

Utility Rate Review

WATER AND SANITARY SEWER UTILITIES

September 2022



The City of Nanaimo is situated on the Traditional Territory of the Snuneymuxw First Nation.

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EXECUTIVE SUMMARY

Overview

The City of Nanaimo owns and operates a Water utility and a Sanitary Sewer utility with a service area of 91 square kilometers, serving over 100,000 residents and 6,000 businesses. These utilities require significant annual operating resources and have over \$1.6 billion invested in infrastructure. Each utility must generate adequate revenues to pay for annual operating expenditures, investment in new and renewed infrastructure and for debt repayment. Like other municipalities, the City is challenged to deliver these critical services in an affordable, effective and efficient manner for the community.

The City of Nanaimo has undertaken a comprehensive Utility Rate Review to:

- Evaluate the financial sustainability of the Water and Sanitary Sewer utilities; and
- Evaluate and recommend changes to utility rate structures that will improve user equity, clarity and administrative efficiency.

Best Practices

The City of Nanaimo is a leader in adopting utilities management best practices through:

- Developing robust long-term planning processes;
- Implementing full-cost recovery for each utility;
- Implementing rate structures to promote user equity and conservation; and
- Implementing universal metering.

Guiding Principles

Best practice guiding principles provided a framework for the review process and can be clearly linked to the recommendations. These principles include promoting conservation and improving economic efficiency, user equity, full cost recovery and transparency.

Methodology

The Utility Rate Review process included the following key steps:

- Evaluation of current utility rate management best practices;
- Analysis of the City's current rate structures, customer water consumption and billing data;
- Financial analysis and modelling; and
- Consultation with City departments and staff responsible for each utility's operations and planning, financial management and revenue collection.

Utility Financial Review

The review included financial analysis and modelling using the current five year financial plan, ten year project plan, utility reserves data and customer billing data to provide guidance on future rate increase recommendations. The current financial and project plans reflect recent inflationary pressures.

The review also included evaluation and recommended changes to the City's current overhead allocation for corporate, engineering and public works services that are budgeted in the General Fund and provide support for the Water and Sanitary Sewer utilities.





Key Recommendations

The financial modelling recommends the following rate increases:

- Water Utility – 5% in 2023 and 2024, 4% for years 2025 to 2026, then 3% per annum;
- Sanitary Sewer Utility – 4% for years 2023 to 2026, then 3% per annum; and
- Changing overhead allocation methodology to better reflect the relative demand each utility places on shared resources.

Utility Rate Structure Review

The review included evaluation of utility rate setting best practices, a survey of other municipalities' utility rate structures and assessment of the City's current rate structures and customer billing data. Utility rate structures include three key elements: customer classifications, billing frequency and a schedule of charges. Rate structures should support user equity, collection of adequate revenues and be understandable. In consultation with City departments and staff responsible for management of each utility, recommendations were developed for incremental improvements to each utility's current rate structures.

Key Recommendations

The review's recommendations focus on Incremental improvements to the utility rate structures that are achievable, effective and easily understood. Additional improvements may be considered in future utility rate reviews.

Recommendations for the Water Utility:

- Implement new Multi-Family Residential classifications to include Multi-Family Residential 2 units and Multi-Family Residential 3+ units;
- Reduce the current increasing Volumetric Rate from six to four levels, reduce the rate increase between level 1 and level 2, increase the rate increases for levels 3 and 4 for Single-Family Residential and Multi-Family Residential 2 units customers;
- Implement a Base Rate by meter connection size for Multi-Family Residential 3+ units and for Non-Residential customers;
- Implement a single Volumetric Rate for Multi-Family Residential 3+ units and Non-Residential customers; and

Recommendations for the Sanitary Sewer Utility:

- Implement a Base Rate by property for Non-Residential customers; and
- Implement a single Volumetric Rate for Non-Residential customers.

Next Steps

This report has been presented as technical background for Council's consideration and to seek Council's direction on proposed recommendations.

INTRODUCTION

The City has undertaken a comprehensive Utility Rate Review for the Water and Sanitary Sewer utilities. Each utility delivers critical public health and safety services through safe and reliable water supply and distribution and sanitary sewer collection. While much of the infrastructure required by these utilities have long useful service lives, the cost to replace, upgrade or expand each utility's infrastructure is significant and requires careful long term planning.

The Utility Rate Review focused on two key questions for each utility:

- **Does the City have adequate utility revenues to provide sustainable Water and Sanitary Sewer services?**
- **Do the current rate structures for the Water and Sanitary Sewer utilities effectively and efficiently support user equity, conservation and administrative efficiency?**

Best practices for utilities management include: full-cost recovery, equitable rate structures, long term planning processes, and demand management (water conservation). The City is a leader in utilizing best practices through implementing universal water metering in 1983, full-cost recovery in 1992 and Development Cost Charges (DCC). DCCs are paid by developers and contribute to the cost of new utility infrastructure required due to growth. The City has undertaken many initiatives to support robust long term planning including:

- Water Supply Strategic Plan (2007)
- Water Conservation Strategy (2008, 2014)
- Development Cost Charges Reviews (2008, 2017)
- Asset Management Update (2012)
- 20 Year Investment Plan and Asset Management Update (2017)
- City of Nanaimo Water Audit (2018)

These initiatives provided Council with important information for decision making regarding future demand, growth and infrastructure investment needs. Council approved:

- Annual 5% increases to Water utility user fees beginning in 2008;
- Annual 5% increases to Sanitary Sewer utility user fees beginning in 2013 for five years, then annual increases of 4% to 2022;
- Additional annual 2.5% increase to Water utility user fees beginning in 2013 and extended to 2021; and
- Increases to Development Cost Charges in 2008 and in 2017.

The City's 20 Year Investment Plan and Asset Management Update (2017) included annual operating and investment requirements and identified significant funding gaps for both the Water and Sanitary Sewer utilities. Projected revenues were not adequate to fund planned infrastructure investment. The City's financial planning processes will provide Council with information to address projected funding gaps. These processes include: Asset Management updates, Development Cost Charges updates, the Utility Rate Review, the ten year project plans and five year financial plans.

Infrastructure Overview

The City's water system is made up of dams, reservoirs, facilities (pump/pressure reducing control stations), a water treatment plant and over 600 kilometers of supply and distribution mains. In compliance with Provincial regulations, the City constructed a new water treatment plant which began operations in 2015. The plant cost \$75 million to construct and was partially funded from \$19 million in senior government grants. The City also borrowed \$22.5 million with annual repayments funded from water user fees.

The City's sanitary sewer system is made up of collection mains and lift station facilities. There are over 550 kilometers of sanitary sewer mains. Sanitary sewer treatment is provided by the Regional District of Nanaimo (RDN). The RDN's annual requisition includes a levy to cover the costs of sanitary sewer treatment.



The City's Engineering and Public Works departments are responsible for operating and maintaining both the water and the sanitary sewer systems with support from the City's IT, Finance and Development Services departments. The Engineering department is responsible for maintaining appropriate information on each utility's infrastructure and developing long term infrastructure investment plans that support maintaining current service levels and addressing the needs of growth.

Below is each utility's investment in infrastructure as shown in the City's 20 Year Investment Plan and Asset Management Update (2017).

The Utility Rate Review used financial planning information for the next ten years. Several issues may impact future utility operations and investment needs. These issues include, but are not limited to: climate change, new regulatory requirements for seismic/other infrastructure upgrades and certainty regarding the cost of a new water supply dam. At this point, reasonable and reliable estimates of these impacts are not available and have not been included in this Utility Rate Review. Future Utility Rate Reviews may consider these and other issues when better information is available or as they arise.

Infrastructure	Description	Current Asset Value - \$M
Water Utility	Water supply dams, water treatment plant, reservoirs, mains, control stations	\$976
Sewer Utility	Mains, lift stations and forcemains	\$597

BEST PRACTICES

The Utility Rate Review found recommended best practices to be common among North American authorities including: the National Guide to Sustainable Municipal Infrastructure's report which can be found at [InfraGuide Water and Sewer Rates: Full Cost Recovery](#), the BC Water & Waste Association (BCWWA) and the American Water Works Association (AWWA).

Established North American best practices for utility rate setting include:

- **Long term planning** processes that provide reasonable estimates of future infrastructure investment and annual operating and maintenance expenditures;
- **Full-cost recovery** where adequate revenues are collected to support annual operating and maintenance and long-term infrastructure investment;
- **Rate structures** that include both a Base (or fixed) Rate and a Volumetric Rate, that equitably recover costs among different customers; and
- **Universal metering** to enable customers to manage their demand and to support rate equity.

Long Term Planning

The City's robust long-term planning processes include:

- Lifecycle asset management planning for utility infrastructure, facilities and equipment;
- Infrastructure condition and capacity assessment programs;
- Asset Management Updates;
- 10 Year Project Plan updated annually; and
- Five Year Financial Plan updated annually.

These integrated planning processes use lifecycle, current infrastructure condition and capacity information to identify long-term infrastructure investment needs. The City's 10 Year and Five Year Plans prioritize and identify the cost, timing and scope of work for each project.

The City's 20 Year Investment Plan and Asset Management Update (2017) indicated a \$120.7 million funding gap for the Water utility and a \$12.5 million funding gap for the Sanitary Sewer utility. Recommended strategies to close the gaps included increases to utility user charges and DCCs. Borrowing may also be utilized for larger projects with repayment from the appropriate utility's operating fund or reserves.

Full Cost Recovery

Full-cost recovery requires generating adequate revenues to fund all costs to provide sustainable, acceptable and the mandated level of service for utility customers. Revenues include utility user fees and Development Cost Charges. Costs include annual operating and maintenance, infrastructure investment and debt repayment.

The City implemented full-cost recovery in 1992. User fees fund annual operating and maintenance expenditures. User fees and Development Cost Charges fund infrastructure investment and debt repayment. The City actively pursues senior government grant programs.

For planning, budgeting and accounting purposes, each utility maintains:

- Separate operating funds where annual revenues, operating and maintenance expenditures are budgeted and allocated;
- Separate capital funds where project expenditures for infrastructure renewal, upgrades and expansion are budgeted and allocated; and
- Separate reserves that provide funding for infrastructure investment projects.

Each year, utility rate revenues in excess of operating and maintenance expenditures are transferred to the appropriate utility reserves to provide funding for infrastructure investment. The City's prudent planning and 'savings' approach minimizes the need for large user fee increases and for borrowing.

At times, it may be practical to use debt financing in addition to annual revenues and reserves to provide funding for infrastructure investment. Annual debt repayment is funded from the appropriate utility annual revenues or reserves.

The City's utility accounting processes are outlined in Appendix 3.

Utility Rate Structures

Utility rate structures include three key elements: customer classification, billing frequency and a Schedule of Charges. A multi-part utility user rate is considered best practice and typically includes:

- A Base or Fixed Rate; and a
- Volumetric Rate based on metered water consumption.

The Base Rate, charged to each user, recovers a portion of the utility's costs and provides stable and reliable annual revenues. The Volumetric Rate is based on each user's metered water consumption and supports user equity and provides a signal to customers to incent conservation. The Volumetric Rate can be a single rate or a series of increasing or decreasing block rates for specific levels of metered water consumption.

Municipalities can implement rate structures for different customer classes based on metered consumption, required infrastructure and any other factors that reflect the differences a type of user class places on the utility. Finding a balance between the Base Rate and the Volumetric Rate to ensure predictable revenues, and support user equity and conservation is a challenge for municipalities.

The City's current utility rate structures include a:

- Base Rate and increasing Volumetric Block Rates for all water users;
- Base Rate only for residential sanitary sewer users;

- Base Rate by property feature only for non-residential sanitary sewer users (excluding hotel, motel and campgrounds) which includes a maximum daily water consumption allocation; and
- Decreasing Volumetric Block Rates only for hotel, motel and campground sanitary sewer users and for other non-residential sanitary sewer users that exceed the maximum daily water consumption allocation included in the above-noted Base Rate.

The City's Base Rate for non-residential sanitary sewer users uses specific property features (e.g. the number of plumbing groups, number of beds, number classrooms or number of washers) for each property.

Universal Metering

The City implemented universal water metering in 1983. Properties are connected to the City's water distribution system through a metered service connection. Some properties have more than one service connection.

Water consumption directly impacts the demand on sanitary sewer services, as water consumed by customers for inside purposes will be collected by the sanitary sewer system.

The City has undertaken many water conservation initiatives to reduce water consumption levels including: community-wide education and outreach programs, water restrictions, increasing Volumetric block rates, toilet and washer rebate programs and water audits. Reducing water consumption levels delays the need to expand both water and sanitary sewer infrastructures and contributes to efficient service delivery.

The City's water conservation initiatives have had a positive impact on reducing water consumption per capita. The City's daily residential water production per capita has decreased 28% since 2009, 299 litres per capita in 2009 to 216 litres per capita in 2021.



GUIDING PRINCIPLES

The User Rate Review is informed by best practice guiding principles including:

- **Conservation** – Rates are linked to demand management so that rates provide an effective signal to users to manage their demand on services;
- **Economic Efficiency** – Long term planning and infrastructure investment identify an optimum combination of maintenance, replacement and expansion programs;
- **Equity** – Rates should reflect customer’s proportionate share of cost of services;
- **Full Cost Recovery** – Revenues must be adequate to fund all costs required to operate, maintain, replace and expand infrastructure required to provide each utility’s services;
- **User Pay** – Rates are based on metered usage; and
- **Transparency** – Rates must be understandable.

The Utility Rate Review’s recommendations can be clearly linked to these principles.

