

WATER AND WASTEWATER UTILITIES

2021 Annual Report



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MESSAGE FROM THE DIRECTORS

The Water and Wastewater Utilities fund a complex urban water ecosystem that starts at the Water Treatment Plant Raw Water Intake on the South Saskatchewan River and ends at the Wastewater Treatment Plant outfall, where treated effluent is discharged into the river. Responsibility for the planning and design, treatment, operations, maintenance, certified laboratory services, quality assurance, asset preservation, programming, and construction engineering falls within the following three departments:

- Saskatoon Water
- Water and Waste Operations – Water and Sewer Section
- Technical Services – Asset Preservation Section

Management and staff from the responsible departments are committed to providing exceptional quality water and wastewater services in the most reliable and cost-efficient way for Utility customers and citizens of Saskatoon. We are pleased to present our results in the Water and Wastewater Utilities 2021 Annual Report on behalf of our departments.

The report describes our contributions to achieving the City of Saskatoon’s Strategic Plan. We take great pride in receiving one of the highest citizen satisfaction ratings of City service for the quality of our water. Several initiatives have been completed and more are underway to further enhance service to customers, increase efficiencies, reduce costs, and strengthen our environmental leadership.

Our financial statements show responsible stewardship of the resources that Saskatoon citizens and regional partners have entrusted to us. We continue to provide excellent value to our customers as we undertake capital and continuous improvement projects that ensure asset and financial sustainability. Our utility rates are designed to fund the needed capital and operating costs for current and future water and wastewater services.

The departments have been focused on addressing growing demands, regulatory improvements, and aging infrastructure for water-related services.

In March of 2020, the water and wastewater utilities faced the unprecedented challenge of COVID-19. The supply of potable water and collection and management of wastewater are essential to quality of life and have a key role in fighting a pandemic. The Utility Directors were extremely proud of their staff for rising to this challenge, and contributing to fight against COVID-19, especially participating in screening wastewater for COVID-19 to give an accurate picture of community infections which helped the Saskatchewan Health Authority make informed decisions in Saskatoon.

We are proud to work with a dedicated group of professionals who demonstrate an ongoing commitment to not only making quality of life great in Saskatoon, but to continue to ensure the water and wastewater infrastructure is sustainable. Their work is greatly appreciated.

Pamela Hamoline – Interim Director of Saskatoon Water
Brendan Lemke – Director of Water and Waste Operations
Dan Willems – Director of Technical Services

EXECUTIVE SUMMARY

The Water and Wastewater Utilities fund essential services that contribute to our city's quality of life by providing safe, reliable, high-quality drinking water, and wastewater collection and treatment that meet health and environmental regulatory standards. The Utilities provide water services to approximately 76,600 residential and commercial water meters. The Water Treatment Plant supplies water to approximately 320,900 Saskatchewan residents including about 282,900 in Saskatoon and approximately 38,000 customers outside of Saskatoon through SaskWater. Wastewater is collected and treated for customers within the City. Less than 4,000 commercial customers account for half of the Utilities' revenues.

Water services are performed by the Saskatoon Water Department, the Water and Sewer Section of the Water and Waste Operations Department, and some staff in the Technical Services Department. Between 330 and 355 staff, depending on the season, were employed through these three departments to:

- Operate and maintain the Water Treatment Plant, three reservoirs and pump stations, the Wastewater Treatment Plant, 26 lift stations, the Meter Shop, and underground water and wastewater infrastructure;
- Provide professional water and environmental laboratory services;
- Provide engineering, planning, and project management services; and
- Provide asset management and preservation services for the Utilities.

In 2021, treated water volumes were higher than 2019 and 2020, but approximately equal to the ten-year annual average. This was despite higher-than-average temperatures and lower than average rainfall in 2021. Partial offsets to weather impacts and population growth occurred due to reduced demand in the commercial sectors due to COVID-19 impacts. Customers are increasingly switching to low-flow appliances and reducing irrigation due to the water block pricing structure and conservation awareness. Some of these factors also influence the fact that wastewater treatment volumes decreased to the lowest levels in the last decade.

Average monthly residential water-related utility bills of \$145.27 in 2021 remain below average when compared to other major prairie cities. In 2021, the Water and Wastewater Utilities collected \$182.4 million in revenues and incurred \$177.8 million in expenses resulting in a \$4.6 million surplus. Compared to 2020, total revenues in 2021 increased by 8.0% due to rate increases and higher than forecast volumes consumed due to hot dry weather even with an estimated 2.6% volume reduction in commercial revenues due to COVID-19. Expenses increased by 8.0% due to increased contributions to Grants-in-Lieu of Taxes and the Return on Investment (ROI) as well as staff compensation, contractor costs and capital investment which were partially offset by decreased maintenance work due to capital investment, and reduced electrical expenses. The Utilities contributed \$25.0 million to the City for ROI and grants-in-lieu of taxes.

In 2021, 49.9% of total revenues, or \$91.0 million, was allocated to capital to fund longer-term, water-related infrastructure projects. In 2021, the Utilities funded 93 active capital

projects valued at \$589.7 million. Significant 2021 capital project highlights include the following:

- *McOrmond Drive Reservoir and Pump Station*: construction contracted awarded.
- *Water Treatment Plant Transfer Pumping and Electrical Upgrades*: construction continued to progress with completion estimated in 2024.
- *Water Treatment Plant Acadia Pump Replacement*: completed in 2021.
- *Wastewater Treatment Plant Digester and Heating Upgrades*: completed in 2021.
- *New Spadina Wastewater Lift Station and Force Main*: construction contract awarded.
- *Wastewater Treatment Plant Bioreactor Gate Replacement*: half of the slide gates were demolished and replaced.
- 15.2 km of sanitary sewer main lined.
- 6.5 km of water main replacement.

In 2021, over 7,800 Advanced Metering Infrastructure (AMI) communication modules were installed to offer real time water usage readings for customers, bringing the total to approximately 84% of all water meters updated since the program started in 2016. AMI module installations will continue in 2022.

The Water and Wastewater Utilities optimized exposure control plans for the COVID-19 pandemic in accordance with public health measures and *The Occupational Health & Safety Regulations* of Saskatchewan. The Wastewater Treatment Plant continued its partnership with the University of Saskatchewan and the Saskatchewan Health Authority to test for the COVID-19 virus in wastewater samples. The wastewater test results provided an early warning of trends in positive cases identified at COVID-19 testing centers and were provided to health officials for consideration in their planning decisions.

In January 2021 the City of Saskatoon launched SAP as its Enterprise Resource Planning software, replacing roughly 280 systems which were previously in place across the organization. Software modules for Finance, Supply Chain Management, and select areas of Human Capital Management were made available to the entire Corporation, while Saskatoon Water also piloted the Enterprise Asset Management module. SAP will allow the City to fuse its many diverse processes and integrate them, creating a new energy and a unified approach to managing resources.

The Long-Term Capital Development Plan for the Wastewater Treatment Plant was completed in 2021, outlining a thirty-year capital expenditure schedule, aligning with expected capacity, redundancy, and regulatory treatment objectives. Work on the Water Treatment Plant Long-Term Capital Strategy continued through 2021 and was scheduled for completion in 2022. These plans will help ensure that the Water and Wastewater Utilities are well positioned to provide high quality, reliable and cost-effective water services in the future.

1.0 OVERVIEW

1.1 Introduction

The Water and Wastewater Utilities fund the Saskatoon Water Department, Water and Sewer Section of the Water and Waste Operations Department, and portions of the Technical Services Department which are collectively responsible for the planning, design, operation, maintenance, and capital project delivery for all water and wastewater services for existing and future customers. The Utilities also fund a portion of Corporate Revenue for customer billing, meter reading, and collection services.

Abbreviations are listed in Appendix One, a Glossary of key definitions for the report can be found in Appendix Two.

1.1.1 Saskatoon Water Department

Saskatoon Water consists of the following seven sub-departments, or sections.



Figure 1: Aerial Photograph of the WTP

The Water Treatment Plant (WTP) supplies all consumers with safe and reliable, high-quality drinking water that meet provincial and federal regulatory standards. Core functions include operating, maintaining, and monitoring the South Saskatchewan River Raw Water Intake, the WTP, and three potable water storage reservoirs with a capacity of 114 million litres.

The Wastewater Treatment Plant (WWTP) ensures that wastewater is treated to meet provincial and federal regulatory standards before being returned to the South Saskatchewan River. Core functions include operating, maintaining, and monitoring the WWTP, 26 lift stations, Marquis Liquid Waste Hauler Facility, Heavy Grit Facility, and Biosolids Facility where solids from the treatment process are handled and applied to agricultural land. Sales of the plant's slow-release fertilizer



Figure 2: Aerial Photograph of the WWTP

from its nutrient recovery system create additional revenues.

The Meter Shop is responsible for the purchase, installation, testing, repair, and replacement of water meters; the activation and termination of water services; as well as the installation and commissioning of Advanced Metering Infrastructure (AMI). The Meter Shop also operates the Cross-Connection Control program to ensure that proper backflow prevention devices on multi-unit residential, commercial, industrial, and institutional service connections protect the City of Saskatoon's potable water.



Figure 3: Photograph of the Meter Shop



Figure 4: Aerial Photograph of New Land Development

Engineering and Planning is responsible for the planning and design of water and sewer servicing for new land development, as well as capacity analysis and improvement within existing neighbourhoods. A city-wide network of sewer and rain gauge monitors are operated and maintained by the system modeling group to assist with water-related planning and design activities. Engineering and Planning also manages the Storm Water Utility and provides storm water engineering expertise. The Section monitors and mitigates damage to public property from riverbank settlement and instability due to high ground water levels. The Storm Water Utility Annual Report provides more information on storm water operations.

Engineering Services is a professional and technically diverse section that provides project management and technical advisory services to support Saskatoon Water and stakeholder departments for the development of capital programs and delivery of capital projects to maintain infrastructure life and capacity required to meet the demands of a growing City.



Figure 5: Photograph of Lift Station Infrastructure Construction

Quality Assurance and Training is a new section, formed in 2021 from existing City staff. This small team of employees exists to support the achievement of the Department's vision. They do so by bridging organizational boundaries, administering training, providing support for work planning and project execution, and delivering a growing portfolio in quality assurance.

Regional Services was also formed in 2021 as part of a re-organization, through an employee transfer from the Technical Services Department. This section exists to support the supply of potable water and removal of wastewater from Saskatoon's regional partners in an efficient, fair, and sustainable way.

