water is assumed to return to the sewer.

A wastewater utility must be monetarily self-sufficient, recuperating not only the cost of daily operations but also being able to fund capital improvements. Customers using a lot of water or those with large seasonal variations in consumption should pay their fair share, since collection networks are sized to meet peak demands.

Artificially keeping low rates will lead to deferring maintenance, rehabilitation, and replacement of deteriorating infrastructure and creating public health hazards in the future. There are ways to address affordability issues within rate structure designs without placing the utility at financial risk. A routine evaluation of these three bulleted points can substantiate rate structure designs.

- Operating Ratio: Operating revenues must meet working expenses, excluding depreciation which will equate to a ratio benchmark of 1.25 or higher. [1]
- Debt Service Coverage Ratio: is calculated as operating revenues minus operating expenses divided by principal and interest and equate to a benchmark ratio of 1.20 or higher. [1]
- Contingency Reserves (Emergency Reserves): At a minimum have appropriation funds to satisfy your billing period (e.g.: per month) or reserves to replace the single most expensive asset. [1]

Water and wastewater utilities are very capital-intensive. The majority of expenses for a utility are tied to capital improvement and administrative costs, and not tied to the cost to collect and treat wastewater.

1 – Information taken from Utility Financial Assessment Tool - NRWA

Considerations:

There are ways the utility can design its rate structures to buffer against insufficient revenues, mainly through charging higher non-variable base charges. Methods cause a balance between setting revenue stability-oriented rate structures and conservation-oriented rate structures. A method could reward customers financially for reducing consumption. In order to offset some of the burden of high base charges on their customers, utilities sometimes include a minimum consumption allowance with the base charge such that any use within the consumption allowance is already paid for through the base charge.

The City of Dayton using past efforts has created a stable structure that combats revenue changes due to fluctuations in wastewater flows. From a perspective to keep customer satisfaction, particularly low volume customers, the City understands the high percentage of users falling into a below average wastewater generation.

A base charge is the amount a customer must pay each billing period, regardless of the amount of wastewater generated. This is oftentimes called a minimum charge. Base charges are highly stable sources of revenue for utilities since they are immune to customer use behavior. There is an incentive to charge as much of the fixed costs of running the utility in the base charge as possible yet reward those customers who are conservation minded.

A good rule of thumb is to have consistent revenues which match 60-75 percent of the total budget, pending the size of community served. With recommended base rates, percentage of revenues equal 45.26 percent of the total budget including the bridge funding.

Due to the capital-demanding nature of wastewater utility costs and because of economies of scale, large utilities can spread their costs over a large customer base and thus are often able to charge lower base charges. Smaller utilities, however, typically rely on higher base charges to recover some of their fixed costs. A utility must be wary to compare their own rates against surrounding communities, as each is unique as it relates to operational cost, debt, and monies necessary for system upgrades.

As with base charges, the higher the amount of the commodity included in the consumption allowance, (wastewater flows) the less sensitive the total bill will be to use reductions, and the less conservation-oriented the rate structure will be.

Unlike base charges, however, the utility has no revenue stability incentive to include higher amounts of water in the consumption allowance. In fact, the more water included in the consumption allowance, the less revenue the utility can expect to collect from most of its customers if the base charge is not adjusted similarly.

For the same reason, seasonal rates are like uniform rate structures, but the price for water associated with wastewater ($/100 cubic feet) is higher in specific summertime months is unlikely to work for the city. Seasonal rates are also proper for seasonal communities (tourism) where demand for water is high in certain months and incredibly low in others.

In times of drought and mandatory watering restrictions, utilities' revenues are open to reductions in use, while the utilities' costs stay the same or increase over time. The lack of revenue linked with reductions in usage can be considerable for utilities that designed conservation-oriented rate structures.

The revenues collected for wastewater generation over the 2.0 units can be significantly reduced thus lowering the overall revenues. To recover some of the lost revenue during the times purposeful reductions exist, (i.e., drought) and to prevent a permanent increase of rates right after the drought, some utilities have considered temporarily raising rates during the mandatory restrictions period. These are sometimes called drought surcharges.