UTILITY RATE REVIEW METHODOLOGY

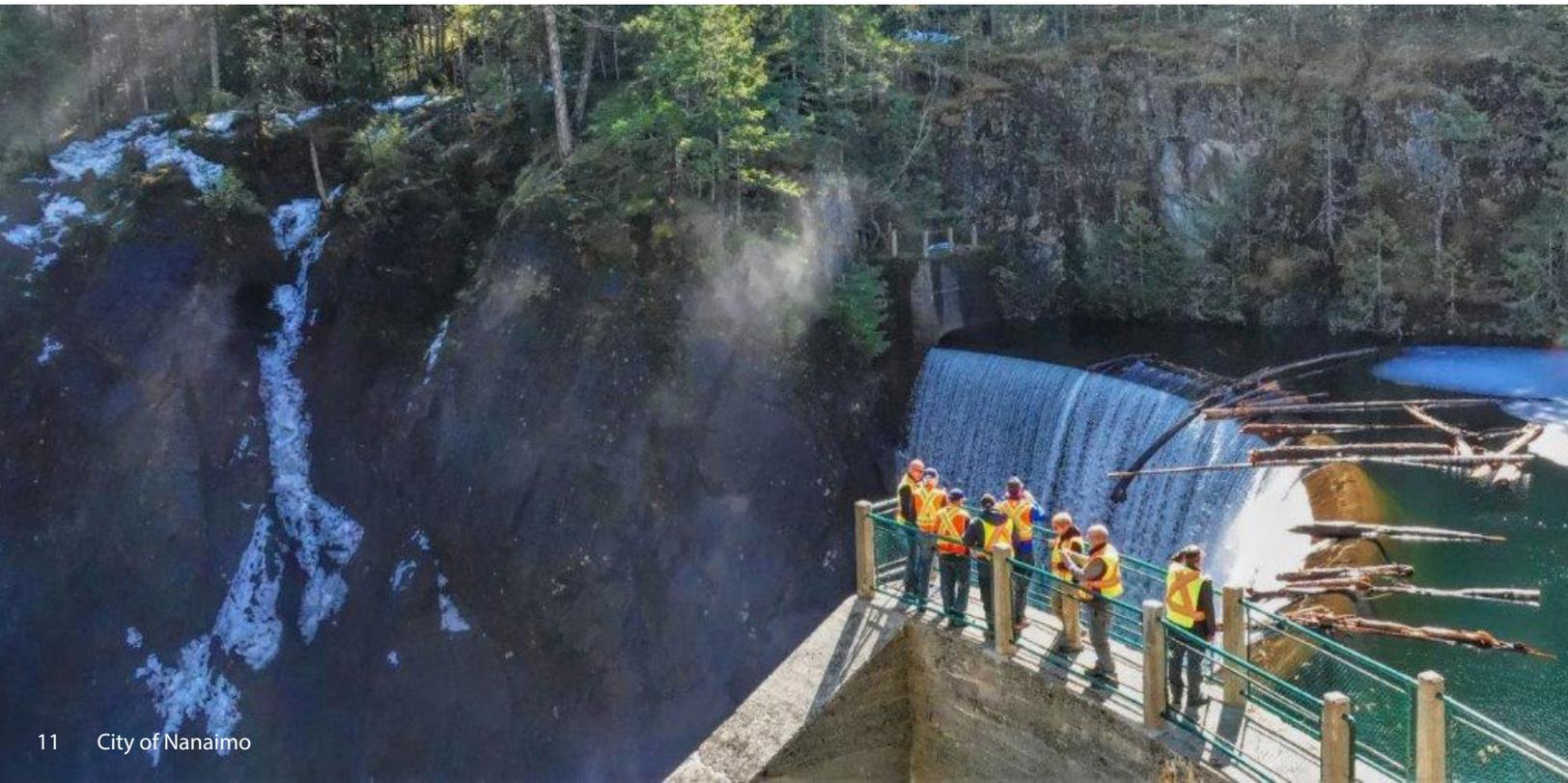
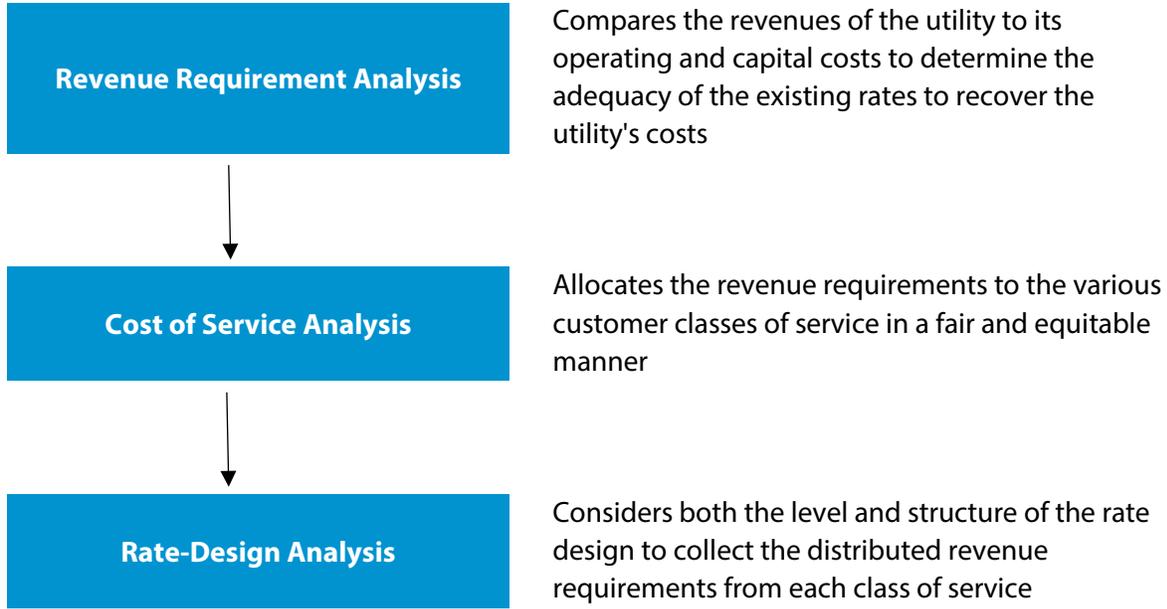
This Utility Rate Review establishes a framework, processes and tools for future reviews. To date, this review has included the following steps:

1. Review of utility rate setting best practices including utilizing the American Water Works Association ‘Principles of Water Rates, Fees, and Charges’ Seventh Edition (2017) manual and the National Guide to Sustainable Municipal Infrastructure ‘Water and Sewer Rates: Full Cost Recovery’ (2006);
2. Review of the City’s current rate structures for each utility;
3. Review of financial information including historical and planned operating, maintenance and infrastructure investment expenditures for each utility;
4. Technical analysis including revenue requirements analysis, cost of service analysis and rate structure design analysis;
5. Development of financial models that identify projected future expenditures, available reserves, borrowing needs and revenues for each utility;
6. Utilization of WATERWORTH, a dedicated utility rate setting software;
7. Review of the City’s water consumption trends;
8. Review of historical customer billing data;
9. Survey of other municipalities’ water and sanitary sewer utility rate structures;
10. Consultation with City departments and staff responsible for each utility’s operations and planning, financial management and revenue collection;
11. Draft report and recommendations.

UTILITY RATE REVIEW ANALYSIS

The American Water Works Association's 'Principles of Water Rates, Fees, and Charges' (2017) manual outlined three categories of technical analysis as a framework for utility rate structures and is shown below.

The City's Utility Rate Review utilized this approach and the results of that analysis is provided for each utility in this report.



FINANCIAL REVIEW

Does the City have adequate utility revenues to provide sustainable Water and Sanitary Sewer services?

The Utility Rate Review included financial analysis and modeling using the Draft 2023 – 2027 Financial Plan and current departmental 10 year project plans. Financial modelling, for the period 2023 to 2032 included:

- Annual operating and maintenance expenditures;
- Infrastructure investment for renewal and growth;
- Current debt repayment; and
- Contributions and withdrawals to reserves and projected year end balances.

The financial modeling included key assumptions regarding:

- Annual growth estimates that will increase each utility's revenue base each year;
- Water conservation estimates that will decrease each utility's revenue base each year; and
- Inflation that will increase annual operating and maintenance expenditures and infrastructure investment estimates.

Conservative water conservation estimates were used, as user's efforts to reduce their water consumption may be offset by the effects of climate change.

The financial review also included development of a new overhead allocation for the water and sanitary sewer utilities. Many resources budgeted in the General Fund, and largely funded by property taxes, are also needed to provide water and sanitary sewer services. The overhead allocation is used to apportion these costs to the Water and Sanitary Sewer Funds where they are funded by utility revenues.

The following sections provide the review findings for the City's Water Utility and Sanitary Sewer Utility.

Water Utility – Financial Review

In compliance with Provincial regulatory requirements the City completed the construction of a water

treatment plant in 2015. The plant significantly increased the utility's annual operating costs and long term infrastructure renewal plans. The City's current 10 year project plan includes a city wide meter replacement program, seismic upgrades for the South Fork Dam, new supply mains and significant renewal and upgrades to existing water supply infrastructure. Currently, a new water supply dam is not anticipated for the foreseeable future. A revenue requirements analysis used the following methodology:

- Draft 2023 – 2027 Financial Plan operating and maintenance costs;
- 2% inflationary increase for projected operating and maintenance costs for years 2028 to 2032;
- Additional 5% increase for 2028 operating costs to allow for additional operating resources required due to growth;
- Draft 2023 – 2032 Project Plan costs; and
- New overhead allocation.

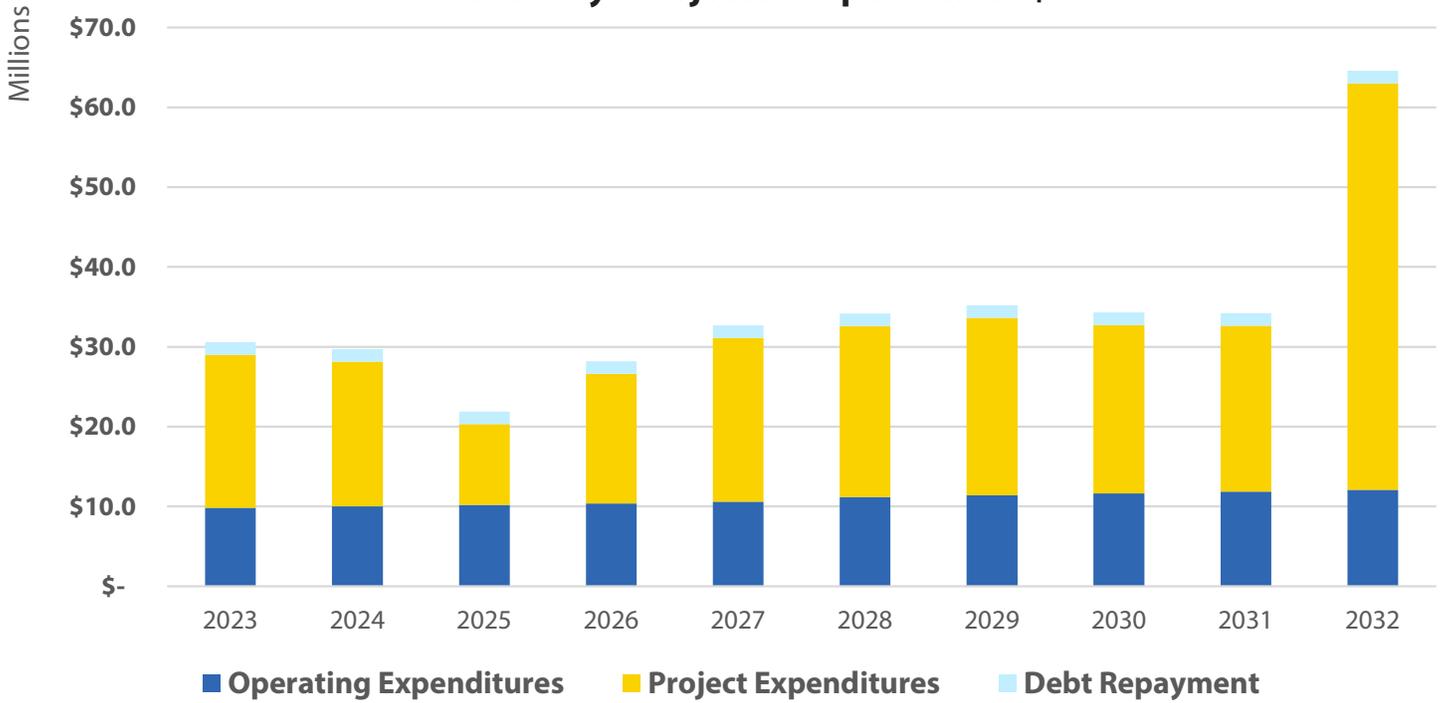
The Utility Rate Review developed detailed financial models that included projected annual operating and maintenance expenditures, infrastructure investment and debt repayment expenditures. Projected expenditures for the water utility are shown on the graph on page 13 titled, "Water Utility - Projected Expenditures \$M."

The Utility Rate Review recommends continuing the annual water user rate increases of 5% until 2024, then annual increases may be reduced as shown in the graph on page 13 titled, "Water Utility Projected Rate Increases."