1.1.2 Water and Waste Operations Department

Although Water and Waste Operations is composed of three distinct Sections, only the Water and Sewer Section provides Water and Wastewater Utility services.

Water and Sewer is responsible for the operation, maintenance, and inspection of the water distribution, sanitary sewer collection, and storm water collection systems. The water distribution and sanitary sewer collection system has a replacement value in excess of \$7.7 billion. Lined up end-to-end, the underground pipes (not including service connections) that make up Saskatoon's water distribution and sanitary sewer collection systems total over 2,300 km.



Figure 6: Photograph of Sewer Inspection Activities

Water and Sewer material handling sites are separated into three locations: The Downtown Yards, Nicholson Yards, and West Saskatoon Yards. Each location houses resources for the Water and Sewer crews to maintain and repair the City infrastructure. The Nicholson Yards and West Saskatoon Yards both store backfill material as well as incoming wet fill which is processed so it can be repurposed and utilized. Having these two remote locations enables crews to provide faster service by accessing the nearest site to the work zone. The Downtown Yards is the reporting grounds for all employees to receive their daily assignments and tasks, as well as storing material, equipment, and parts.

The Clearance and Records workgroup provides communication to the public through the delivery of maintenance notices. The group sees that all records and data for work done to the underground infrastructure are managed and maintained, as well as providing infrastructure locates for internal and external contractors. Providing location to a work group enables crews to work safely and effectively, with the reassurance that when digging, there will be no obstructions or concerns for their safety or safety of those around.

1.1.3 Technical Services Department

Technical Services consist of three Sections, with **Asset Preservation** responsible for managing asset preservation for underground water distribution and sewer collection systems. The condition of the distribution and collection assets is continually evaluated, and a long-term asset management plan is in place outlining levels of service and funding for annual maintenance and rehabilitation programs. The Construction and Design Department provides construction engineering services to deliver the required capital projects to upgrade the water and sewer assets.



Figure 7: Photograph of Work in an Excavated Trench

Municipal Engineering Services supports the Water and Sewer Section of the Water and Waste Operations Department through program design, contract management, and Continuous Improvement initiatives.

1.2 Strategic Linkages

The City's 2018-2021 Strategic Plan provided the direction that guided the activities of the Water and Wastewater Utilities. Through October and November 2021, a draft version of the 2022-2025 Strategic Plan was available for public feedback and was set for release in 2022. The following section outlines our Vision and Mission, the Corporate Purpose and Values, and our linkages to the Corporate Strategic Goals.

1.2.1 Our Vision

Saskatoon citizens have exceptionally high-quality water and dependable wastewater handling services that sustain people, property, and the environment.

1.2.2 Our Mission

Saskatoon Water and Wastewater Utilities deliver safe, reliable, and cost-effective water and wastewater services that meet and exceed health and environmental regulatory standards.

1.2.3 Our Corporate Purpose

The Water and Wastewater Utilities are aligned with the City of Saskatoon's Corporate Purpose; it describes the reasons we come to work every day.

Our Purpose

Our Purpose describes the reasons we come to work every day.

- › **We are making** Saskatoon a great place to live, work, learn and play every day.
- › **We are creating** a welcoming workplace where each of us are encouraged to realize our full potential.
- › **We are building** a sustainable future upon our predecessors' legacy and history of success.
- › **We are exceptional** in delivering public services.
- › **We are innovative** and unleash creative solutions and investments that contribute to a great city.
- › **We adopt and support** behaviours that reduce the environmental footprint of the city.



1.2.4 Our Corporate Values

The Water and Wastewater Utilities adhere to the City of Saskatoon's Corporate Values. They are part of who we are, what we stand for, and how we behave towards each other.



Our Values

Our values are part of who we are, what we stand for and how we behave towards each other.

PEOPLE MATTER

We work together as one team, seek input when it matters, support each other to grow and be our best selves, and foster a culture where we use our voices to drive change.

RESPECT ONE ANOTHER

We value the diversity each of us brings, celebrate our successes - big or small, and take the time to listen, understand and appreciate each other.

ACT AND COMMUNICATE WITH INTEGRITY

We are honest and take ownership of our actions, transparent in our decision-making, and question actions inconsistent with our values.

SAFETY IN ALL WE DO

We never compromise on the safety, health and well-being of ourselves and those around us, we put safety at the forefront of all decisions, and take responsibility to act on unsafe or unhealthy behaviours.

TRUST MAKES US STRONGER

We depend on each other and know we will do what we say, we assume the best of others, and support, inspire and empower each other every day.

COURAGE TO MOVE FORWARD

We lead and embrace change, think outside the box, and ask the tough questions.



1.2.5 Our Strategic Goals

Quality of Life: Provide citizens with affordable, reliable, and high-quality water and wastewater treatment services.

A Culture of Continuous Improvement: Increase workplace efficiencies and improve services through implementing innovative approaches that maximize value.

Asset and Financial Sustainability: Adopt and maintain Asset Management Plans which optimize the value of the services which the Water and Wastewater Utilities provide.

Environmental Leadership: Implement leading-edge innovations for environmentally responsible water-related infrastructure and services, and take action to mitigate the impacts of climate change on this infrastructure and these services.

Sustainable Growth: Work closely with other departments to provide efficient and resilient designs for water and wastewater infrastructure for new developments. Explore collaborative servicing strategies with regional partners, driven by business case development.

Moving Around: Collaborate with all stakeholders to minimize water-related transportation disruptions.

Economic Diversity and Prosperity: Provide competitively priced and reliable water-related services, and cost-effective water and sewer designs for new developments.

2.0 OUR PEOPLE

2.1 Organizational Charts

The following organizational charts provide an overview of how the management teams are structured within Saskatoon Water, Water and Waste Operations, and Technical Services.

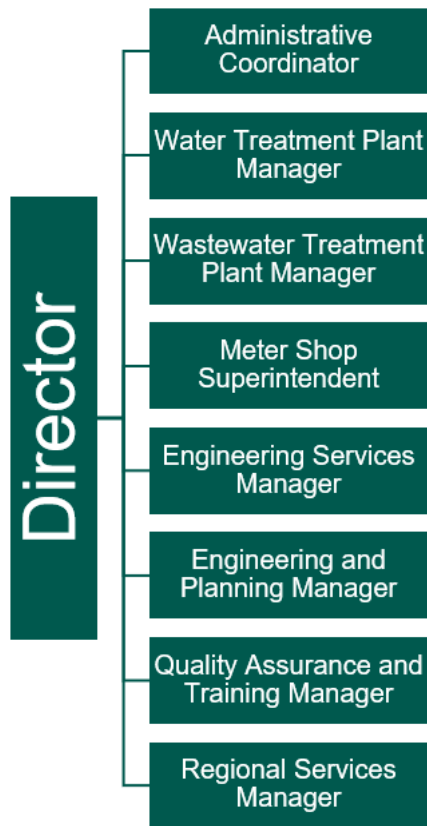


Figure 9: Saskatoon Water Management

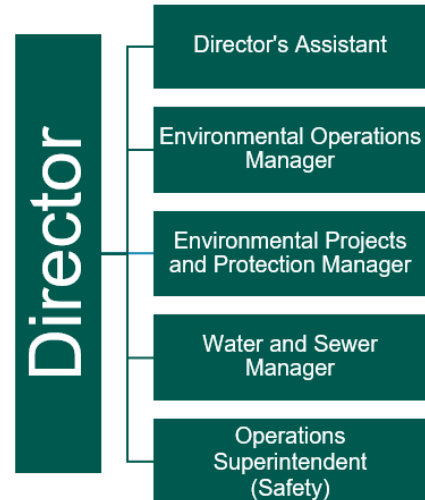


Figure 8: Water and Waste Operations Management

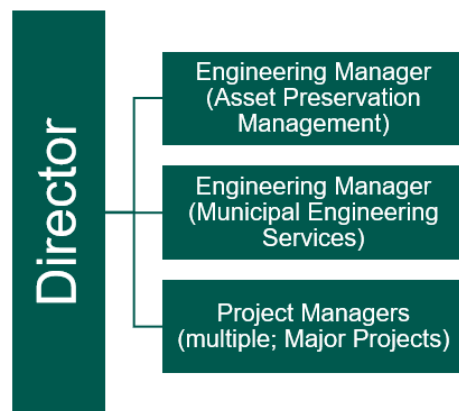


Figure 10: Technical Services Management

2.2 Number of Employees

Saskatoon Water had 185 employees as of December 2021. The graph below shows the distribution within each Section. Director and support staff are included in Water Treatment.

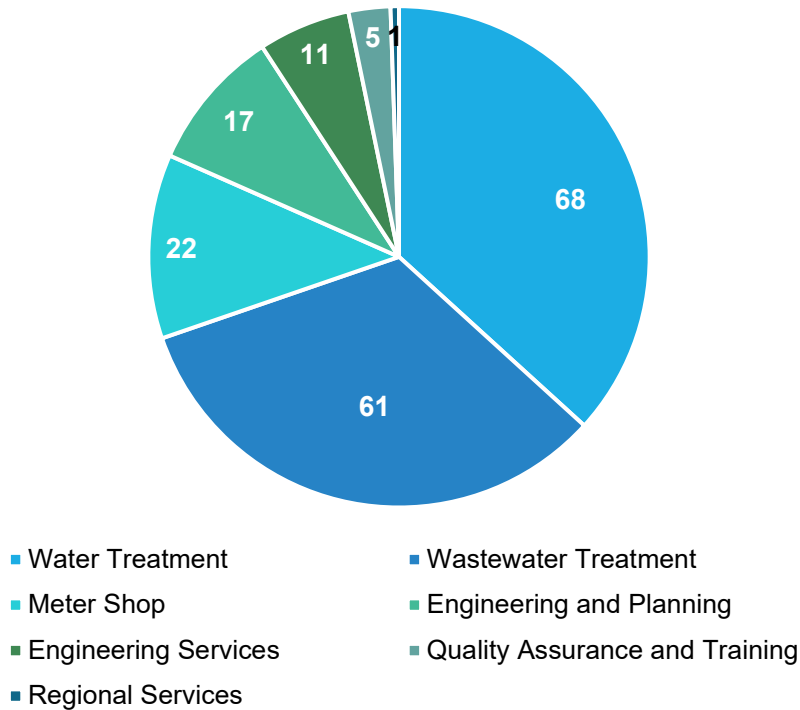


Figure 11: Employee Distribution within Saskatoon Water

At its peak in July, the Water and Sewer Section of the Water and Waste Operations Department had 145 employees and as of December 31, 2021 had 119. Technical Services had 46 employees throughout the Department, with approximately 25 focused on water and sewer services and activities.