These temporary rate increases would go into effect for two simultaneous reasons:

- To recover some of the lost revenue as customers use less water (to continue paying the fixed operating costs), and
- To encourage further conservation by setting higher rates for high volume use. These temporary rate increases must be prepared for and communicated to the customers well in advance of droughts. Create an ordinance or resolution with specific rules about when the temporary rates would be implemented, when they would be removed, which blocks would be affected, and how high the rates would be constructed

As utility costs continue to increase annually, trying to circumvent routine (annual) increases only burdens the utility with prioritizing and tabling projects or routine maintenance. Eventually the consumer cost per unit increases, paying more for less water. With annual reviews of operating expenses, and relating said expenses to a per unit cost, this step correlates the allowances and revenues to the base rate and should demonstrate what the new base rate should be.

Recommended Rate Structure:

- Wastewater Base Rate for all 5/8-3/4-inch water service - $51.42
    - Wastewater generation is decided by a winter water average usage from October through March
    - Wastewater Base Charge includes first 2 units (200 cf) of consumption
- Wastewater Base Rate for one-inch and larger service - see table "Proposed Rates"
    - Wastewater generation will match previous months water meter reading
    - Usage is applied for the month of water usage
- Wastewater Generation Flow Rate per unit - $ 7.50
    - Generation Flow rate per unit for commercial customers could be $9.00
    - Commercial generation can be higher strength waste that requires more treatment.
    - Revenues from this billing method will match, exceed adopted budget

- Annual adjustment based on consumer price index relating to the basket of services (water, wastewater maintenance) – averaging approximately 3.81 percent running average over ten-year cycle

With 121K units (91.25 MG) of wastewater treated annually, and the adopted budget at $1,092,031.70, the average monthly usage correlates to 9.5 units. Actual water sales annually are 102K which equates to 9.7 units average per month per user. Using the 9.7 figure and implementing the recommendations in this study, 100 percent of the budget is matched. If the allowance for a 5/8-inch by 3/4-inch meter were reduced to two units, matching the water rate structure, the budget would be met with a monthly average consumption of 9.5 units.

The second challenge in developing wastewater rates for the City of Dayton was how to meet the financial goal of funding the Ferry Street bridge project. Variations in funding examples were provided, with considerations of potential grant monies, low interest loans and awarding of Congressional Direct Spending. The final specifics for funding the bridge project were calculated project cost at $6M with 1 percent interest for 30-years. These reasons would add ≈ $235K annual payment to the existing wastewater operating budget for a total of $1,092,031.00. This single project would increase the monthly base rates ≈$25.00 per month.

Prior to the completion of the project, estimated date December 2025, the city will collect a monthly $12.00 debt service fee in September 2023, and September 2024 to fund the first and subsequent annual payments. The city has been able to delay additional costs over two years due to reserves in place.

The chart below depicts hypothetical monthly costs associated with the various levels of consumption. The chart's monthly figures are correlated using four units (400 cf) as an allowance.