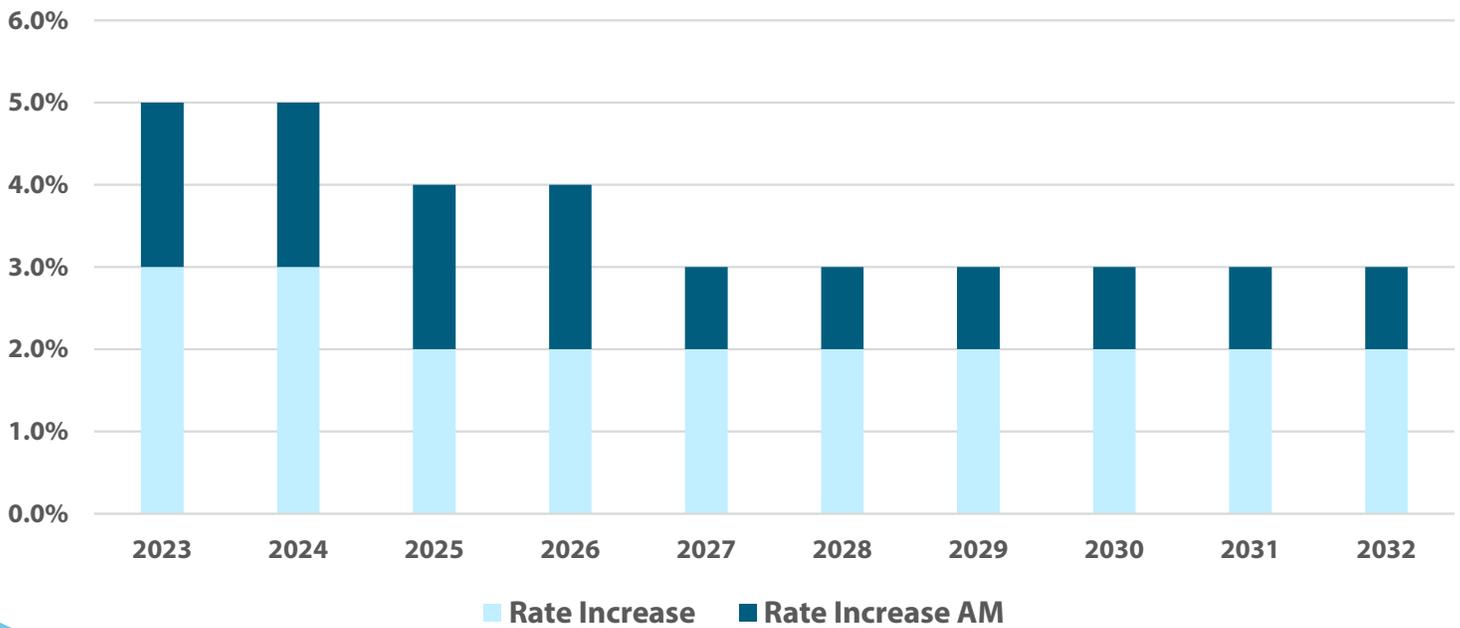
The City's Water Utility reserve balances support the sustainment of services and reduces the need for external borrowing. A projection of reserves balances for the water utility is shown in the graph on page 14 titled, "Water Utility - Projected Reserve Balances \$M".

A number of significant projects currently planned in the later years of the project plan are still subject to cost estimate and timing changes. These projects include the city wide water meter replacement project, seismic upgrades for the South Fork Dam and a secondary intake to the Control Building. Borrowing may be required where reserve balances are not adequate to fund infrastructure investment.

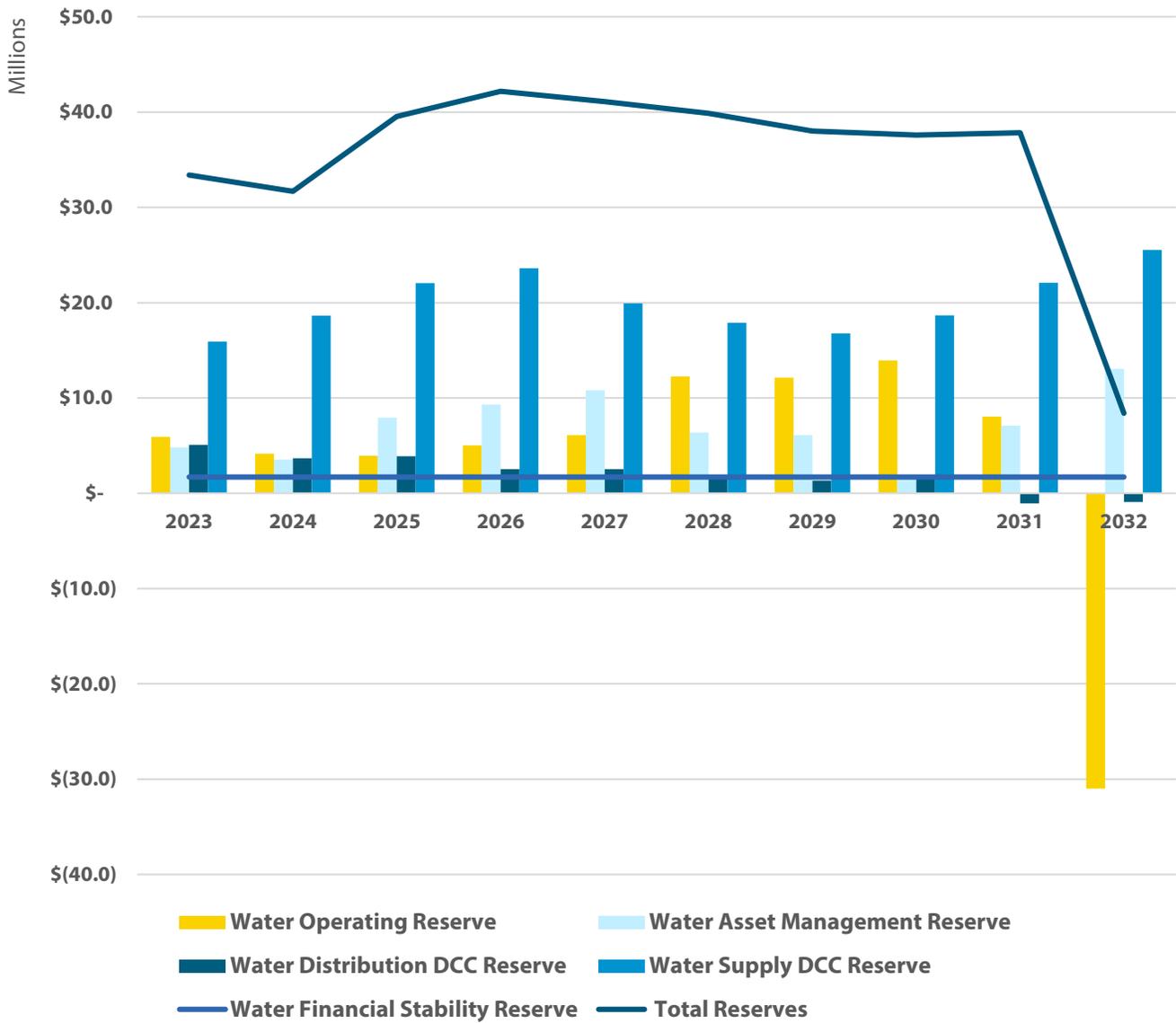
Water Utility - Projected Expenditures \$M



Water Utility - Projected Rate Increases



Water Utility - Projected Reserve Balances \$M



Sanitary Sewer Utility - Financial Review

The City's Sanitary Sewer Utility requires significant investment for infrastructure renewal and for new or upsized mains to support growth.

The revenue requirements analysis included the following information and assumptions:

- Draft 2023 – 2027 Financial Plan operating and maintenance costs;
- 2% inflationary increase for projected operating and maintenance costs for years 2028 to 2032;
- Additional 5% increase for 2028 operating costs to allow for additional operating resources required due to growth;
- Draft 2023 – 2032 Project Plan costs; and
- New overhead allocation.

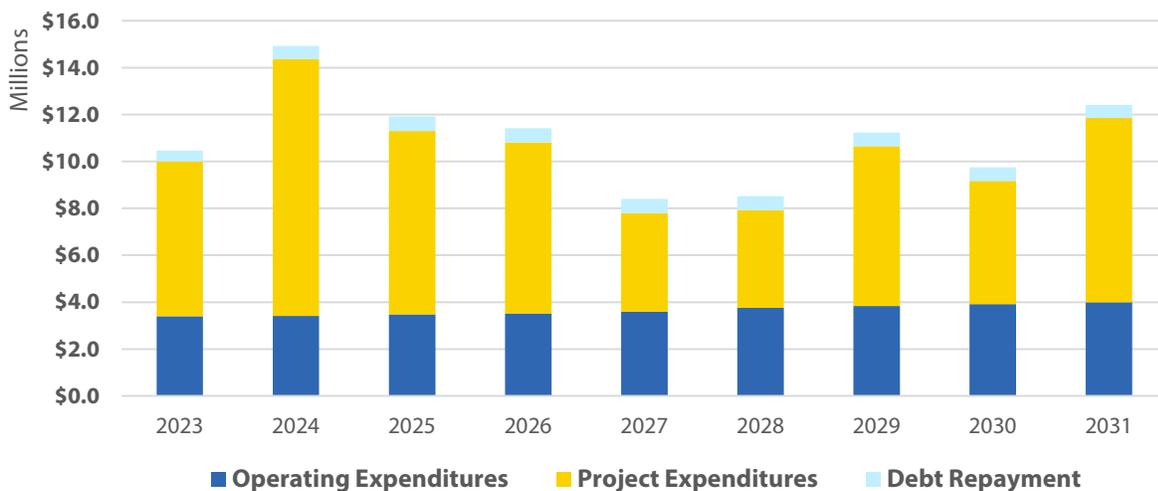
The Utility Review developed detailed financial models that included projected operating and maintenance expenditures, infrastructure investment and debt repayment expenditures. Projected expenditures for the sanitary sewer utility are shown in the graph titled, "Sewer Utility - Projected Expenditures \$M" below.

The Utility Rate Review revenue requirements analysis **recommends** continuing the annual sewer user rate increases of 4% until 2026, then reduce the annual increases may be reduced as shown in the graph titled, "Sewer Utility - Projected Rate Increases" on page 16.

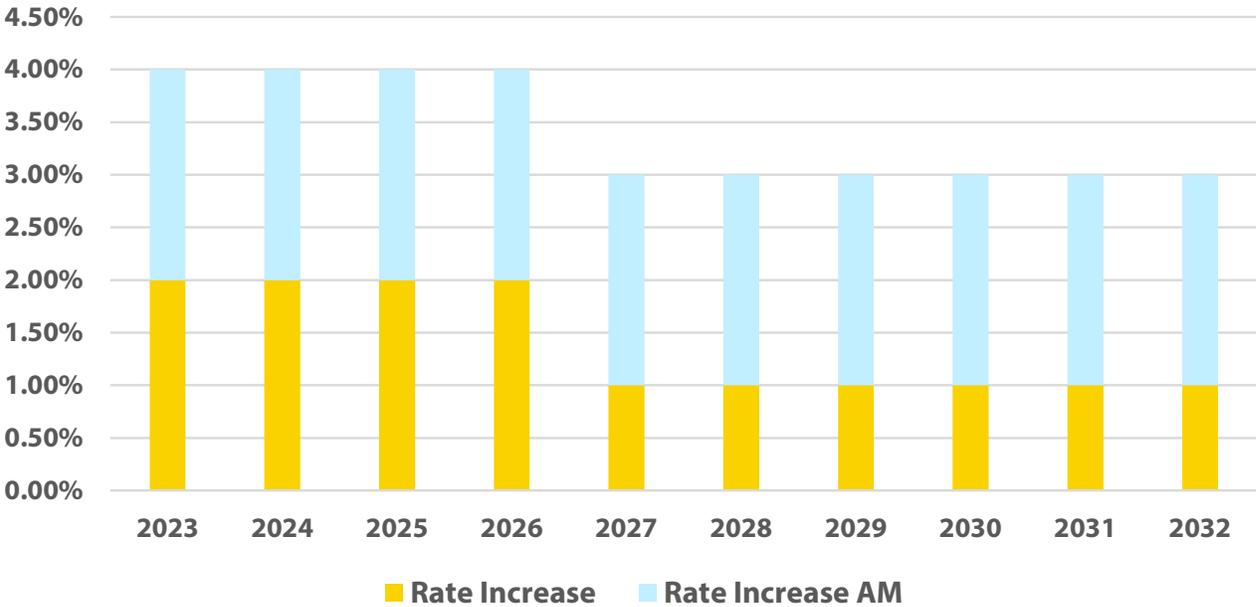
The City's Sanitary Sewer Utility reserve balances support the sustainment of services and reduce the need for external borrowing. A projection of reserves balances for the sanitary sewer utility is shown in the graph titled, "Sewer Utility - Projected Reserves \$M" on page 16.

Ongoing infrastructure assessment and planning is expected to require the inclusion of additional projects in the next 10 year plan. These projects will require additional funding from reserves.