2.3 Representative Workforce

The Water and Wastewater Utilities continue to participate in diversity, equity, and inclusion programs with Human Resources and other City departments to increase awareness among under-represented groups of career opportunities within the department.

Relative to 2019 employment equity targets from the Saskatchewan Human Rights Commission (SHRC), Saskatoon Water had a higher proportion of self-declared visible minority employees and lower proportions of employees who self-declared as Indigenous, female, or with a disability. Water and Waste Operations had a higher proportion of employees self-declared as Indigenous and lower proportions of employees who self-declared as female, a visible minority, or with a disability.



Figure 12: Photograph of Employees Showing Support for International Women’s Day

Table 1: Percentage of Employees Self-Declared as an Equity Group Member, Dec. 2021

Equity Group	Saskatoon Water	Water and Waste Operations	SHRC Target (2019)
Self-Declared as Indigenous Ancestry	5.0%	16.8%	14.0%
Self-Declared as Visible Minority	17.7%	8.2%	16.8%
Self-Declared as Person with Disability	2.2%	2.9%	22.2%
Self-Declared as Female	19.3%	10.7%	47.0%

2.4 Employee Safety

Safety is a core value at the City of Saskatoon and is integrated into the work performed by Water and Wastewater Utility staff through a Health and Safety Management System (HSMS). The eight elements that make up the HSMS are:

- Leadership;
- Hazard identification, assessment, and control;
- Incident investigation;
- Inspection program;
- Education and communication;
- Emergency response;
- Health and wellness; and
- Program administration.

Management and staff place a strong emphasis on safety in the workplace and strive to meet goals for leading and lagging indicators. The HSMS is continuously improved through the establishment and completion of annual projects and initiatives. An example of the 2021 improvement targets is provided below for Saskatoon Water. Each Department established annual goals, specific for their work environments.

Within Saskatoon Water, a comprehensive audit was performed on all health and safety policies and procedures. The audit recommendations resulted in improved document organization and accessibility, and a sustainable process through which health and safety documentation is regularly reviewed to ensure it is relevant and reliable.

In 2021, Saskatoon Water experienced three lost-time incidents, equal to the three reported in 2020. The number of lost time days in 2021 due to injury was 30, up from 19 in 2020. In 2021, Water and Sewer experienced five lost-time incidents, compared to two in 2020. The number of lost time days was 78 in 2021, up from 21 in 2020. Technical Services had no lost-time incidents in 2021.

SASKATOON WATER

2021 SAFETY GOALS

- Supervisor Training - Safety Leadership
- Critical Task Inventory - Review & Update
- Dave Fennell - Risk Tolerance Presentation
- Wellness Activities - will be reviewed in one safety meeting each quarter

S.T.A.R.T. SAFELY

Stop • Think • Assess
Review • Talk

100%

LEADING INDICATORS

- › Work Observations Conducted
- › Workplace Inspections Performed
- › Safety Meetings Conducted

ZERO

LAGGING INDICATORS

- › High Risk Incidents
- › Lost Time Incidents
- › Medical Aids Incidents
- › Preventable Vehicle Collisions

E V E R Y O N E I S A C C O U N T A B L E

Director

OHC Co-Chair Employer

OHC Co-Chair Employee

City of Saskatoon

Figure 13: Saskatoon Water's 2021 Safety Goal Poster

3.0 OUR CUSTOMERS

3.1 Number of Customers

In 2021, water treatment and distribution, and wastewater collection and treatment services were provided to approximately 282,900 Saskatoon residents. There are approximately 76,600 water meters, and of those 3,200 are industrial, commercial, and institutional (based on water meters) customers in Saskatoon. Some water meters, such as many of those servicing multi-residential apartments and condos, may provide water services for more than one household or business. Some businesses may have more than one water meter.

The Water Utility also sells treated water to SaskWater, which receives this water at seven supply points around the city's perimeter and redistributes it to approximately 38,000 customers outside of Saskatoon.

3.2 Water Treatment Plant Volumes

Based on customer meter readings, 35.9 million cubic meters of water was sold in 2021. Although the population has grown by approximately 19% since 2012, demand has not increased in a similar manner over the past ten years. This is influenced by a generally declining trend in consumption per capita due to more low-flow faucets, toilets, and washing machines, along with the water rate (pricing) structure, an increased water conservation awareness, and more recently the COVID-19 impact on commercial consumption.

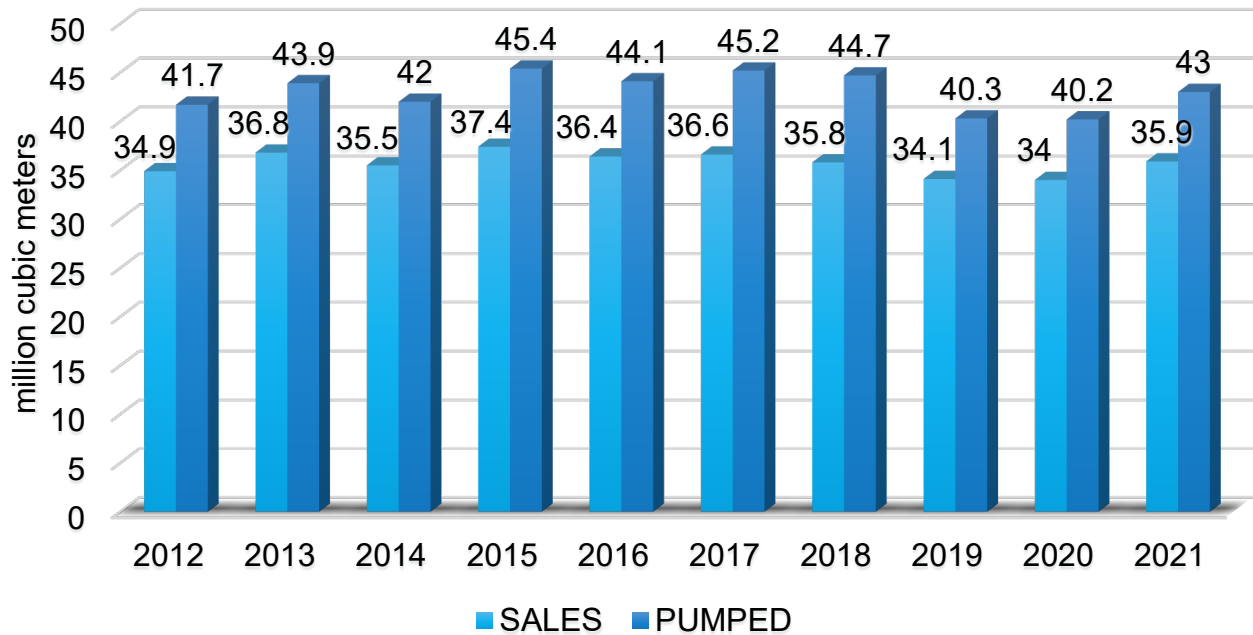


Figure 14: WTP Water Pumped and Sales Volume (million cubic meters)

The chart above compares the annual volume of treated water pumped from the WTP into the distribution system and the volume of water sold (the pumpage was estimated in 2012 and 2013). In 2021, unmetered water was 16.5% of total water pumpage (43 million cubic meters), which was slightly higher than 2020. The difference between the volume of treated water pumped and sold was due to the following:

- Water loss through leaks;
- Water main breaks;
- Unauthorized water use;
- Authorized but unmetered consumption (e.g., flushing water mains and fire flow)
- Estimated consumption and year-end unbilled volumes; and
- Water meter accuracy.

Summer rainfall and temperatures can help explain some variation in annual water demand. In particular, weather has a significant impact on the water demand for irrigation. In 2021, Saskatoon recorded 146 mm of rainfall, which is lower than the last ten-year average of 265 mm. This was the fourth lowest seasonal rainfall total since 1900.

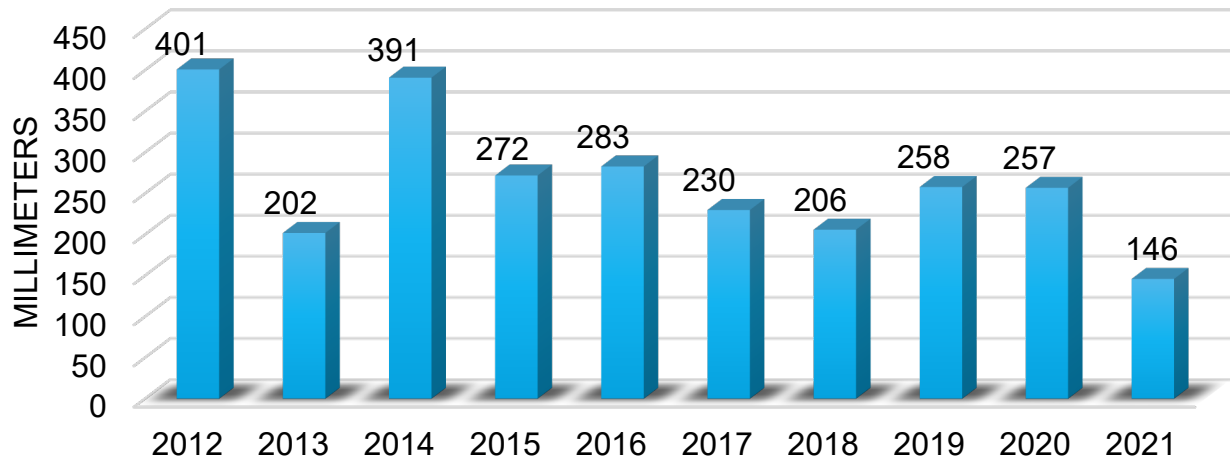


Figure 15: Saskatoon Annual Rainfall, millimeters (April to September)
 Source: City of Saskatoon 2021 Annual Rainfall Report

Summer (May to August) temperatures in 2021 averaged 16.8°C, which was higher than the last ten-year average of approximately 16°C. Therefore, with the summer of 2021 being drier and warmer than average, this contributed to the higher water usage when compared to the previous two years.