Hypothetical Usage – Monthly Costs

Water Consumption - Monthly Rate Comparison									
Connection Size		3/4	3/4	1.0	1.5	2.0	3.0	4.0	6.0
Base Rate Wastewater Allowance		**2**	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Base Rate		**$44.51**	**$53.41**	**$62.31**	**$80.12**	**$129.08**	**$489.61**	**$0.00**	**$0.00**
Consumer Class									
Residential		824	0	6	1	2	1	0	0
Commercial		0	30	2	6	1	1	0	0
Other		0	3	0	0	0	0	0	0
Monthly Usage and Hypothetical Cost at Various Consumption Levels									
Tier Rates	**Tier One**	**$7.50**		**Tier Two**			**Tier Three**	**NA**	
Consumption Levels		**First level at 5.44 is average water usage discovered in wate rate study 2021**							
5.44		$ 70.31	$ 94.21	$ 103.11	$ 120.92	$ 169.88	$ 530.41	$ 40.80	$ 40.80
6		$ 74.51	$ 98.41	$ 107.31	$ 125.12	$ 174.08	$ 534.61	$ 45.00	$ 45.00
7.5		$ 85.76	$ 109.66	$ 118.56	$ 136.37	$ 185.33	$ 545.86	$ 56.25	$ 56.25
8		$ 89.51	$ 113.41	$ 122.31	$ 140.12	$ 189.08	$ 549.61	$ 60.00	$ 60.00
9.5		$ 100.76	$ 124.66	$ 133.56	$ 151.37	$ 200.33	$ 560.86	$ 71.25	$ 71.25
10		$ 104.51	$ 128.41	$ 137.31	$ 155.12	$ 204.08	$ 564.61	$ 75.00	$ 75.00
11		$ 112.01	$ 135.91	$ 144.81	$ 162.62	$ 211.58	$ 572.11	$ 82.50	$ 82.50
12		$ 119.51	$ 143.41	$ 152.31	$ 170.12	$ 219.08	$ 579.61	$ 90.00	$ 90.00
13		$ 127.01	$ 150.91	$ 159.81	$ 177.62	$ 226.58	$ 587.11	$ 97.50	$ 97.50
14		$ 134.51	$ 158.41	$ 167.31	$ 185.12	$ 234.08	$ 594.61	$ 105.00	$ 105.00
15		$ 142.01	$ 165.91	$ 174.81	$ 192.62	$ 241.58	$ 602.11	$ 112.50	$ 112.50
16		$ 149.51	$ 173.41	$ 182.31	$ 200.12	$ 249.08	$ 609.61	$ 120.00	$ 120.00
17		$ 157.01	$ 180.91	$ 189.81	$ 207.62	$ 256.58	$ 617.11	$ 127.50	$ 127.50
18		$ 164.51	$ 188.41	$ 197.31	$ 215.12	$ 264.08	$ 624.61	$ 135.00	$ 135.00
19		$ 172.01	$ 195.91	$ 204.81	$ 222.62	$ 271.58	$ 632.11	$ 142.50	$ 142.50
20		$ 179.51	$ 203.41	$ 212.31	$ 230.12	$ 279.08	$ 639.61	$ 150.00	$ 150.00
25		$ 217.01	$ 240.91	$ 249.81	$ 267.62	$ 316.58	$ 677.11	$ 187.50	$ 187.50
30		$ 254.51	$ 278.41	$ 287.31	$ 305.12	$ 354.08	$ 714.61	$ 225.00	$ 225.00
35		$ 292.01	$ 315.91	$ 324.81	$ 342.62	$ 391.58	$ 752.11	$ 262.50	$ 262.50
40		$ 329.51	$ 353.41	$ 362.31	$ 380.12	$ 429.08	$ 789.61	$ 300.00	$ 300.00
45		$ 367.01	$ 390.91	$ 399.81	$ 417.62	$ 466.58	$ 827.11	$ 337.50	$ 337.50
50		$ 404.51	$ 428.41	$ 437.31	$ 455.12	$ 504.08	$ 864.61	$ 375.00	$ 375.00
55		$ 442.01	$ 465.91	$ 474.81	$ 492.62	$ 541.58	$ 902.11	$ 412.50	$ 412.50
60		$ 479.51	$ 503.41	$ 512.31	$ 530.12	$ 579.08	$ 939.61	$ 450.00	$ 450.00
65		$ 517.01	$ 540.91	$ 549.81	$ 567.62	$ 616.58	$ 977.11	$ 487.50	$ 487.50
70		$ 554.51	$ 578.41	$ 587.31	$ 605.12	$ 654.08	$ 1,014.61	$ 525.00	$ 525.00
75		$ 592.01	$ 615.91	$ 624.81	$ 642.62	$ 691.58	$ 1,052.11	$ 562.50	$ 562.50
80		$ 629.51	$ 653.41	$ 662.31	$ 680.12	$ 729.08	$ 1,089.61	$ 600.00	$ 600.00
85		$ 667.01	$ 690.91	$ 699.81	$ 717.62	$ 766.58	$ 1,127.11	$ 637.50	$ 637.50
90		$ 704.51	$ 728.41	$ 737.31	$ 755.12	$ 804.08	$ 1,164.61	$ 675.00	$ 675.00
95		$ 742.01	$ 765.91	$ 774.81	$ 792.62	$ 841.58	$ 1,202.11	$ 712.50	$ 712.50
100		$ 779.51	$ 803.41	$ 812.31	$ 830.12	$ 879.08	$ 1,239.61	$ 750.00	$ 750.00

As collected evidence presents itself during the later years, the Oregon Association of Water Utilities will return, if called upon, to review and confirm the effectiveness of the recommendations, thus assuring the goals presented in this wastewater rate study.

With many considerations and decisions being calculated with this rate study, it is a goal of Oregon Association of Water Utilities to aid the City of Dayton towards a sufficient wastewater rate to meet the needs of the system, supply fair rates for all consumers and to ensure the wastewater system is poised for future growth.