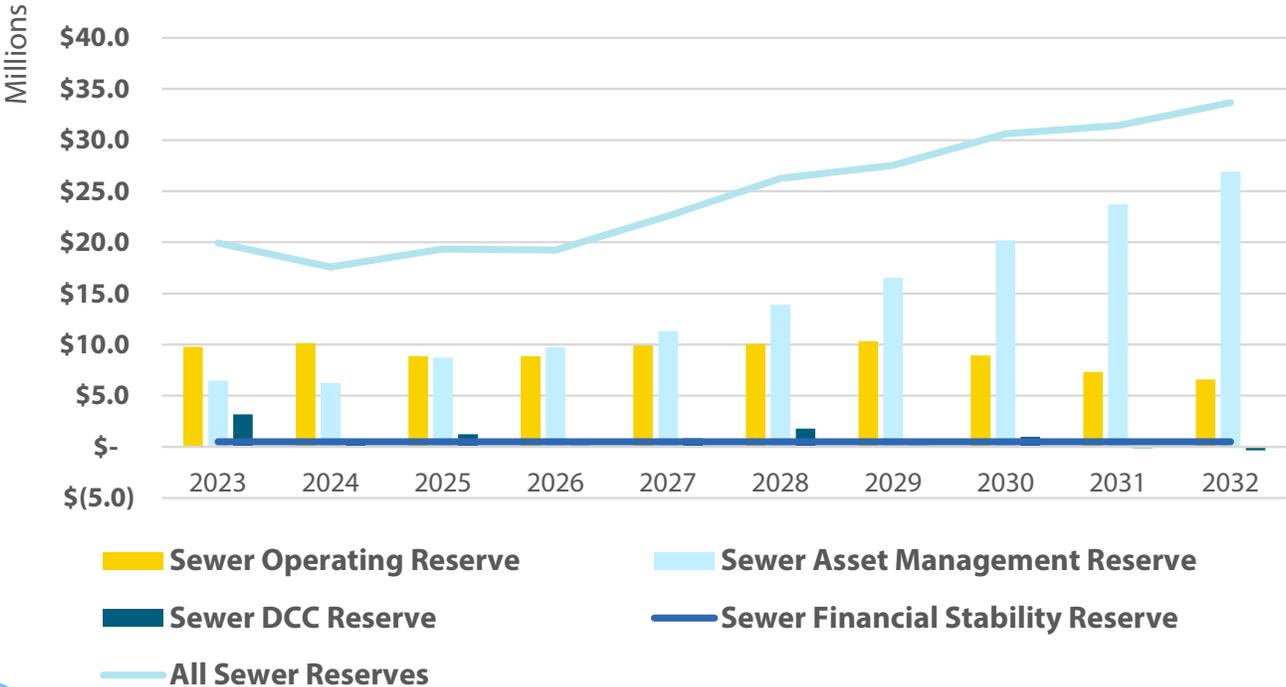
Sewer Utility - Projected Expenditures \$M



Sewer Utility - Projected Rate Increases



Sewer Utility - Projected Reserves \$M



Overhead Allocation

Many resources budgeted in the General Fund also support water and sanitary sewer services. These resources include Corporate (e.g. Legislative Services, Human Resources, Finance), Engineering and Public Works operations. The annual overhead allocation recognizes the shared costs for these resources. This allocation reduces the General Fund budget and funding required from property taxes and increases the Water and Sanitary Sewer Fund budgets and revenues required from utility customers.

The current overhead allocation consists of a corporate allocation which uses historical amounts that are increased by 2% each year and an allocation of specific Engineering and Public Works budgets based on a historical percentage. The rationale for the historical amounts is not known.

The new overhead allocation looks at each operating area budgeted in the General Fund that also supports water and sanitary sewer services, and utilizes an appropriate allocation base to calculate the portion of their annual budget to be allocated to each utility.

Allocation bases include:

- # of FTEs
- % of annual operating expenditures
- % of project expenditures

The new overhead allocation will be updated annually based on the prior year's budget and new allocation bases.

A calculation to show the impact of the proposed change for the Draft 2023 – 2027 Financial Plan is shown below.

The new allocation to the Sanitary Sewer Fund will be lower and the new allocation to the Water Fund will be higher. This change recognizes the significant differences in the numbers of FTEs and the relative size of annual operating and project budgets for each utility.

2022 2026 Financial Plan			
	Sewer	Water	Total
Corporate Allocation	1,001,951	962,753	1,964,704
Public Works and Eng Allocation	574,931	804,904	1,379,835
	1,576,882	1,767,657	3,344,539

New OH Allocation			
	Sewer	Water	Total
Corporate Allocation	503,865	1,407,887	1,911,752
PW Allocation	130,723	365,008	495,731
Engineering Services Allocation	782,967	989,344	1,772,311
	1,417,555	2,762,239	4,179,794

Overhead Allocation Change			
	(159,327)	994,582	835,255

Cost of Service Analysis

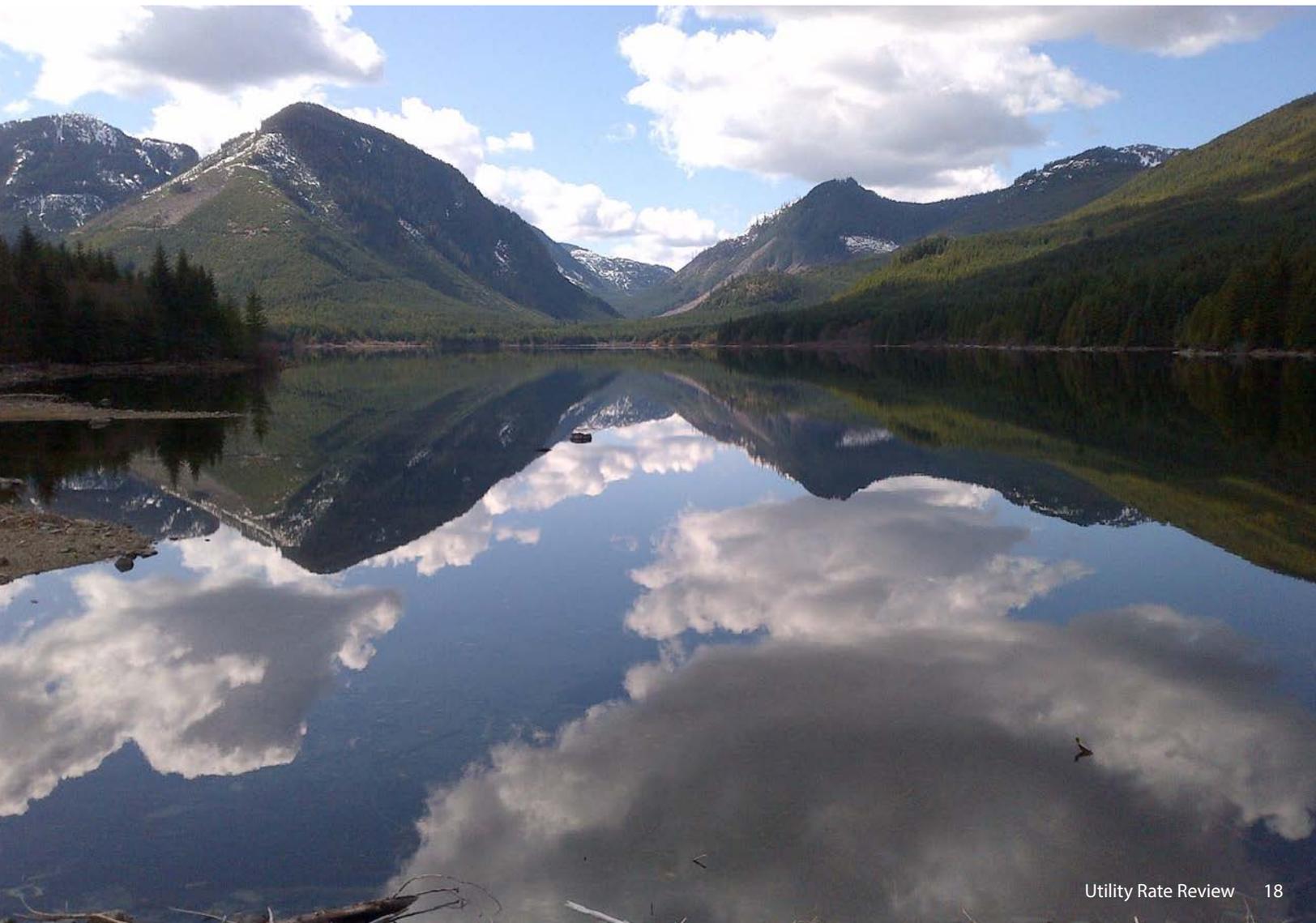
A Cost of Service analysis looks at service and demand characteristics by customer classification or by specific customers. Recommended by AWWA, this analysis is used in development of utility rate structures that support user equity.

This Utility Rate Review utilized a simplified approach to determine the cost of service by:

- Utilizing customer classifications where users in each classification share common service and demand characteristics;
- Recognizing that larger customer water service connections put additional cost burden on each utility's infrastructure; and
- Utilizing metered water consumption data by customer, by meter, by billing period.

This simplified approach relied on using each customer's water capacity or service as measured through their meter connection and through each customer's water consumption or demand to determine an equitable cost of service. This approach was used to evaluate each utility's current rate structures and recommendations for improvement.

A more robust cost of service analysis requires customer demand data (by day, by hour), engineering and financial analysis to determine required operating and infrastructure investment by customer or customer type and complex allocations and assumptions to determine cost of service by customer or customer classification. This approach would require detailed consumption data not currently available and significant additional engineering and financial resources.



UTILITY RATE STRUCTURE REVIEW

Do the current rate structures for the Water and Sanitary Sewer utilities effectively and efficiently support user equity, conservation and administrative efficiency?

The Utility Rate Review included review and assessment of each utility's current rate structures. Utility rate structures include three key elements:

- Customer classifications;
- Billing frequency;
- Schedule of Charges.

Customer Classifications

The City currently uses the following primary customer classification for both utilities:

- Single-Family Residential
- Multi-Family Residential
- Commercial
- Government
- Municipal
- Other

Single-family residential customers are the largest group and are considered the most homogenous classification for service and demand characteristics.

The service and demand characteristics of multi-family residential properties can vary widely due to the number of units, the proportion of outside space per unit and the number of persons per unit. Multi-family residential properties with 2 units are considered most similar to single-family residential in that they may have larger outdoor space per unit and the ability to cooperate and manage water consumption.

The service and demand characteristics of Commercial, Government, Municipal and Other properties varies widely. These classifications represent a wide range of business, institutional and industrial and manufacturing types as well as properties that are a mix of commercial and residential areas. Commercial, Government, Municipal and Other classifications are grouped together and referred to as Non-Residential for this review.

Billing Frequency

The City currently has three billing cycles each year, or approximately every four months, and utilizes a meter reading schedule with 16 specific routes and reading dates for all customers. The billing cycles or meter readings do not align with the calendar year or seasons. For example, the 2018 'billing year' started with meter readings in August 2017 and ended with meter readings in July 2018.

A summary of the City's billing periods is provided below.

Billing	Months
1	August to November
2	December to March
3	April to July

Schedule of Charges

The current Schedule of Charges for the Water and Sanitary Sewer utilities have significant differences.

The following sections provide more detailed information and assessment of each utility's Schedule of Charges and recommendations for changes.

Water Utility Rate Structure Review and Recommendations

Following is an overview of the utility's current rate structure, observations of strengths and weaknesses and recommendations for changes.

Schedule of Charges

The City's current Schedule of Charges for the water utility include:

- A Base Rate for each customer service connection;
- An Increasing Volumetric Rate (six blocks) for each customer service connection;
- A Multi-Family Option (MFO); and
- Fireline Rates for customer service connections required for fire flow.

The Base Rate – or Minimum Service Rate – is a fixed amount per day for each water service connection. The Base Rate is the same for all customers.

The Volumetric Rate is an increasing block rate and is based on metered water consumption for each service connection. This is also known as an expanding block rate and is intended to incent conservation by charging higher rates for higher levels of consumption. Total water consumption for a billing period is prorated to an average daily amount and the Volumetric Rates are then applied and charges calculated. The Volumetric Rates are the same for all customer classifications.

The Multi-Family Option (MFO) calculates charges using two methods for multi-family residential service connections with the lower charge billed. The two methods are outlined below:

- The first method calculates one Base Rate and the Volumetric Rates by service connection;
- The second method calculates charges per residential unit for a multi-family service connection. The Base Rate is charged per residential unit. Metered water consumption is divided by the number of residential units and the Volumetric Rate levels are then applied and charged. This method can produce a higher total Base Rate charge and lower total Volumetric Rate charges for a multi-family residential property.

Analysis of historical billing data indicates that the second option for Multi-Family Residential properties usually produces a higher total charge for a service connection and is therefore infrequently used for actual billing.

Firelines

City regulations require specific multi-family and non-residential buildings to have automatic sprinkler systems. These buildings may require separate water meter connections, referred to as firelines, to ensure fire flow needs. In some situations an upsized water meter connection, referred to as a combination meter, may be used to meet fire flow requirements. A combination meter provides both domestic water consumption and fire flow needs.

Fireline Rates are a separate Base Rate charged for dedicated fireline meter connections and for combination meter connections.