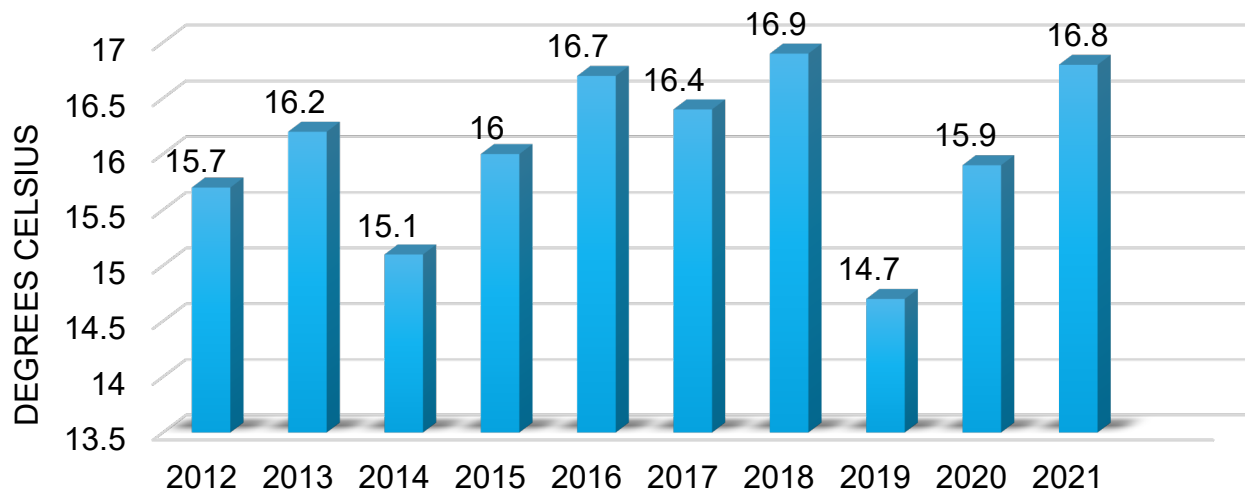


Figure 16: Saskatoon Seasonal Mean Temperature, Deg. Celsius (May to August)
 Source: Environment Canada

The current level of service is for the WTP’s capacity to meet or exceed the maximum daily water demand, which is the average of four consecutive days of highest demand each year. Large volatility in the maximum daily demand is mostly due to weather conditions.

The chart below reflects the extra capacity required for the maximum daily volume of water consumption at the height of summer irrigation relative to average daily water consumption throughout the entire year. In 2021, the maximum day pumpage to average day pumpage ratio of 1.89 was higher than the ten-year average of 1.84. The maximum day pumpage ratio is used for long-term demand forecasting; however, due to its volatility, it is difficult to

provide accurate forecasts. As demand approaches Plant capacity, the level of service to always meet maximum daily demand will be evaluated along with conservation strategies and capital expansion plans.

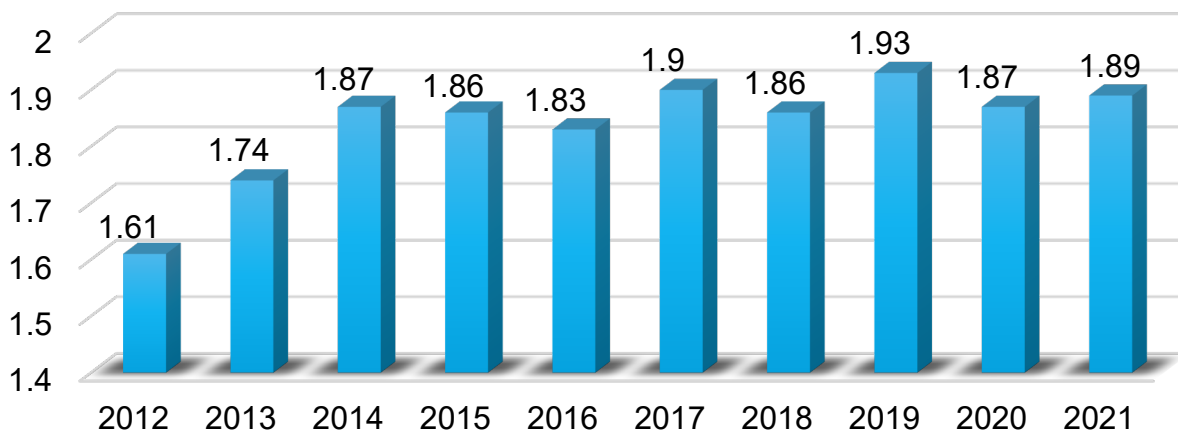


Figure 17: Ratio of treated water maximum day pumpage to average day pumpage

3.3 Wastewater Treatment Plant Volumes

In 2021, WWTP effluent continued to reduce in volume and was at its lowest level in the last decade at 28.3 million cubic meters. Volumes have decreased significantly over the last five years. WWTP effluent flow increases as the population grows and decreases when households install water-saving appliances, such as low-flush toilets. Large commercial and industrial operations can significantly impact effluent volume. Wet weather or intense storm conditions also influence effluent flow due to inflow (e.g., weeping tiles) and infiltration (e.g., leaky pipe joints and manholes) into the wastewater collection system; therefore, less effluent is expected in dry years. The work on lining sewer mains also reduces infiltration into the collection system, thereby reducing the demand on WWTP equipment.

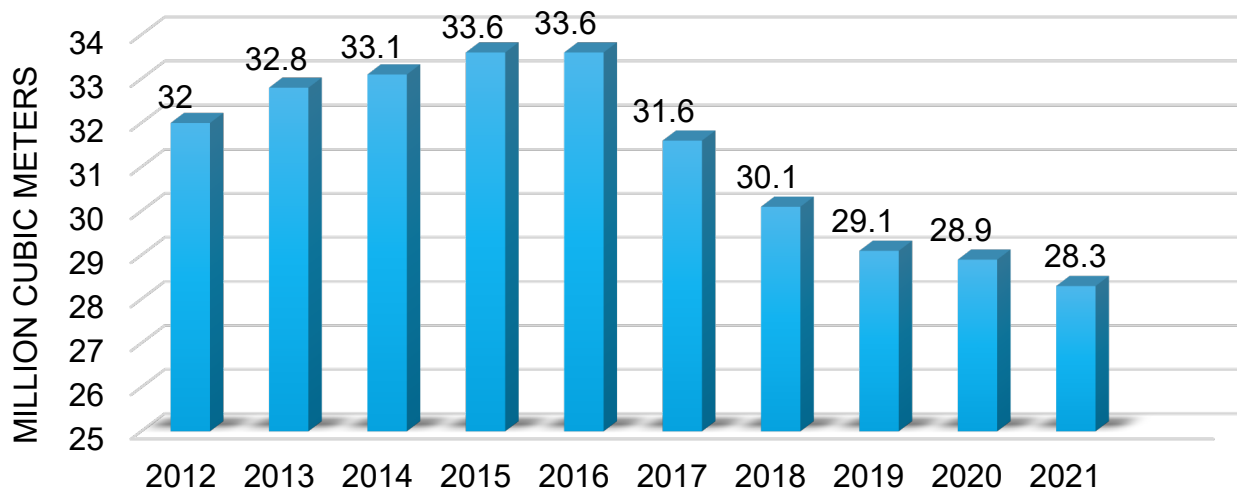


Figure 18: Volume of Wastewater Treatment Plant effluent flow (million cubic meters)

3.4 Meter Shop Customers

In 2021, the Meter Shop undertook over 11,100 total jobs, reflecting a nearly 22% increase over the previous years' COVID-19 impacted total. See the graph below for a breakdown of the total jobs, which result from work orders generated by Corporate Revenue to check malfunctioning meters or for cut-offs and reconnects. For job definitions, see Meter Shop Service Calls in Appendix Two: Glossary.

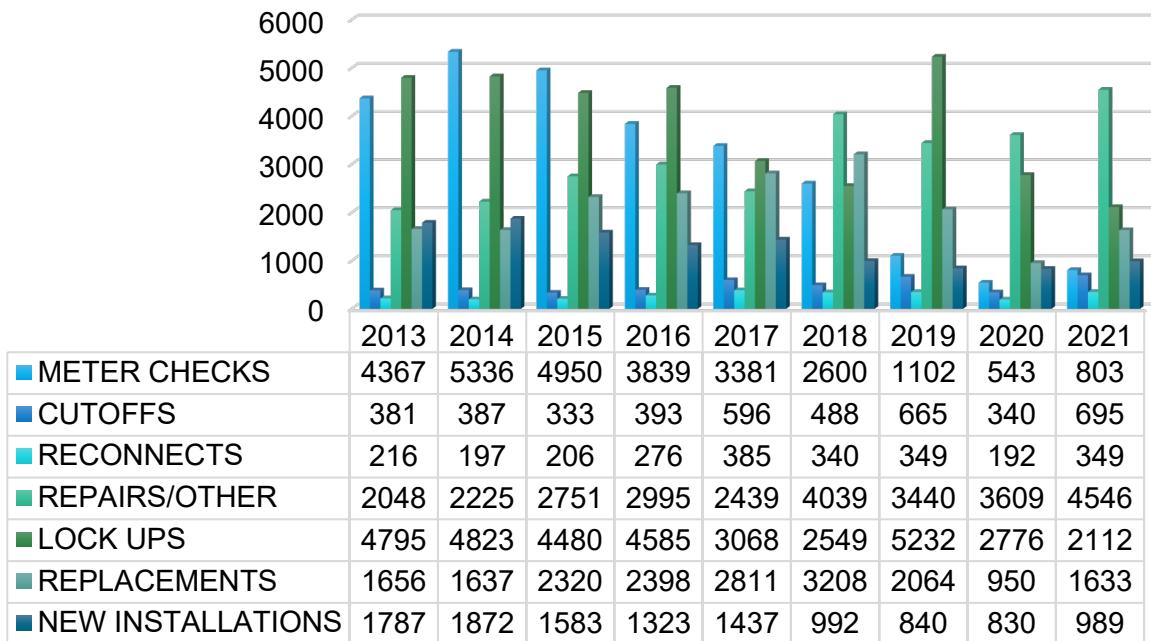


Figure 19: Quantity of Meter Shop Service Calls

In 2021, 7,846 AMI communication modules were installed, totaling 64,486 since the program started in 2016. This represents approximately 84% of the nearly 76,600 total water meters within Saskatoon. Most AMI installations require that installers enter homes or businesses to access water meters. While AMI installations rebounded from the previous year's COVID-19 impacted decline, reduced staffing and a reduced number of homes needing the AMI module installation resulted in the total installation in 2021 being below the previous three-year average.