The City's 2022 Water Utility Schedule of Charges is shown below:

2022 Base Rate					
	\$/Day - Domestic	\$/Day - Firelines	Total \$/Day	\$/ Year	
All Customers	\$ 0.90398	\$ -	\$ 0.90398	\$	330
Fireline - Single Meter < 100 mm	\$ -	\$ 0.89413	\$ 0.89413	\$	326
Fireline - Single Meter 100 mm and larger	\$ -	\$ 1.50636	\$ 1.50636	\$	550
Fireline - Combination Meter < 100 mm	\$ 0.90398	\$ 0.44708	\$ 1.35106	\$	493
Fireline - Combination Meter 100 mm and larger	\$ 0.90398	\$ 0.75319	\$ 1.65717	\$	605

2022 Volumetric Rates - Increasing					
All Customers					
Level	Consumption/ Day - Imperial Gallons (IG)	\$/ IG	\$/ 1,000 IG	Rate Change %	
1	first 145 gallons	\$ 0.00190	\$ 1.90		
2	next 75 gallons	\$ 0.00876	\$ 8.76	461%	
3	next 109 gallons	\$ 0.00921	\$ 9.21	105%	
4	next 219 gallons	\$ 0.00958	\$ 9.58	104%	
5	next 548 gallons	\$ 0.00991	\$ 9.91	103%	
6	over 1,096 gallons	\$ 0.01022	\$ 10.22	103%	

1 imperial gallon = 4.54609litres

Review Observations and Recommendations:

Recommendations for changes to the Water utility's rate structure are provided in the following framework:

- Customer Classifications
- Base Rate
- Volumetric Rate
- Multi-Family Option

Water Utility - Customer Classifications

Best practices creates classifications for customers that share service characteristics and demand patterns. Commonly used classifications are:

- Residential for one and two family properties;
- Commercial for multi-family apartment buildings and for business properties; and
- Industrial for manufacturing and processing establishments.

The number of units for multi-family residential properties ranges from 2 units to over 200 units. Multi-family residential properties with 2 units may be considered more like single-family residential properties in demand patterns and ability to manage water consumption.

Customer Classification - Recommendations:

Implement two new customer classifications for multi-family residential properties to:

- Recognize the difference in service characteristics/ demand patterns; and
- Enable different charges for Multi-Family Residential 2 units and Multi-Family Residential 3+ units.

These new classifications for multi-family residential properties are required to support recommended changes to the current Base Rate and Volumetric Rates as outlined further in this report. A comparison is provided below:

Current Customer Classifications	Proposed Customer Classifications
SF Residential	SF Residential
MF Residential	MF Residential 2 units
Commercial	MF Residential 3+ units
Government	Commercial
Municipal	Government
Other	Municipal
	Other



Water Utility - Base Rate

Best practices recommend considering a Base Rate that increases with meter connection size. The rationale is based on the understanding that the cost of service is higher for larger capacity meter connections due to the upsized infrastructure and higher cost replacement components required to maintain adequate water pressure.

Currently, the Base Rate is:

- a daily rate for each meter connection for all customer classifications;
- a daily rate for each fireline meter connection; and
- an additional daily rate for combination meter connections.

Meter connection sizes range from 19mm to 250mm. Customers with larger service connections have proportionately larger water capacity on demand but do not currently incur higher costs for that service.

Currently, 35% of total water revenues is collected through the Base Rate charges, which supports a stable source of revenues for the utility. However, currently the proportion of Base Rate charges is significantly different for each customer classification. Approximately 61% of Single-Family Residential revenues are collected as Base Rate charges, while only 4% of Multi-Family Residential and 8% of Non-Residential revenues are collected as Base Rate charges.

Firelines

The City of Nanaimo's current approach is to consider fireline meter connections primarily a fire protection benefit for the private property owner. This approach is consistent with the majority of other municipalities surveyed.

Meter Connection

The Base Rates by meter connection size can be determined by using equivalent meter capacity ratios. Ratios can be determined using different methodologies including; cost analysis of shared infrastructure, water capacity on demand, or by cost analysis of meter and related service connection costs.

The City's Engineering department has developed ratios based on meter and related service connection costs. This approach was used as it was most readily available and recognizes cost differences for larger meter connections. The table below shows the meter connection ratios that are used in proposed rate structure changes.

Meter Size	Ratio
19mm	1.00
25mm	1.20
38mm	2.10
50mm	2.70
75mm	3.20
100mm	4.00
150mm	9.10
200mm	11.80
250mm	15.20

Single-Family Residential and Multi-Family Residential 2 units are typically a single 19mm meter size connection. Multi-Family Residential 3+ units and Non-Residential users may have more than one water service connection and meter sizes can vary from 19mm to 250mm.

Base Rate - Recommendations:

- Maintain the current Base Rate by service connection for Single-Family Residential and Multi-Family Residential with 2 units;
- Maintain the current Base Rate by service connection for dedicated firelines;
- Implement a Base Rate by meter size service connection for Multi-Family Residential 3+ units and Non-Residential customers; and
- Eliminate additional Base Rate for combination meters

Customers with larger service connections, including combination meter connections, will pay a higher Base Rate or fixed charge to better reflect their higher demand on shared infrastructure and increased water capacity and availability.

A comparison of the current Base Rate charges and the proposed Base Rate charges is provided on page 23.



2022 Base Rate						
	\$/Day - Domestic		\$/Day - Firelines		Total \$/Day	\$/Year
All Customers	\$	0.90398	\$	-	\$ 0.90398	\$ 330
Fireline - Single Meter < 100 mm	\$	-	\$	0.89413	\$ 0.89413	\$ 326
Fireline - Single Meter 100 mm and larger	\$	-	\$	1.50636	\$ 1.50636	\$ 550
Fireline - Combination Meter < 100 mm	\$	0.90398	\$	0.44708	\$ 1.35106	\$ 493
Fireline - Combination Meter 100 mm and larger	\$	0.90398	\$	0.75319	\$ 1.65717	\$ 605

Proposed Base Rate *			
		\$/Day	\$/Year
Single- Family Residential, Multi-Family Residential 2 units	\$	0.90398	\$ 330
Fireline - Single Meter < 100 mm	\$	0.89413	\$ 326
Fireline - Single Meter 100 mm and larger	\$	1.50636	\$ 550

Multi-Family Residential 3+ units, Non Residential			
Meter Size		\$/Day	\$/Year
19mm	\$	1.12998	\$ 412
25mm	\$	1.35597	\$ 495
38mm	\$	2.37295	\$ 866
50mm	\$	3.05093	\$ 1,114
75mm	\$	3.61592	\$ 1,320
100mm	\$	4.51990	\$ 1,650
150mm	\$	10.28277	\$ 3,753
200mm	\$	13.33371	\$ 4,867
250mm	\$	17.17562	\$ 6,269

* Proposed rates do not include annual rate increase for 2023.



Water Utility - Volumetric Rate

Best practices recommend implementing a Volumetric Rate with two or more blocks. The first, or the first and second blocks, are generally tied to a residential customer's indoor and outdoor use. Additional blocks can be tied to the cost of water resources required to provide services in excess of levels 1 and 2. The last block is infinite so as not to limit the amount of water than can be purchased.

Generally held assumptions regarding customer demand are:

- Single-Family Residential customers have the greatest ability to manage their water consumption;
- Multi-Family Residential customers have less ability to manage their individual water consumption as the meter is shared between multiple units;
- Multi-Family Residential customers consume less water for outside purposes per capita than Single-Family Residential users due to proportionately less area for outside landscaping and higher use of irrigation;

- Non-residential customer's water consumption is used for business or institutional purposes. There is a wider range of consumption among individual customers and less discretion to reduce or manage consumption; and
- Water conservation can be better addressed for Non-Residential customers through other strategies developed for specific businesses or institutions than through the utility rate structure.

The City's current Volumetric Rate includes six increasing blocks for all customers. Level 1 is considered to provide an average Single-Family Residential customer with inside and some outside water consumption, level 2 provides additional consumption for outside purposes. The rationale for levels 4 to 6 are not available.

The current rate increase from level 1 to 2 is 461% with minimal increases for levels 3 to 6 as shown below.

2022 Volumetric Rates - Increasing All Customers					
Level	Consumption/ Day - Imperial Gallons (IG)		\$/ IG	\$/ 1,000 IG	Rate Change %
1	first 145 gallons		\$ 0.00190	\$ 1.90	
2	next 75 gallons		\$ 0.00876	\$ 8.76	461%
3	next 109 gallons		\$ 0.00921	\$ 9.21	105%
4	next 219 gallons		\$ 0.00958	\$ 9.58	104%
5	next 548 gallons		\$ 0.00991	\$ 9.91	103%
6	over 1,096 gallons		\$ 0.01022	\$ 10.22	103%

Water Revenue Analysis

A revenue analysis by customer classification indicates that 84% of volumetric charges for Single-Family Residential customers and 81% of volumetric charges for Multi-Family Residential 2 units are at levels 1 and 2. These customers pay small increases for consumption in levels 3 to 6.

Volumetric charges for Multi-Family Residential 3+ units and all Non-Residential customers are largely at levels 5 and 6. Customers with less ability to manage water consumption are paying for most of their water consumption at the highest levels.

See below for the table titled, "Consumption Levels by Customer Classification" and graph titled, "Water Revenue Analysis by Customer Classification".

Further analysis of Single-Family Residential customers indicates that their average daily water consumption is

well within the current volumetric rate for levels 1 and 2, as shown in the table below titled, "Single-Family Average Water Consumption by Billing Period".

Single-Family Average Water Consumption by Billing Period		
Billing Periods	Months	Average Daily Water Consumption IG
1	August to November	174
2	December to March	97
3	April to July	152

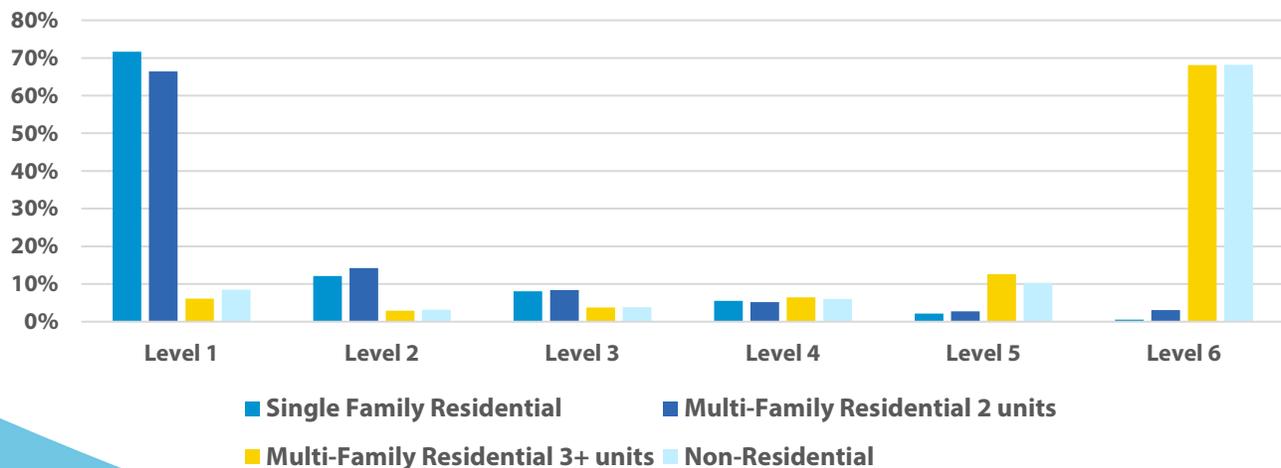
Billing period 2 average daily consumption would best represent a Single-Family Residential customer's consumption for indoor purposes only. This analysis indicates that the current allocation for level 1 water consumption (up to 145 gallons/day) is significantly higher than the current demand for indoor purposes.

Consumption Levels by Customer Classification

Classification	Consumption					
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Single Family Residential	72%	12%	8%	6%	2%	1%
Multi-Family Residential 2 units	66%	14%	8%	5%	3%	3%
Multi-Family Residential 3+ units	6%	3%	4%	6%	13%	68%
Non-Residential	8%	3%	4%	6%	10%	68%

Assume no Multi-Family Option

Water Revenue Analysis by Customer Classification



Volumetric Rate Recommendations:

- Reduce increasing Volumetric Rate blocks from six to four blocks to improve clarity and administrative efficiency;
- Reallocate the current total water consumption in levels 1 and 2 (220 gallons). Level 1 to apply to the first 110 gallons/day and level 2 to apply to the next 110 gallons/day. This reallocation better aligns with average single family residential demand for indoor and outdoor purposes;
- Reduce % increase from level 1 to level 2 from 462% to a more reasonable 250%;
- Increase % increase to 175% for levels 3 and for level 4 to better recognize the increased costs for higher levels of demand, improve user equity and further incent conservation;

- Continue to utilize the increasing Volumetric Rate for Single-Family Residential and Multi-Family Residential with 2 units customers only;
- Implement a single Volumetric Rate for Multi-Family Residential 3+ units and for all Non-Residential customers to recognize their reduced ability to manage water consumption; and
- Consider other strategies to support water conservation for Multi-Family Residential 3+ units and Non-Residential customers.

A comparison is provided in the tables labelled, “2022 Volumetric Rates - Increasing”, “Proposed Volumetric Rates - Increasing” and “Proposed Volumetric Rate - Single” on page 27.

The proposed single Volumetric Rate is higher than the 2022 Level 1 volumetric rate, however, lower than the 2022 Levels 2 to 6 volumetric rates.



2022 Volumetric Rates - Increasing

All Customers					
Level	Consumption/ Day - Imperial Gallons (IG)		\$/ IG	\$/ 1,000 IG	Rate Change %
1	first 145 gallons	\$	0.00190	\$ 1.90	
2	next 75 gallons	\$	0.00876	\$ 8.76	461%
3	next 109 gallons	\$	0.00921	\$ 9.21	105%
4	next 219 gallons	\$	0.00958	\$ 9.58	104%
5	next 548 gallons	\$	0.00991	\$ 9.91	103%
6	over 1,096 gallons	\$	0.01022	\$ 10.22	103%

Proposed Volumetric Rates - Increasing *

Single Family and Multi-Family 2 units Residential Customers					
Level	Consumption/ Day - Imperial Gallons (IG)		\$/ IG	\$/ 1,000 IG	Rate Change %
1	first 110 gallons	\$	0.00190	\$ 1.90	
2	next 110 gallons	\$	0.00475	\$ 4.75	250%
3	next 110 gallons	\$	0.00831	\$ 8.31	175%
4	over 330 gallons	\$	0.01455	\$ 14.55	175%

Proposed Volumetric Rate - Single *

Multi-Family 3+ units Residential and Non-Residential Customers					
	Consumption/ Day - Imperial Gallons (IG)		\$/ IG	\$/ 1,000 IG	
	all	\$	0.00750	\$ 7.50	

* Proposed rates do not include annual rate increase for 2023.

Multi-Family Option:

The City's current Multi-Family Option for calculating multi-family residential charges is not a best practice, may be difficult for users to understand and is not administratively efficient.

Multi-Family Option Recommendation:

- Eliminate the Multi-Family Option.

The proposed new customer classifications and Base and Volumetric Rate structure changes will improve equity for Multi-Family Residential customers. Multi-Family Residential 2 units will share the same Base Rate charges by connection and increasing Volumetric Rate charges as a Single-Family Residential customer to reflect their common demand characteristics and ability to manage water consumption. Multi-Family Residential with 3+ units will incur Base Rate charges depending on service connection size to better reflect their proportionate share of system costs and a single Volumetric Rate charge to reflect their reduced ability to manage water consumption.

Impact of Proposed Rate Structure on Water Utility Customers

The proposed rate structure must still collect adequate annual revenues; however, the proposed changes may impact charges for individual customers.

It can be acknowledged that currently some customers may not be paying an equitable share of the utility's costs and some customers may be paying more than their equitable share. Implementation of the recommended rate structure changes will have impacts for some customers – some customers may pay more and some may pay less. The purpose and rationale of the proposed rate structure changes must reasonably and adequately explain these impacts.

An analysis was completed comparing charges under the City's current Water Utility rate structure with the projected charges under the proposed rate structure. The most significant impacts are noted in the table below.

Some Non-Residential customers may see a decrease in Water Utility charges due to the single volumetric rate and an increase in Sewer Utility charges due to the proposed single volumetric rate based on water consumption.

Customer Type	Service Demand	Impact
Single Family Residential and Multi-Family Residential 2 units	Does not exceed level 2	Lower Volumetric charge due to lower rate increase for level 2
	Exceeds level 2	Higher Volumetric charge due to higher rate increase for level 3 and 4
Multi-Family Residential 3+ units	Higher consumption	Lower Volumetric charges due to single volumetric rate.
	Larger meter connection	Higher Base Rate charge due to Base Rate by meter size
Non Residential	Lower consumption	Higher Volumetric charge due to single volumetric rate
	Higher consumption	Lower Volumetric charge due to single volumetric rate
	Larger meter connection	Higher Base Rate charge due to Base Rate by meter size

Sanitary Sewer Utility Rate Structure Review and Recommendations

Following is an overview of the key component of the utility's rate structure, observations of strengths and weaknesses and recommendations for changes.

Schedule of Charges

The City's current Schedule of Charges for the sanitary sewer utility include:

- A Base Rate per unit only for residential customers;
- A Base Rate only per property feature, including maximum daily water consumption (currently 11,000 gallons or 50m³ per day) for all non-residential users excluding hotels, motels and campgrounds; and
- A decreasing Volumetric Rate (four blocks) only for hotels, motels and campgrounds and for non-residential users that exceed the daily maximum water consumption noted above.

The Base Rate is the same for all residential premises and is the only charge for sanitary sewer services.

The Base Rate for Non-Residential customers, excluding hotels, motels and campgrounds, is charged on a specific type and number of features or amenities for each property. The Base Rate charge is by group of plumbing fixtures, or by washer, or by classroom or by bed depending on the property type. If a customer's water consumption exceeds 11,000 gallons, or 50 m³, per day the customer is then charged the decreasing Volumetric Rate instead of a Base Rate.

Hotels, motels and campgrounds are charged a decreasing Volumetric Rate based on metered water consumption each billing period.

The City's 2022 Sanitary Sewer Utility Schedule of Charges is shown on page 30.



2022 Sanitary Sewer Utility Schedule of Charges

Base Rate Only - Residential			
		\$/ Day	\$/ Annum
Single Family Residence		\$ 0.41658	\$ 152
Apartments, Suites or Duplex	each unit	\$ 0.41658	\$ 152
Rooming Houses	first unit	\$ 0.41658	\$ 152
Rooming Houses	each additional group of plumbing fixtures	\$ 0.27860	\$ 102
Trailer or Mobile Home Park	per occupied space	\$ 0.41658	\$ 152
Secondary Suite		\$ 0.41658	\$ 152
Base Rate only - Non Residential (includes 11,000 gallons per day water			
Cafes, Restaurant, Licensed Premises	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Garage or Service Station		\$ 0.41658	\$ 152
Store or Business Premises	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Cleaners	per washer	\$ 0.19526	\$ 71
Schools and Colleges	per classroom	\$ 0.27860	\$ 102
Hospitals	per bed	\$ 0.27860	\$ 102
Office Building	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Churches and Halls	for each group of plumbing fixtures	\$ 0.27860	\$ 102
Other Premises	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Current Volumetric Rates			
Hotels, Motels and Campgrounds and Non-Residential customers that exceed 11,000 gallons per day water consumption included in Base Rate			
Level	Consumption/ Day - Imperial Gallons (IG)	\$/IG	\$/1000 IG
Level 1	per 1,000 gallons up to 11,000 gallons/day	\$ 0.00138	\$ 1.38033
Level 2	per 1,000 gallons for next 11,000 gallons/day	\$ 0.00111	\$ 1.10732
Level 3	per 1,000 gallons for next 55,000 gallons/day	\$ 0.00083	\$ 0.83430
Level 4	per 1,000 gallons for over 77,000 gallons/day	\$ 0.00055	\$ 0.54605

Metric equivalents: 11,000 gallons = 50 m³, 55,000 gallons = 250 m³ and 77,000 = 352 m³

Review Observations and Recommendations

Recommendations for changes to the Sanitary Sewer Utility's rate structure are provided in the following framework:

- Customer Classifications
- Base Rate
- Volumetric Rate

Sanitary Sewer Utility - Customer Classifications

As noted in the Water Utility section, best practices creates classifications for customers that share service characteristics and demand patterns. Commonly used classifications are:

- Residential for one and two family properties;
- Commercial for multi-family apartment buildings and for business properties; and
- Industrial for manufacturing and processing establishments.

The number of units for multi-family residential properties ranges from 2 to over 200 units. Multi-family residential properties with 2 units may be considered more like single-family residential properties in demand patterns and ability to manage water consumption.

Customer Classification Recommendations:

Consistent with the Water Utility, implement two new customer classifications for multi-family residential properties to:

- Recognize the difference in service characteristics/demand patterns; and
- Enable different charges for Multi-Family Residential 2 units and Multi-Family Residential 3+ units.

These new classifications for multi-family residential properties are required to support recommended changes to the current Base Rate and Volumetric Rates as outlined further in this report. A comparison is provided below:

Current Customer Classifications	Proposed Customer Classifications
SF Residential	SF Residential
MF Residential	MF Residential 2 units
Commercial	MF Residential 3+ units
Government	Commercial
Municipal	Government
Other	Municipal
	Other

Sanitary Sewer Utility - Base Rate

Best practices recommends using a multi-part rate that includes a Base Rate and a Volumetric Rate.

Currently, all residential properties are charged a Base Rate only per residential unit. The City's customer billing for mobile home parks and strata properties requires individual statements. The administration of individual billings for these properties are typically the responsibility of the owners of these properties consistent with the water utility.

Currently, all non-residential customers (excluding hotels, motels and campgrounds) are charged a Base Rate only based on specific features of each premise and includes a maximum daily water allocation. This approach is not common with other municipalities surveyed and requires significant administrative resources to maintain specific and accurate property information for billing. While there may be a link between each customer's number of plumbing fixtures, or washers, or beds or classrooms and the demand they make on the City's sanitary sewer system, this approach is not a best practice.

Currently, the Base Rate for all non-residential customers (excluding hotels, motels and campgrounds) includes a significant water consumption allocation. The allocation is the same for each customer. If the allocation is exceeded, the customer is charged the decreasing Volumetric Rate only. The City has been advised by some non-residential customers that they may use water in excess of their needs so that they are charged using the decreasing Volumetric Rate instead of the Base Rate by number of features or amenities as that may produce a lower charge. This approach does not support conservation.

Base Rate Recommendations:

- Maintain the Base Rate by property for Single-Family Residential and a base rate by residential unit for all Multi-Family Residential properties;
- Implement a Base Rate by property for Non-Residential customers; and
- Eliminate the Base Rate by specific features of a property and maximum daily water allocation for Non-Residential customers.

A comparison is provided in the tables on page 32.

Current Base Rates			
		\$/ Day	\$/ Annum
Single Family Residence		\$ 0.41658	\$ 152
Apartments, Suites or Duplex	each unit	\$ 0.41658	\$ 152
Rooming Houses	first unit	\$ 0.41658	\$ 152
Rooming Houses	each additional group of plumbing fixtures	\$ 0.27860	\$ 102
Trailer or Mobile Home Park	per occupied space	\$ 0.41658	\$ 152
Secondary Suite		\$ 0.41658	\$ 152
Base Rate only - Non Residential (includes 11,000 gallons per day water consumption)			
Cafes, Restaurant, Licensed Premises	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Garage or Service Station		\$ 0.41658	\$ 152
Store or Business Premises	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Laundry, Laundromat or Dry Cleaners	per washer	\$ 0.19526	\$ 71
Schools and Colleges	per classroom	\$ 0.27860	\$ 102
Hospitals	per bed	\$ 0.27860	\$ 102
Office Building	for each group of plumbing fixtures	\$ 0.41658	\$ 152
Churches and Halls	for each group of plumbing fixtures	\$ 0.27860	\$ 102
Other Premises	for each group of plumbing fixtures	\$ 0.41658	\$ 152

Metric equivalent: 11,000 gallons = 50 m³

Proposed Base Rates *			
		\$/ Day/ Unit	\$/ Annum
Residential and MF Residential	\$	0.41658	\$ 152
		\$/ Day/ Property	\$/ Annum
Non Residential	\$	0.41658	\$ 152

* Proposed rates do not include annual rate increase for 2023.

Sanitary Sewer Utility - Volumetric Rate

The current Schedule of Charges for the Sanitary Sewer Utility does not include a Volumetric Rate for customers (excluding hotels, motels and campgrounds). Decreasing Volumetric Rates are charged for hotels, motels and campgrounds and for Non-Residential customers who exceed their Base Rate water allocation. The current Volumetric Rates are shown in the table below.

A survey of other municipalities found that most used a single Volumetric Rate based on metered water consumption for sanitary sewer services; and adjusted either the rate or the volume to recognize that some water is consumed for outside purposes and is not collected by the sanitary sewer system. Municipalities used one of the following approaches for calculating volumetric sewer charges:

- A % of metered water consumption (e.g. 90%), or
- Reduce sewer Volumetric Rates during the spring and summer months, or
- Use fall and winter water consumption to estimate spring and summer water consumption.

These municipalities also used more frequent meter readings and had reading schedules that more closely aligned with annual seasons.

Volumetric Rate Recommendations:

- Implement a single Volumetric Rate for Non-Residential customers based on metered water consumption to improve user equity.
- There may be Non-Residential properties that consume significant amounts of water that is not collected by the sanitary sewer system (e.g. irrigation). Implement a policy and process where a customer may apply for an adjustment to water consumption volumes for calculating sanitary sewer volumetric charges. This adjustment may require the installation of a separate meter.

The City may consider implementing a volumetric rate based on water consumption for residential customers when the planned meter replacement program has been completed and meter readings can be increased to a minimum of four times a year to better align with annual seasons. A comparison is provided in the tables below.

The proposed single Volumetric Rate is higher than the current decreasing Volumetric Rate levels. There will be a shift from Base Rate charges only to a combination of Base Rate and Volumetric charges for Non-Residential customers.

Current Volumetric Rates				
Hotels, Motels and Campgrounds and Non-Residential customers that exceed 11,000 gallons per day water consumption included in Base Rate				
Level	Consumption/ Day - Imperial Gallons (IG)		\$/IG	\$/1000 IG
Level 1	per 1,000 gallons up to 11,000 gallons	\$	0.00138	\$ 1.38033
Level 2	per 1,000 gallons for next 11,000 gallons	\$	0.00111	\$ 1.10732
Level 3	per 1,000 gallons for next 55,000 gallons	\$	0.00083	\$ 0.83430
Level 4	per 1,000 gallons for over 77,000 gallons	\$	0.00055	\$ 0.54605

Metric equivalents: 11,000 gallons = 50 m³, 55,000 gallons = 250 m³ and 77,000 = 352 m³

Proposed Volumetric Rate *				
Single Volumetric Rate				
Non Residential Customers Only				
	Consumption/ Day - Imperial Gallons (IG)		\$/IG	\$/1000 IG
All	All	\$	0.00350	\$ 3.50

* Proposed rates do not include annual rate increase for 2023.

Impact of proposed Rate Structure on Sanitary Sewer Utility Customers

Consistent with the Water Utility, the proposed Sanitary Sewer rate structure must still collect adequate annual revenues; however, the proposed changes may impact charges for individual customers.