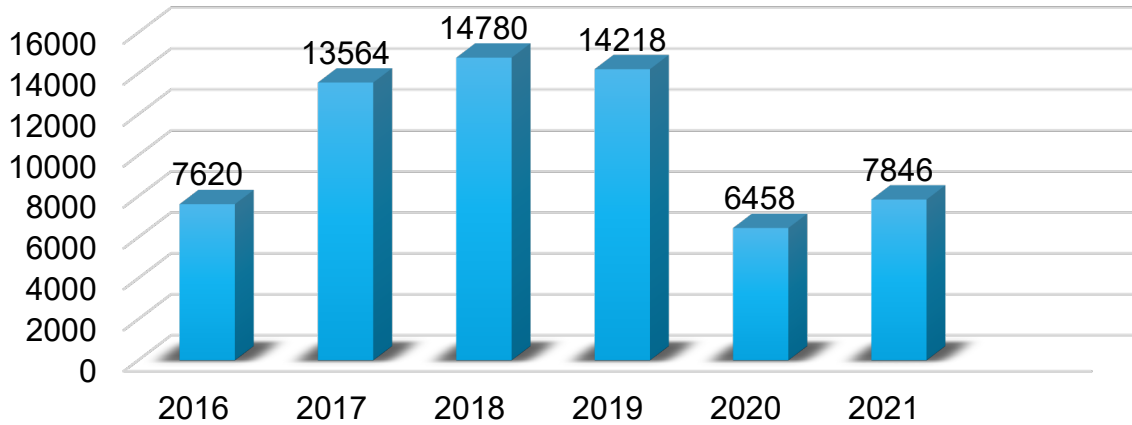


Figure 20: Quantity of AMI Communication Modules Installed

Backflow prevention devices are important in reducing the risk of contaminants from entering the City’s drinking water system. In 2021, 496 new backflow prevention devices were installed, with a total of 10,289 devices being active as of December 31, 2021. In 2021, 93% of the devices were tested, and of those tested, 96% passed. Saskatoon Water’s Cross Connection Control Inspectors work with commercial and industrial water users to ensure proper backflow prevention devices are installed and tested annually. In 2021, 565 cross connection control survey/inspections were performed, and 9,893 notices were processed.

3.5 Customer Satisfaction

The City of Saskatoon conducted two civic services surveys in 2021: the **Satisfaction & Performance Survey** and the **Performance, Priorities and Preferences Survey**. Each survey was conducted by telephone, through an online panel, and by having a survey link available on the City website (referred to as 'self-selected'). Similar surveys were last performed in 2018.

The **Performance, Priorities and Preferences Survey's** primary objectives were to gauge the following:

- Perceptions of quality of services provided by the City of Saskatoon;
- Priorities of services; and
- Preferences on level of civic services for 12 categories.

Saskatoon citizens were asked to rate services provided by the City on a ten-point scale where a score of ten means “excellent” and one means “poor”. The charts below summarize the results. Similar to 2018, **quality of drinking water** and **speed of water main break repairs** ranked in the top three highest rated services in the 2021 survey.

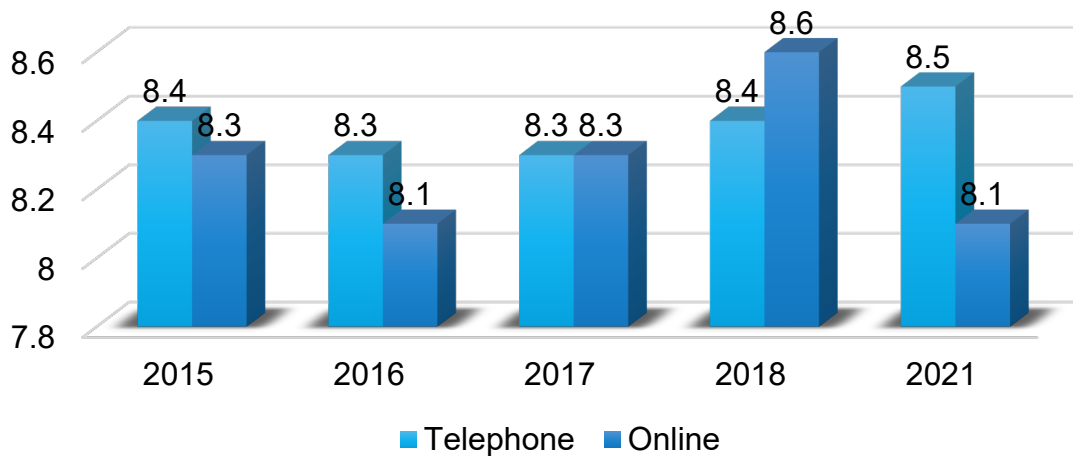


Figure 21: Citizen Satisfaction with Water Quality (rating out of 10)

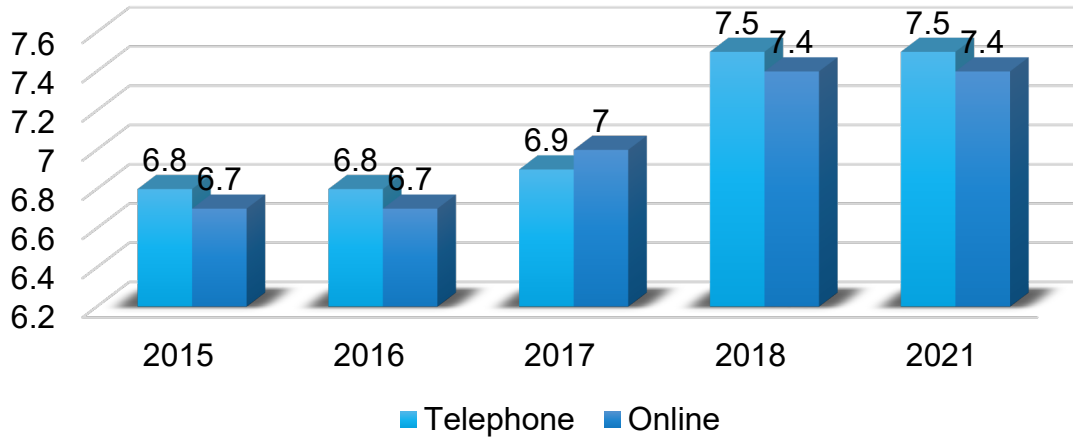


Figure 22: Citizen Satisfaction with Speed of Water Main Break Repairs (rating out of 10)

3.6 Customer Enquiries

Numerous phone calls to the Customer Care Centre were received and resolved by the Water Laboratory through discussion and education. In 2021, laboratory personnel did not attend any in-person water quality investigations.

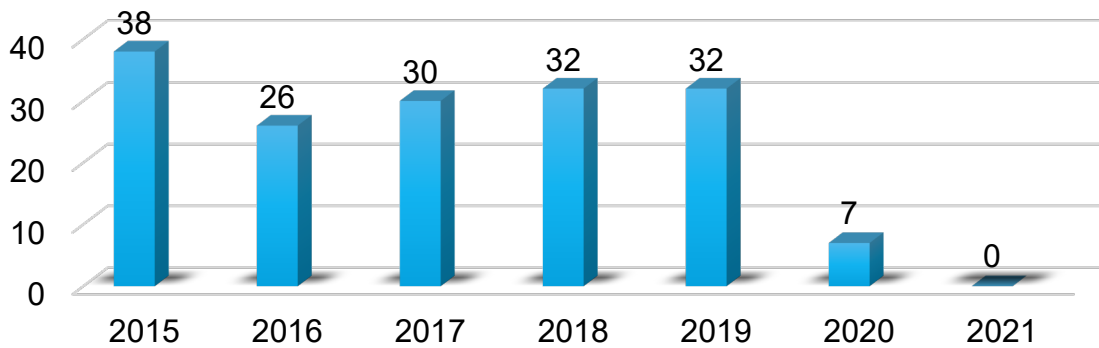


Figure 23: Quantity of Complaints about Water Quality that Require In-Person Action

Two calls regarding WWTP odour were received in 2021. The Customer Care Centre received approximately 80 complaints related to odours from various sanitary sewer mains across the City, and approximately 180 reports of sanitary sewer mains surcharging, blocked, or running high at various locations.

4.0 OUR INFRASTRUCTURE

The replacement value of all water and wastewater infrastructure was estimated at over \$7.7 billion. A detailed review of the valuation of the WTP, water intakes, and reservoirs, along with the WWTP and lift stations is planned in the near future.

The WTP and assets associated with water distribution have an estimated value of \$3.96 billion.

The WWTP and assets associated with the sanitary sewer collection system have an estimated replacement value of \$3.79 billion.

Table 2: Estimated Water Utility Asset Replacement Values

Asset	2021 Inventory	Replacement Value (\$M)
Water Treatment Plant, water intakes and three reservoirs*		\$ 600
Water Pipes	1,281 km	\$ 2,316
Valves	16,357	\$ 230
Hydrants	7,216	\$ 142
Service Connections	71,776	\$ 670
Total		\$ 3,958

* Value remains unchanged from 2020 annual report.

Table 3: Estimated Wastewater Utility Asset Replacement Values

Asset	2021 Inventory	Replacement Value (\$M)
Wastewater Treatment Plant*		\$ 500
Lift Stations*	26	\$ 132
Wastewater Pipes	1,055 km	\$ 2,326
Manholes	11,569	\$ 136
Force main	70 km	\$ 144
Service Connections	71,317	\$ 551
Total		\$ 3,789

* Value remains unchanged from 2020 annual report.

The **Water Distribution System** is used to deliver potable water from the WTP to the customers. The system is composed of approximately 1,280 km of water mains, 16,360 valves, 7,220 hydrants, and 71,780 service lines.

The **Wastewater Collection System** is used to collect wastewater from customers and deliver it to the WWTP. The system is composed of approximately 1,060 km of gravity sewer mains, 70 km of pressurized force mains, 11,570 manholes, and 71,320 service lines.

The condition of distribution and collection assets is continually evaluated, and a long-term asset management plan is in place outlining levels of service and funding for annual maintenance and rehabilitation programs.

5.0 OUR WORK

5.1 Community Awareness and Engagement

A major priority for the Water and Wastewater Utilities is ensuring residents are informed about our services, significant projects, initiatives, and campaigns. In 2021, we reached the public through reports, news releases about major projects, signage, flyers, social media, and through the City's website, saskatoon.ca. Once again, COVID-19 resulted in cancellations or adjustments to some initiatives such as plant tours and in-person presentations and open houses.