It can be acknowledged that currently some customers may not be paying an equitable share of the utility's costs and some customers may be paying more than their equitable share. Implementation of the recommended rate structure changes will have impacts for some customers – some customers may pay more and some may pay less. The purpose and rationale of the proposed rate structure changes must reasonably and adequately explain these impacts.

An analysis was completed comparing charges under the City's current rate structure with the projected charges under the proposed rate structure.

Residential customers will not see any change as the current Base Rate by connection (Single-Family Residential) and by unit (all Multi-Family Residential) will remain.

It is difficult to make any broad assumption regarding the impact for Non-Residential customers due to a wide range of amenity units used for the current charges and a wide range of water consumption.

The most significant impacts for noted are shown in the table below.

As previously noted, some Non-Residential customers may see a decrease in Water Utility charges due to the single volumetric rate and an increase in Sewer Utility charges due to the single volumetric rate based on water consumption.

Customer Type	Service Demand	Impact
Single Family Residential	All	No change
Multi-Family Residential 2 units	All	No change
Multi-Family Residential 3+ units	All	No change
Non-Residential	All	Difficult to make broad assumptions due to significant rate structure change from Base Rate per feature or amenity unit to Base Rate by property and Volumetric Rate based on water consumption
		Customers with a higher unit count and lower water consumption may have lower total charges due to new Volumetric Rate based on water consumption
		Customers with higher water consumption may have increased total charges due to new Volumetric Rate based on water consumption

ADDITIONAL INFORMATION

The City also provides water and sanitary sewer services as required by provincial legislation or through contractual agreements. A brief overview of these services for information purposes only are provided below. These services were not included in this review.

Southwest Extension Waterworks District

Under provincial legislation, the City provides water to Southwest Extension Waterworks District. An annual calculation charges a rate per 1,000 gallons for Southwest Extension's consumption. This rate is calculated each year based on the City's annual water supply administration, operating and average infrastructure investment costs. The City's 2021 billing indicated total consumption by the District of 5.8 million gallons or approximately 0.24% of the City's total water consumption.

Water Hauler Fill Stations

The City owns and operates two Water Hauler Fill Stations. One is located on Labieux Road and one at Chartwell Road and MacMillan Road in Cedar. Typical users are water truck haulers. Haulers must apply for a SMART card from the City and prepay to access the Bulk Water Filling Station. The annual water hauler charge is calculated to recover annual operating, maintenance and investment for the fill stations plus cost of water at the highest volumetric level.

Bulk Water Agreements

The City's bulk water rate is equal to the highest volumetric rate.

The City has the following agreements to provide water:

- Lantzville Water Agreement
- Snuneymuxw First Nation Water Servicing Agreements

These agreements provide water at the current City of Nanaimo bulk water rates.

The agreement with Lantzville was entered into in 2014 and has a 20 year term.

The two agreements with Snuneymuxw First Nation were entered into in 2012 and have a 40 year term.

The City has the following agreements to provide an emergency water connection:

- North Cedar Improvement District
- Nanaimo Forest Products (Harmac)

The North Cedar Improvement District contract provides water at current City of Nanaimo bulk water rates. This agreement was entered into in 2015 and renewed in 2020 for an additional 5 year term.

The agreement with Nanaimo Forest Products also provides the City with an emergency water supply. Water is provided by either party at specified rates. This agreement was entered into in 2011 and has a 30 year term.

Sanitary Sewer Agreement

The City has a tripartite agreement with the Regional District of Nanaimo and Snuneymuxw First Nation. The City provides sanitary sewer collection and the Regional District of Nanaimo provides sanitary sewer treatment for Snuneymuxw First Nation. This agreement was entered into in 2015 and has a 40 year term.



OTHER CONSIDERATIONS

Income Subsidy

The City offers a Water and Sewer User Fee Subsidy to qualifying residents. The resident must be over 65 years of age and meet specific income requirements. The subsidy provides for a 50% reduction in the minimum charges for water and sewer rates. Council may wish to review and provide further direction on the City's current income subsidy program.

Early Payment Discount

The City offers a payment discount for water and sewer users. User rate payments are due three weeks after the utility billing is issued. If the payment is received on or before the due date the account holder receives a 5% discount. Payments received after the due date do not qualify for the discount. Council may wish to review and provide further direction on the City's current early payment discount program.

Agricultural Properties

The City's current water rate structure does not include either a separate customer classification or specific rates for agricultural properties. The City currently has 30 Class 9 farm properties for property tax purposes. The majority of these properties are classified as residential and are currently charged the same as all other water utility customers.

MEASUREMENT UNITS

The City's current utility billing system uses imperial measurement for recording water consumption data and for customer billing. The Utility Review process and this report uses imperial gallons for all analysis and reporting to minimize risk of conversion errors. City staff have indicated a desire to change the utility billing system to metric.

At this time, changing the current billing system to collect, calculate and present data using metric measurement is not considered practical and would require considerable resources to verify and monitor the

system input and output. The City may consider the change to metric measurement at the time that a new billing software is required.

MUNICIPAL SURVEY

The City sent a questionnaire to several similar sized municipalities regarding their water and sewer utility rate structures. The City received responses from the following municipalities which all used full cost recovery:

- City of Abbotsford
- City of Chilliwack
- City of Kamloops
- City of Kelowna
- City of Victoria

The rate structures utilized by these municipalities included some key differences from the City of Nanaimo's current utility rate structures:

- Most municipalities used fewer customer classifications or only one classification, and customer classifications were usually the same for both the water and sewer utilities;
- Most municipalities had more frequent meter reading schedules or reading schedules that appeared to align with seasons;
- Most municipalities used a Base Rate by meter size which is a best practice;
- Most municipalities used either a single Volumetric Rate or an increasing Volumetric Rate with less block levels; and
- No municipalities had a sewer rate structure based on specific attributes of a property (e.g. number of plumbing fixtures, beds, classrooms). All used either a combination of a Base Rate and Volumetric Rate or Volumetric Rate only for the sewer utility.

A summary of the municipal survey findings can be found in Appendix 2.

SUMMARY OF UTILITY RATE REVIEW RECOMMENDATIONS

The Utility Rate Review evaluated the financial sustainability of the City's Water Utility and Sanitary Sewer Utility and the effectiveness and efficiency of each utilities' current Rate Structures. Each utility's rate structures were examined to identify opportunities to improve user equity, clarity and administrative efficiency.

A summary of the Utility Rate Review recommendations:

Water Utility

- Maintain annual rate increases;
- Implement two new customer classifications for multi-family residential customers: Multi-Family Residential 2 units and Multi-Family Residential 3+ units;
- Implement Schedule of Charges:
 - Maintain current daily Base Rate by property for Single Family Residential
 - Maintain current daily Base Rate by property for Multi-Family Residential 2 units
 - Implement daily Base Rate by meter size for each service connection for Multi-Family Residential 3+ units and Non-Residential customers,
 - Eliminate additional Base Rate for combination meters,
 - Reduce increasing Volumetric Rate to 4 levels for Single-Family Residential and Multi-Family Residential 2 units only including new consumption levels, decreasing the rate increase between level 1 and level 2 and increasing rate increase for level 3 and level 4
 - Implement a single Volumetric Rate for Multi-Family Residential 3+ units and Non-Residential; and
- Eliminate the Multi-Family Option.

Sanitary Sewer Utility

- Maintain annual rate increases;
- Implement new customer classifications for multi-family residential customers: Multi-Family Residential 2 units and Multi-Family Residential 3+ units;
- Implement Schedule of Charges:
 - Maintain current daily Base Rate by property for Single-Family Residential;
 - Maintain current daily Base Rate by residential unit for Multi-Family Residential 2 units
 - Maintain current daily Base Rate by residential unit for Multi-Family 3+ units;
 - Implement base rate by property for Non-Residential Customers;
 - Implement single Volumetric rate for Non-Residential Customer;
- Implement a policy and process for customers to apply for an adjustment to water consumption where significant water consumption is not collected by the sanitary sewer system – e.g. for irrigation;
- Eliminate the Base Rate by property feature for non-residential customers including the maximum daily water allocation; and
- Eliminate the decreasing Volumetric Rate for hotels, motels and campgrounds and for Non-Residential customers that exceed a specific daily water consumption.



FUTURE UTILITY RATE REVIEWS

The current Utility Rate Review is focused on incremental and achievable changes to improve customer equity, clarity and administrative efficiency. This Utility Rate Review has developed a framework and tools for future reviews.

Future improvement may include:

- Utility Customer Statements - improve disclosure of water consumption to support continued conservation and affordability of services.
- Sanitary Sewer - implement volumetric rate for residential customers once planned meter replacement program is completed

- Water Reading Schedule – implement a bi-monthly or quarterly meter reading schedule that better aligns with the seasons/calendar year. More frequent meter readings would improve feedback to customers, better align with seasonal demand for analysis, and improve quality of data for utility operators, planners and decision makers. This change is dependent on the planned meter replacement program.

NEXT STEPS

This report has been presented for Council's consideration and to seek Council's direction on proposed recommendations.

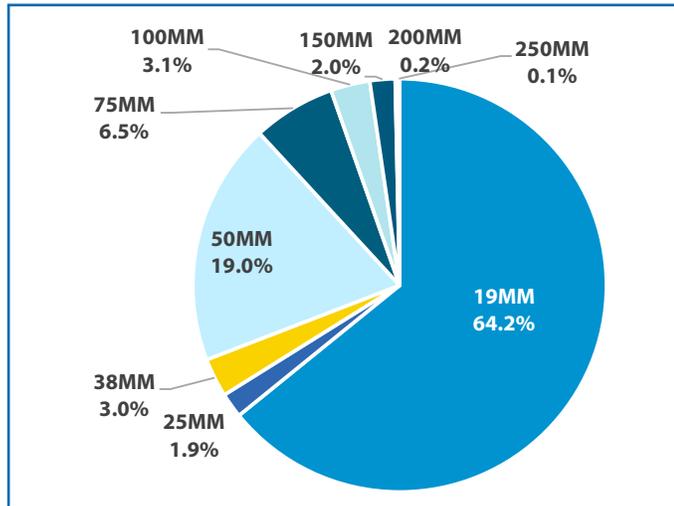
Implementation of new rate structures will require significant resources to update software and test appropriately.

APPENDIX 1: ADDITIONAL UTILITY INFORMATION

Water Service Connection

Each customer’s access to water requires connection to the City’s water distribution system. The size of the service connection can vary between customers with a larger service connection - or meter size – allowing greater water capacity on demand for a customer. Larger service connections may require upsizing of infrastructure and a related increase in operating and investment costs. Single-family residential users are typically a single 19mm meter size connection. Multi-family and non-residential users may have more than one water service connection and meter sizes can vary from 19mm to 250mm. Additional service connections may be required for fire protection to ensure adequate water flow in case of fire.

A breakdown of service connection sizes in the City is shown below:

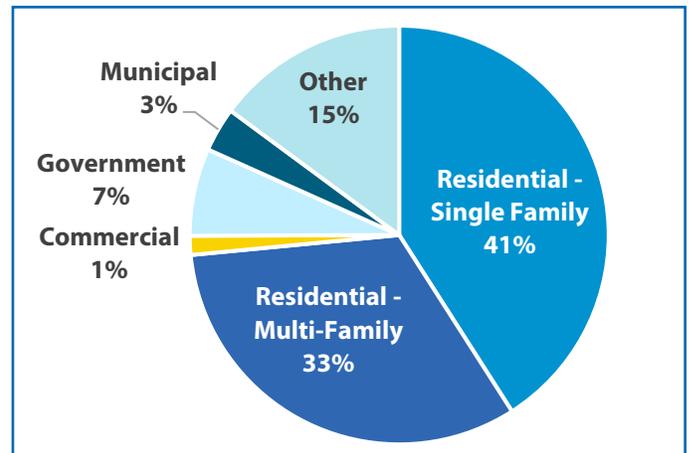


Water Consumption

Water consumption for customers is for indoor and outdoor purposes. Water consumption can vary somewhat year to year mainly due to seasonal irrigation demand. Analysis of historical water consumption data indicates residential customer’s water consumption is approximately 74% of total water consumed. The

remaining water was consumed by non-residential customers. The Utility Rate Review used 2018 water consumption data for analysis and modelling.

The City’s water consumption by customer type is shown below.