General information on water quality, water and wastewater treatment processes, major capital projects, and water conservation has been posted on the City's website: saskatoon.ca/water and saskatoon.ca/wastewater.

Water Quality Reporting: Saskatoon Water produced the annual [Drinking Water Quality and Compliance Report](#) to comply with Water Security Agency (WSA) requirements to notify consumers about water quality, and the performance of the waterworks in submitting samples required by a Minister's Order or Permit to Operate a Waterworks.

Water Treatment and Wastewater Treatment Plant Outreach: Guided tours are normally available to the public, ages 16 and older, to increase awareness of how the Utilities operate in providing safe, reliable water and in returning quality effluent to the South Saskatchewan River. No tours were conducted in 2021 due to continued COVID-19 restrictions.



Figure 24: Billboard Communicating AMI Program Information

Advanced Metering Infrastructure (AMI) System: Through letters and phone calls, Saskatoon Water continued to reach out to residents who had not yet signed up to receive AMI infrastructure. The meters have a communication module to improve billing by utilizing remote meter reading and monthly billing based on current usage instead of estimates.

Prevent Irritable Sewer Syndrome:

Significant problems can occur in the sewer system when individuals put harmful things down their drain. To shift behaviors, the City developed an education campaign, [Prevent Irritable Sewer Syndrome](#), in partnership with Partners For the Saskatchewan River Basin (PFSRB). The program’s goal is to reduce the number of blockages experienced throughout the community by building awareness of what is and is not to be flushed down toilets and rinsed down sinks. As part of the program, PFSRB purchased an “Enviroscape Drinking Water and Wastewater Treatment Model” to support slide and video presentations.



Figure 25: Enviroscape Drinking Water and Wastewater Treatment Model

In 2021, the program was delivered through a combination of online and in-person presentations to comply with COVID-19 requirements. The program reached 231 students and teachers from eight schools.

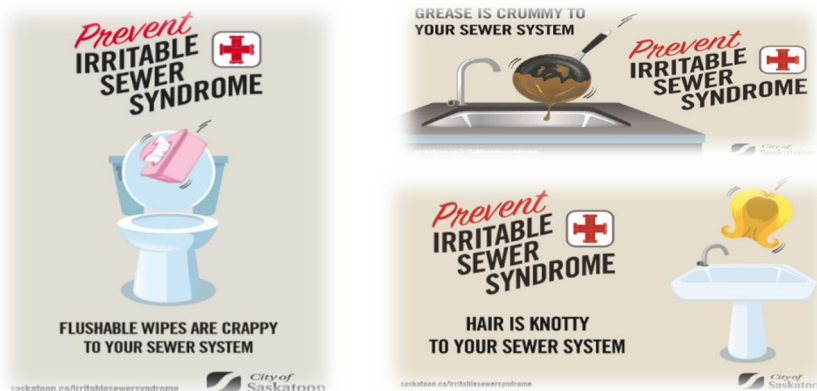


Figure 26: Examples of Educational Content for the Prevent Irritable Sewer Syndrome Campaign

5.2 Water Quality

The City's water treatment and distribution systems are regulated by a "Permit to Operate a Waterworks" issued by the WSA. Our drinking water quality is further regulated by Health Canada's *Guidelines for Canadian Drinking Water Quality* and Saskatchewan Environment's *The Waterworks and Sewage Works Regulations, 2015*. Water quality is closely monitored 24 hours a day, 365 days a year.

The WTP Laboratory's comprehensive inspection program meets the highest standard in North America. In 2021, a total of 19,624 water treatment quality tests and 10,588 distribution water quality tests were conducted by our WTP Laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to meet ISO/IEC 17025:2017 standards.

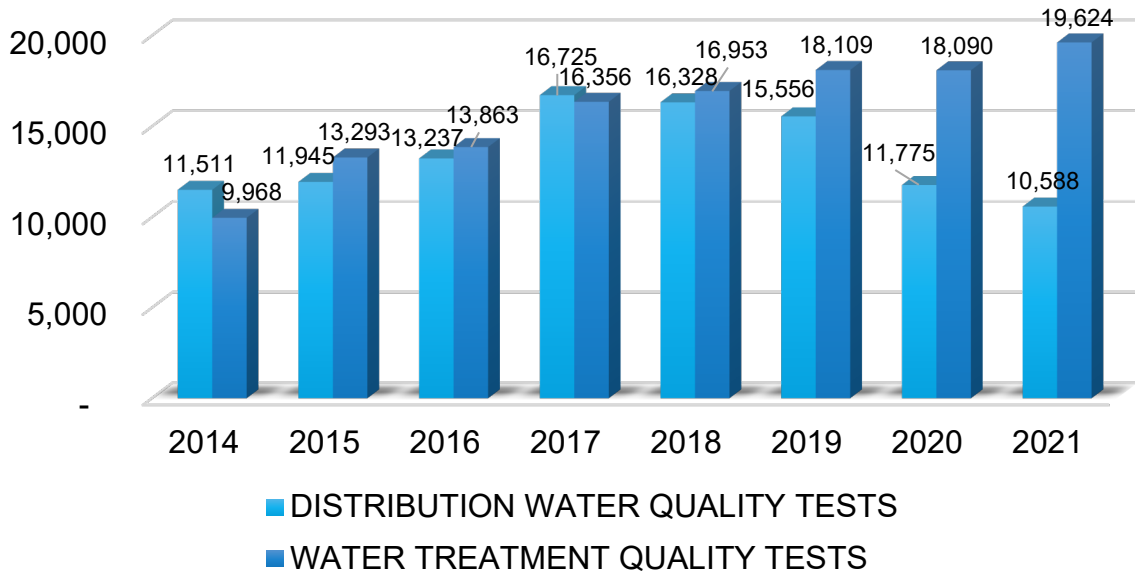


Figure 27: Quantity of Treated Water Quality Tests Performed by the WTP Laboratory

The following table shows the results of some of the many types of testing completed by the WTP, which are well within acceptable limits under the Permit to Operate a Waterworks.

Table 4: Summarized Results of Select Water Quality Tests from the Distribution System

	2014	2015	2016	2017	2018	2018	2020	2021	Allowable Values
Yearly Total Chlorine Median (mg/L)	1.78	1.83	2.00	1.93	1.99	2.0	1.95	1.90	0.5-3.0
Yearly Turbidity Median (NTU) ²	0.14	0.18	0.13	0.11	0.09	0.10	0.10	0.10	< 1.0
Total Coliforms >0 (CFU/100mL) ³	0	0	0	0	0	0	0	0	0

² Nephelometric Turbidity Units (NTU) is a measure of scattered light. A high turbidity level is caused by organic matter which can promote the growth of pathogens as well as being aesthetically unappealing.

³ Colony Forming Unit (CFU) is a measure of viable bacterial cells.

Wastewater Quality and Environmental Monitoring Program: The City’s wastewater collection and treatment systems are regulated by a “Permit to Operate a Sewage Works” issued by the WSA. Our final effluent water quality and spillage of untreated raw sewage are further regulated by Saskatchewan Environment’s *The Waterworks and Sewage Works Regulations, 2015*, the Saskatchewan Environmental Code, and the Federal *Wastewater System Effluent Regulations, 2012*. The water quality of raw sewage coming to the Wastewater Treatment Plant and the final effluent discharged into the South Saskatchewan River (SSR) is closely monitored 365 days a year.

Analytical tests to monitor required parameters are performed by the Saskatoon Water’s Environmental Laboratory. The Laboratory demonstrated technical competence for a defined scope and the operation of a laboratory quality management system to ISO/IEC 17025:2017 as recognized by the Canadian Association for Laboratory Accreditation Inc. (CALA). In 2021, there were 66 laboratory non-conformances identified and corrective actions were put in place. In combination, a total of two internal audits, external assessments, and inspections were completed to assess Lab’s compliance to the Quality Management System.

In 2021, the Environmental Laboratory collected a total of 1,838 samples and performed 11,848 tests for the WWTP Permit to Operate a Sewage Works and over 14,000 tests for the WWTP process control.

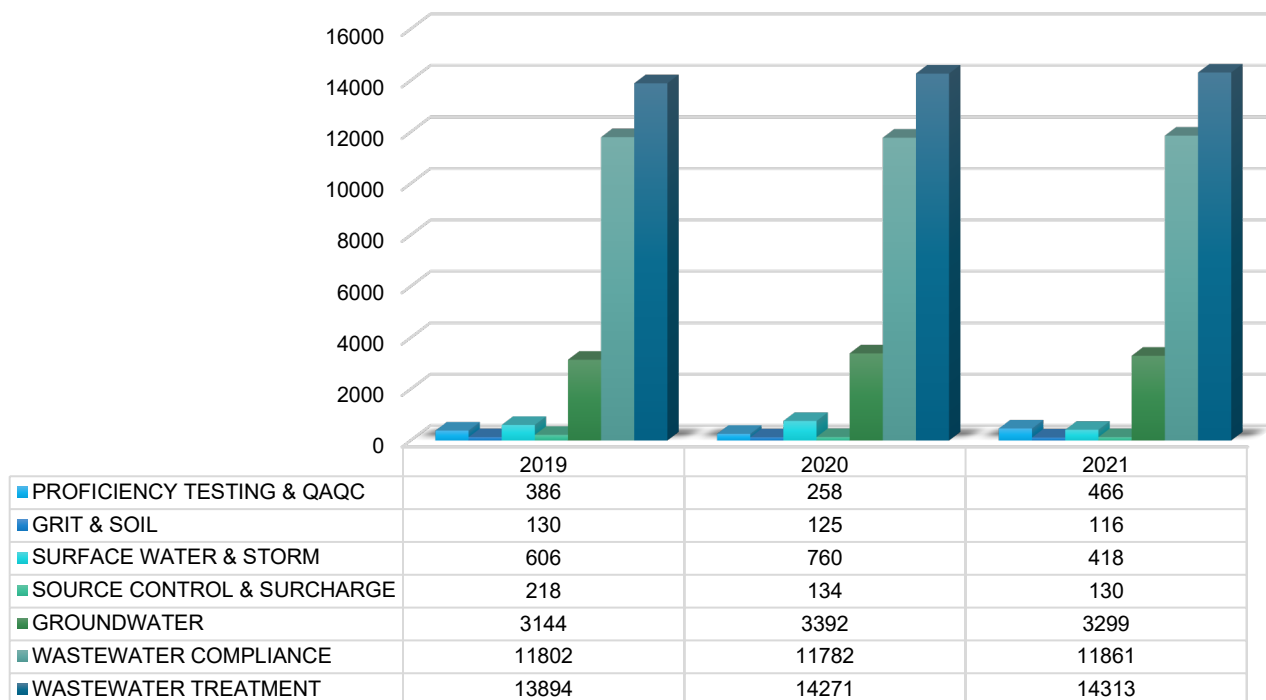


Figure 28: Quantity of Water Quality Tests Performed by the Environmental Laboratory

The Environmental Laboratory also collected over 300 samples and performed 3,963 water quality tests to support other divisions and departments of the City of Saskatoon. The other sampling and monitoring programs are groundwater, ponds, stormwater outfalls, bylaw compliance, industrial sewer surcharge, and the SSR water quality. The Environmental Laboratory performed 7,006 additional tests through third-party labs for the tests that were not in the scope of the Environmental Laboratory's activities.