Water Consumption and Sanitary Sewer Demand

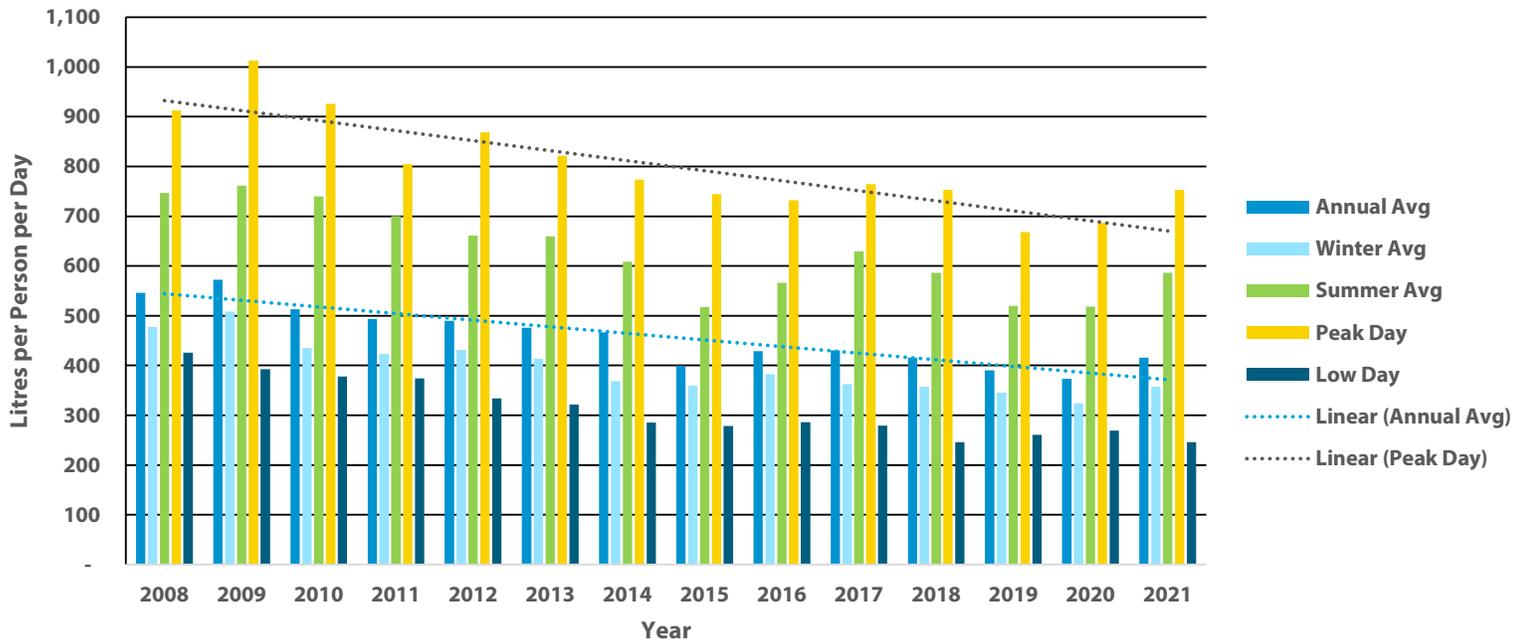
Water consumption by customers for indoor purposes will require collection by the sanitary sewer system. Historical water consumption data was used to analyze and develop recommendations for both the water and sanitary sewer utilities.

Peak Demands

The City’s water and sanitary sewer systems are constructed and maintained to meet peak period service demands. These peak periods are primarily caused by each customer’s daily water consumption patterns, by seasonal irrigation, by fire protection and by system maintenance requirements. Where data is available, analysis of peak demands can be used when developing or evaluating utility rate structures.

The City maintains daily peak demand water consumption data for the entire system only. The City currently does not have peak demand data by customer class or individual users. Enhanced water meters would need to be implemented to provide more detailed customer peak demand data.

Litres per capita production - all uses



A significant increase in 2021 water consumption was largely due to the extended 'heat dome' during June.

Data

Access to accurate and reliable data is a critical requirement for a Utility Rate Review.

The Utility Rate Review financial analysis relied on the City's robust financial planning processes and information, and used conservative assumptions for user growth, water conservation and inflation.

The Utility Rate Review used data provided by the City's Water Resources and Revenue Services departments and by the City's utility billing software. The data included:

- Historical water production and consumption data;
- Historical utility customer account billing data; and
- Water consumption by billing period, by customer, by meter.

Historical billing data by meter was not available. Each billing period, calculations for charges and customer statements are generated, however, these detailed calculations are not currently retained by the billing system. Review analysis included using historical water consumption data and the City's current utility rate bylaws to generate current customer billing charges for comparison to charges under proposed rate structures.

APPENDIX 2: MUNICIPAL SURVEY

Water Utility Rate Structure

City of Nanaimo	<p>All Users</p> <ul style="list-style-type: none"> • Base Rate by service connection • Volumetric Rate (six increasing blocks)
City of Abbotsford	<p>Volumetric Rate (single level) only</p> <ul style="list-style-type: none"> • By user type (Residential, Commercial/Institutional and Industrial/Agriculture)
City of Chilliwack	<p>All Users</p> <ul style="list-style-type: none"> • Base Rate by meter size • Volumetric Rate (single level)
City of Kamloops	<p>Residential Users</p> <ul style="list-style-type: none"> • Base Rate by meter size • Base Rate (water allotment by season) • Volumetric Rate (four increasing blocks in excess of allotment) <p>Commercial Users</p> <ul style="list-style-type: none"> • Base Rate by meter size • Volumetric Rate (five increasing blocks)
City of Kelowna	<p>All Users</p> <ul style="list-style-type: none"> • Base Rate by meter size <p>Single Family Residential Users</p> <ul style="list-style-type: none"> • Volumetric Rate (four increasing block rates) <p>Multi-Family Residential and Other Users</p> <ul style="list-style-type: none"> • Volumetric Rate (single level)
City of Victoria	<p>All Users</p> <ul style="list-style-type: none"> • Base Rate by meter size, plus • Volumetric Rate (single level)

Sewer Utility Rate Structure

City of Nanaimo	<p>Residential Users</p> <ul style="list-style-type: none"> • Base Rate by residential unit <p>Non-Residential Users (excluding hotels, motels and campgrounds)</p> <ul style="list-style-type: none"> • Base Rate by specific property amenities, includes maximum daily water allocation • If maximum daily water allocation exceeded, decreasing Volumetric Rate is charged instead <p>Hotel, Motels and Campgrounds</p> <ul style="list-style-type: none"> • Decreasing Volumetric Rate only
City of Abbotsford	<p>Base Rate only</p> <ul style="list-style-type: none"> • By user type – Residential, Commercial/institutional and Industrial/Agricultural • Lower rate for Industrial and Agricultural
City of Chilliwack	<p>Residential Users</p> <ul style="list-style-type: none"> • Base Rate per SF property or MF dwelling unit <p>All Customers</p> <ul style="list-style-type: none"> • Volumetric Rate only (90% of metered water consumption)
City of Kamloops	<p>Residential Users</p> <ul style="list-style-type: none"> • Base Rate by meter size, plus • Base Rate by family unit <p>Commercial Users</p> <ul style="list-style-type: none"> • Base Rate by meter size, plus • Volumetric Rate
City of Kelowna	<p>Residential Users</p> <ul style="list-style-type: none"> • Base Rate per residential unit only <p>Commercial Users</p> <ul style="list-style-type: none"> • Base Rate, plus • Volumetric Rate (single level)
City of Victoria	<p>All Users</p> <ul style="list-style-type: none"> • Volumetric Rate only (lower rate June to September)

APPENDIX 3: UTILITY ACCOUNTING PROCESSES

The City's operations and activities are organized and reported by Fund. The City maintains a Sewer Fund and a Water Fund with separate accounting and budgeting structures. The fund tracks and reports all revenues, expenditures and reserves for each utility.

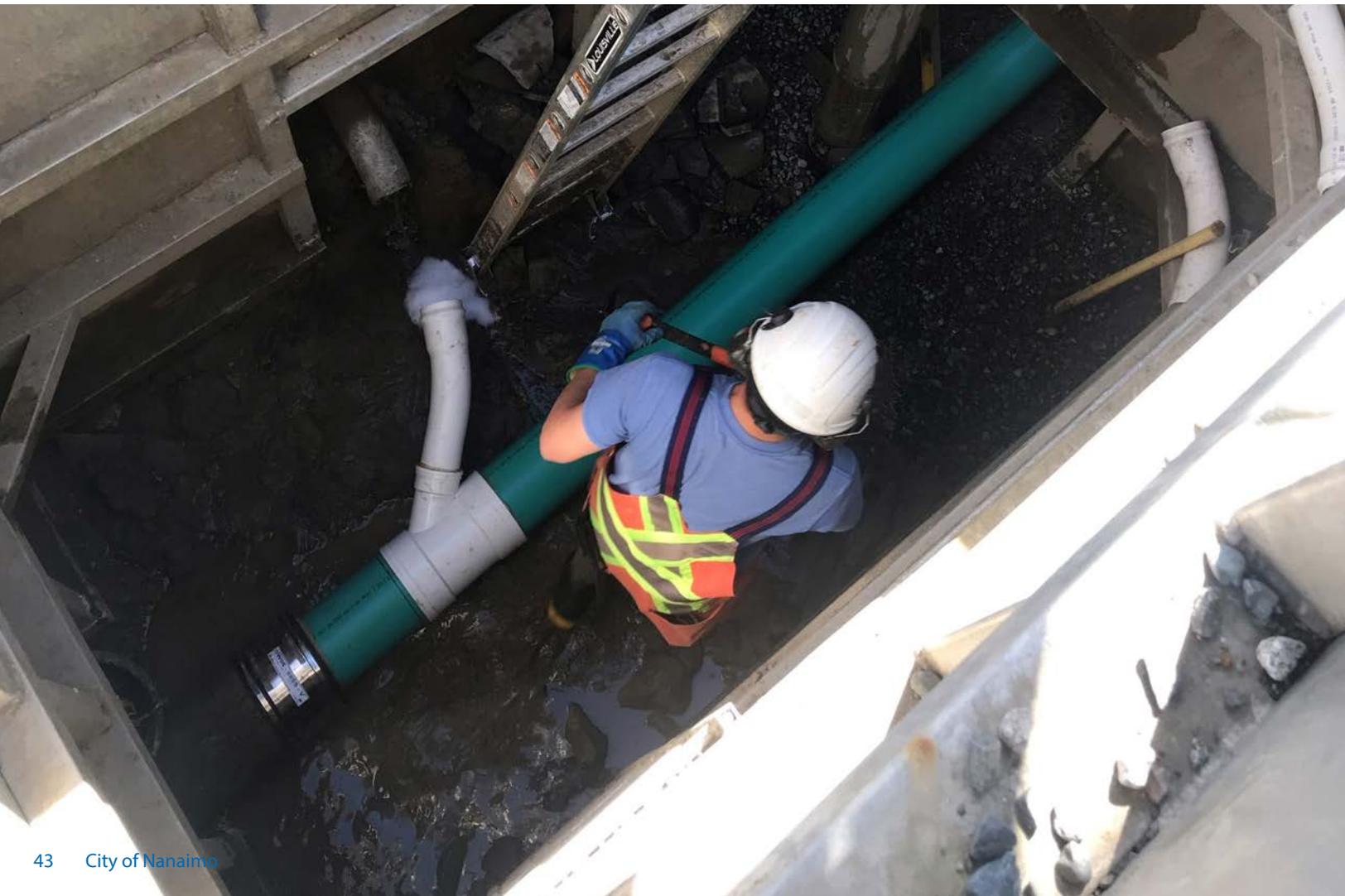
The City's Revenue Services unit, within the Finance department, is responsible for the following utility billing processes:

- Customer account maintenance;
- Collection of metered water consumption data; and
- Customer billing and revenue collection.

Each City water service has a meter to record water consumption. Water meter reader staff collect the water consumption data for each meter three times a year or approximately every four months.

The City is divided into 16 areas, or categories, with up to eight routes per area that meter readers follow to collect water consumption data.

The City's Revenue Services staff monitor metered water consumption data and advise utility customers through either a note on a subsequent billing statement or a courtesy letter of significant issues. These issues can include a significant increase or decrease in water consumption, water consumption that has been estimated and for adjustments. A significant increase in water consumption may be due to an undetected water leak or change in property use which will require further action.





APPENDIX 4: REVIEW REFERENCES

The City's Utility Rate Review included review of external reference materials including the National Guide to Sustainable Municipal Infrastructure (Water and Sewer Rates: Full Cost Recovery 2006), the American Water Works Association (AWWA) Manual of Water Supply Practices, Principles of Water Rates, Fees and Charges (Seventh Edition) and a survey of other municipalities through a questionnaire.

WATERWORTH, a dedicated utility rate setting software, was used for rate structure modelling. The WATERWORTH team has worked with small and medium-sized communities for over 15 year and provided valuable support and advice for the City's Utility Review process.

GLOSSARY

Asset Management: An integrated approach involving planning, engineering and finance to effectively manage existing and new municipal infrastructure to maximize benefits, reduce risk and provide satisfactory levels of service to the community.

Base Rate: A fixed or flat rate charged to utility users each billing period that is intended to provide the utility with a reliable revenue stream that will recover a portion of the total utility costs.

Decreasing Block Rate: A volumetric rate structure with multiple rate levels with decreasing consumption blocks. Usually used for users that have limited ability to control consumption.

Development Cost Charges (DCC): The Local Government Act allows the City to collect monies from developers to offset infrastructure investment needed for growth.

Full-Cost Recovery: Full Cost Recovery requires the collection of sufficient revenues to cover the total costs of operating, maintaining, renewing and upgrading infrastructure required to provide specific levels of service.

Increasing Block Rate: A volumetric rate structure with multiple rate levels with increasing consumption blocks. Higher demand by users will increase billing in blocks with higher rates and incent conservation.

Level of Service: A composite indicator that reflects the social, environmental and economic goals of the community and may include any of the following parameters: safety, customer satisfaction, quality, quantity, capacity, reliability, responsiveness, environmental, cost and availability.

Reserves: Reserves can be compared to 'savings accounts' and are used to support the City's long-term financial stability and sustainability.

Sustainability: The pillars of sustainability include ensuring that the current social, economic and environmental commitments are considered in investment decisions and that those decisions will not compromise the ability of future generations to meet their own needs.

Upgrade: Investment in added or enhanced components to existing infrastructure assets designed to increase service capacity required for growth. Infrastructure upgrades may also be required to meet building code changes, new regulations, adjusted service levels, or technology improvements.

Volumetric Rate: A rate that is based on water consumption. The rate can be a single, decreasing or an increasing block rate.