The following table shows the results of some of the many types of wastewater testing completed by Saskatoon Water's Environmental Laboratory, which are well below the acceptable limit under the Permit to Operate a Sewage Works.

Table 5: Summarized Results of Select Wastewater Quality Tests

	2017	2018	2019	2020	2021	Wastewater Effluent Standard
Yearly Median cBOD ⁴	3.5	4.0	3.0	2.0	3.58	<25 mg/L
Yearly Median BOD	14.9	16.7	9.8	8.2	13.0	<30 mg/L
Yearly Median TSS ⁵	7.3	10	7.8	6.2	7.3	<25 mg/L
Yearly Median Total Phosphorous (TP)	0.31	0.425	0.364	0.287	0.323	<0.75 mg/L
Yearly Median E.coli ⁶	<10	<10	<10	<10	<10	<200 mpn/100mL
Yearly Median unionized ammonia	0.179	0.203	0.089	0.074	0.248	<1.25

⁴ Carbonaceous Biochemical Oxygen Demand (CBOD) Measures the oxidation of carbons in water

⁵ Total Suspended Solids

⁶ E.coli is a common indicator of fecal contamination and is quantified using the Most Probable Number (MPN) method. MPN is a probabilistic test which assumes coliform bacteria meet certain criteria.

5.3 Wastewater COVID-19 Testing

In 2021, the WWTP continued its collaboration with University of Saskatchewan and the Saskatchewan Health Authority in a pilot project to test sewage samples for the virus that causes COVID-19. Infected people shed virus traces through their feces, often even before COVID-19 symptoms appear. The wastewater test results provided an early warning of trends in positive cases identified at COVID-19 testing centers and were provided to health officials for consideration in resource allocation planning and decision making.

The chart below plots the sewage testing results for the overall viral RNA load of COVID-19 in the community. Results have shown that sewage results provide an accurate two-week prediction of new cases in Saskatoon.

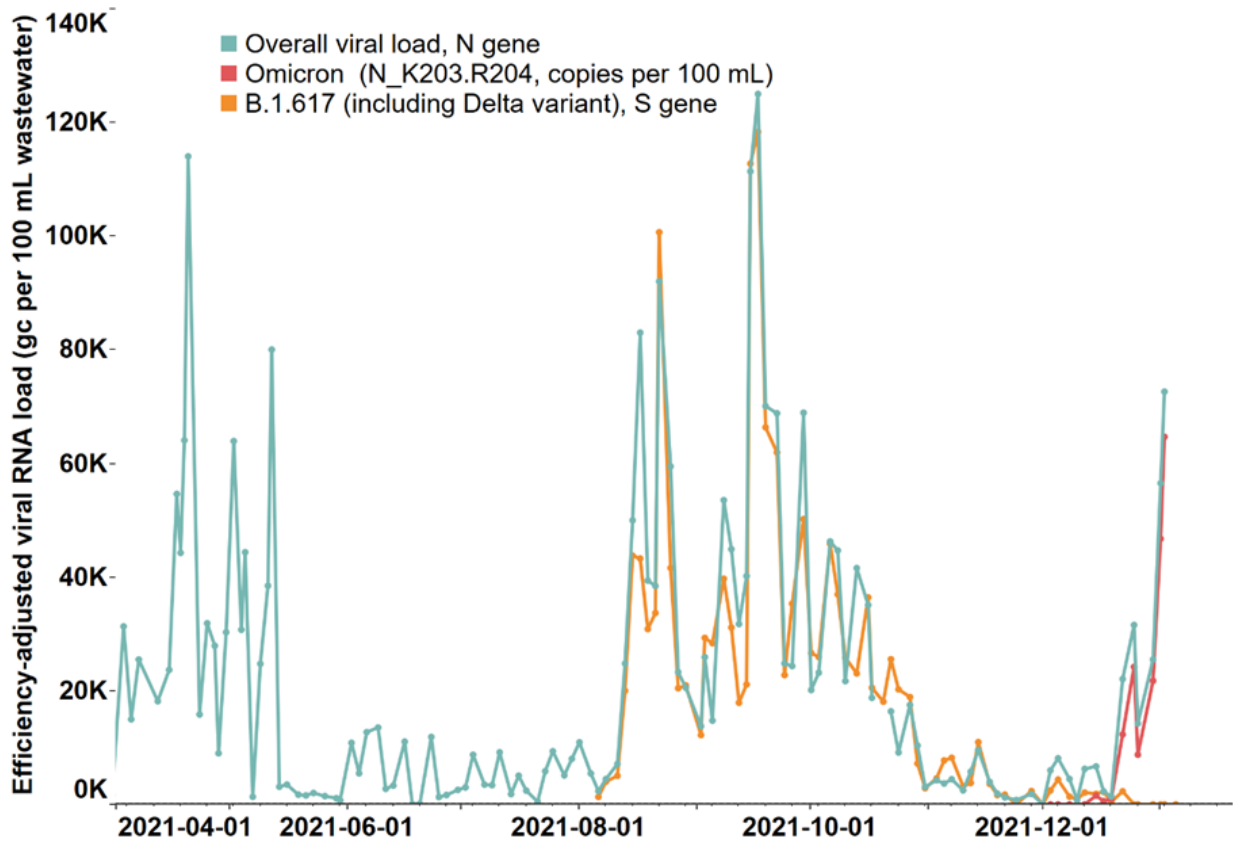


Figure 29: SARS-CoV-2 Viral RNA Load in Wastewater, City of Saskatoon

5.4 Water Main Operations

Maintaining utility service for residents is important so a high level of service has been established. Water main breaks are to be repaired within 48 hours. Maintenance crews repaired 1,666 locations in 2021, of which only 269 (16%) were water main breaks. In 2021, approximately 49% of water main breaks were repaired and water restored within 24 hours, the average repair time was 30.8 hours per break, and the service level time was exceeded on 26 occasions.

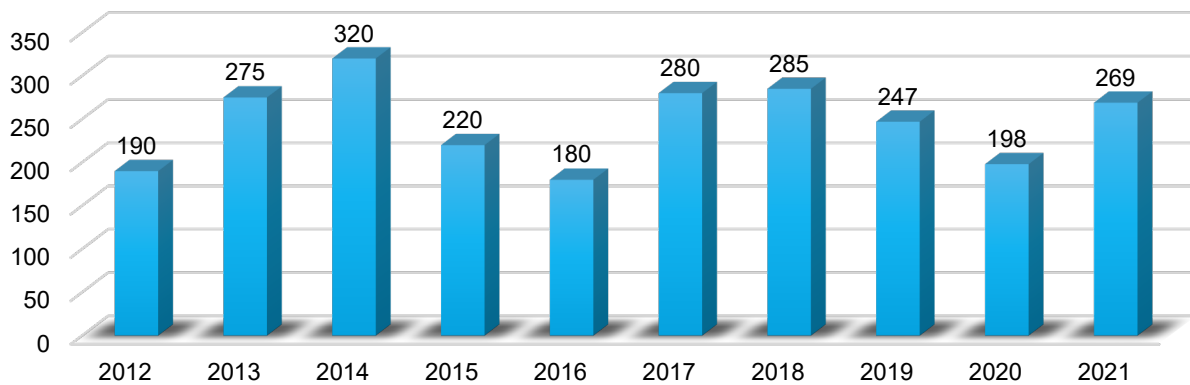


Figure 30: Quantity of Water Main Breaks per Year

The chart above shows the number of water main breaks in each of the last ten years. The number of breaks in 2021, 269, was higher than the ten-year average of 245. The number of breaks varies every year due to weather and frost depth; however, the trend of the average number is going down over the past thirty years. While there are spikes in water main breaks, the Planned Maintenance Program and the Capital Rehabilitation Program, supported by Technical Services and the Construction and Design department, are having an overall positive impact on the reliability of the distribution system.

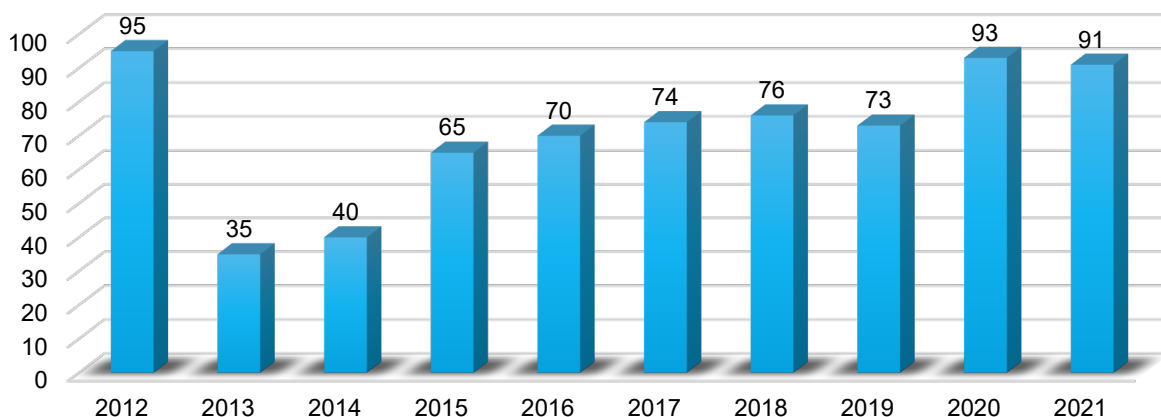


Figure 31: Quantity of Water Main Valve Repairs and Replacements

The chart above shows the number of completed water main valve repairs and replacements throughout the system. These repairs are part of the over 1,600 locations maintained by Water and Sewer staff in 2021.

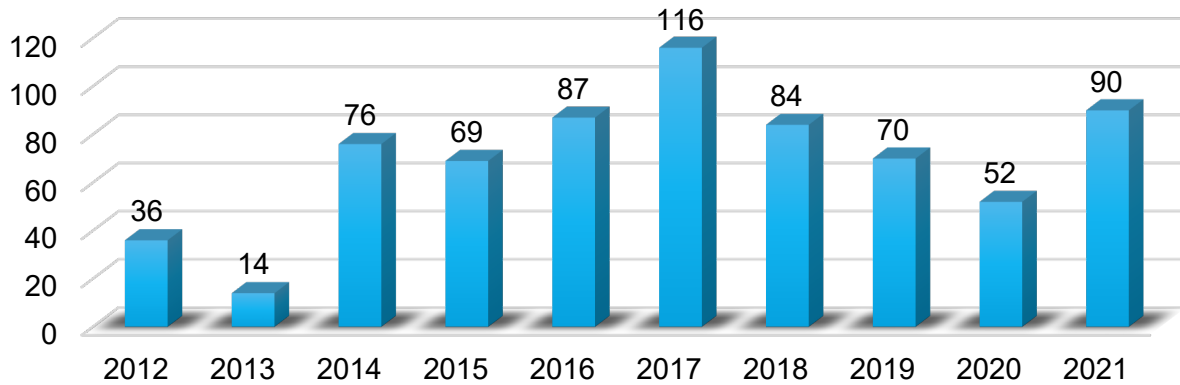


Figure 32: Quantity of Valve Casings or Spindles Repaired Using Hydro-Excavation

The chart above shows the number of locations in each year where valve casings or spindles were repaired using hydro-excitation. This method is less damaging to the road infrastructure and is used where possible.



Figure 33: Photographs of Water Main Break Repair Work

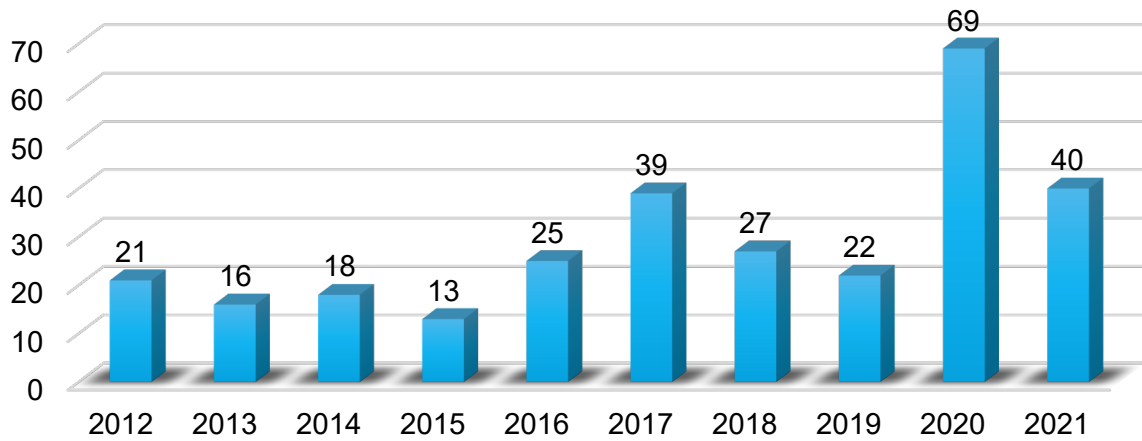


Figure 35: Quantity of Fire Hydrant Replacements

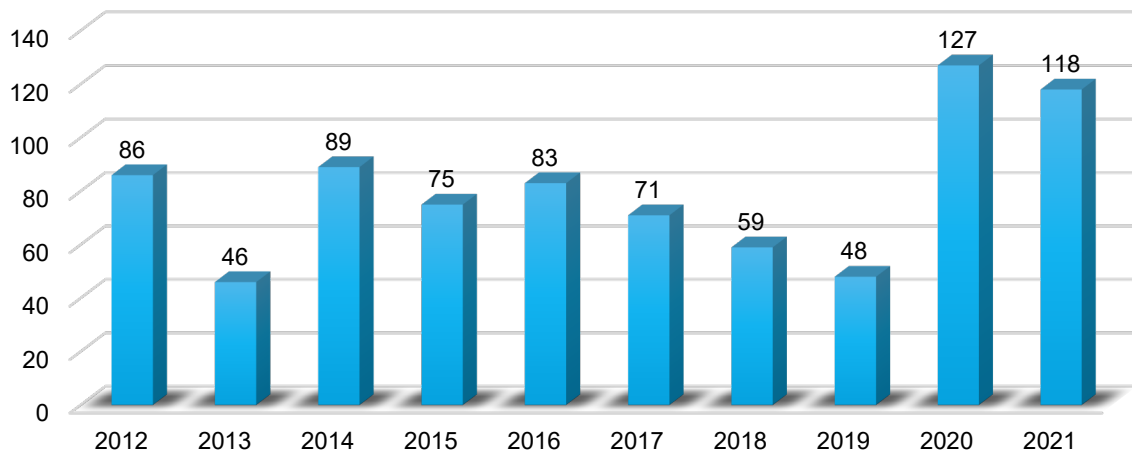


Figure 34: Quantity of Fire Hydrant Repairs

The two charts above show the number of fire hydrants repaired and replaced by Water and Sewer in each year. The decision to replace or repair a non-functional or damaged hydrant is made based on the most cost-effective option. Each hydrant is also inspected and tested annually to ensure high reliability for firefighting.

5.5 Sanitary Sewer Operations

The Sewer Operations workgroup is responsible for maintaining over 12,180 sanitary manholes. Two types of sewer maintenance activities are performed. The first technique utilizes high pressure water jetting called “flushing”. The second technique is called “brushing” and involves pulling stiff brushes through sewer mains. Approximately 155 km of sanitary sewer mains were cleaned using flushing and 3.9 km of were brushed. Closed-Circuit Television (CCTV) crews inspected 13.5 km of pipe.



Figure 36: Photographs of Closed-Circuit Television Inspection Work

5.6 Capital Projects

The Water and Wastewater Utilities funded 93 capital projects in 2021, budgeted at \$589.7 million, of which, \$196.0 million was unspent. The following table summarizes the active capital projects by three areas.

Table 6: Active Capital Projects Summary by Work Group, as of December 31, 2021

Section	# of Active Projects	Approved Funding	Unspent Funding
Water Treatment	48	\$249,720,000	\$108,208,006
Wastewater Treatment	41	\$160,124,000	\$58,872,126
Water Distribution and Wastewater Collection	4	\$179,842,500	\$28,927,492
Total	93	\$589,686,500	\$196,007,624

The following section describes some of the Utilities' major capital projects.

Water Treatment Plant

McOrmond Drive Reservoir and Pump Station: This project includes the design and construction of a new 43 megalitre reservoir system complete with pump station in the Evergreen neighborhood. Construction was awarded PCL Construction Management Inc. for \$40.5 million in July 2021. Completion is expected in Summer 2023.

Water Treatment Plant Transfer Pumping and Electrical Upgrades: This project will replace the short-term transfer pumping system, increase efficiency, and address single points of failure while replacing much of the electrical systems on-site. Construction was awarded to Westridge Construction Ltd. for \$40.7 million in March 2019. Completion is expected in 2024.

Water Treatment Long Term Capital Strategy: A comprehensive long-term capital planning process was introduced for the City's WTP in 1980 and updated in 2009. The process identifies a strategy for WTP development and modernization to meet the City demands and the Drinking Water Quality Standards. The plan is being reviewed and evaluated to determine how to increase the City's water treatment capacity to provide safe and reliable drinking water for approximately 500,000 people. Engineering services were awarded to AECOM Canada Ltd. for \$329,000 and they provided their recommendations in August 2021. Due to the magnitude, level of complexity, and strategic nature of the decisions evaluated, a *Decision Quality* review of the strategy will be undertaken utilizing internal resources. The *Decision Quality* review is expected to be complete in January 2022.

Water Treatment Plant Permit to Operate Study: This project is a follow-up study to the recently completed Saskatoon Water River Impact Study and was mandated by the WSA as part of the WTP's updated Permit to Operate issued on May 30, 2020. This project will further study the effect that the WTP discharge has on the South Saskatchewan River.

Engineering services were awarded to Hutchinson Environmental Sciences Ltd. for \$143,000. Completion of the study is expected in Winter 2022.

Acadia Pumphouse Pump Replacements: This project included the manufacture and supply of three horizontal split case pumps and associated motors for the Acadia Drive Reservoir Pump Station. The new pumps were installed in spring 2021. The pumps are operating as designed.

Raw Water Intake Screen Refurbishment and Replacement: In the Fall of 2020, a routine inspection found damage to the intake screens at the Saskatoon Raw Water Intake Facility. This project included the repair and refurbishment of the four screens, returning them to a fully functional state. Final repair of the screens was completed in Fall of 2021, for a total cost of \$355,000.

Meter Shop

Advanced Metering Infrastructure: AMI is used to transmit electrical and water consumption data directly from individual meters to the utilities. The data will assist in obtaining more accurate revenue projections throughout the year. Consumers benefit from having their monthly bill based on actual consumption rather than estimates. AMI continues to be implemented throughout the City to provide accurate utility readings. Saskatoon Water is installing communication modules on all water meters and are approximately 84% complete. A second wave through the City is being completed using the opt-out policy to assist with installations. City Council determined that fees would apply to those who don't accept AMI and this policy will facilitate project completion. A letter was issued to residents in 2021, providing information about AMI, and noting that the project is expected to be completed in 2022. However, completion is dependent on a number of factors, including resident response rates to the letters. Once installations are finished, the project will move into maintenance mode and the data can be utilized to help optimize operations.

Wastewater Treatment Plant

Wastewater Treatment Plant Primary Effluent Pump (PEP) 6: This project includes the installation of a sixth PEP and related ancillary works. Engineering services were awarded to MPE Engineering Ltd. in 2020 with construction expected to be completed in Winter 2022.

Wastewater Treatment Plant Long Term Capital Development Plan: This project included an internal review and further development of the Long-Term Capital Development Plan for the WWTP prepared in 2012. The review considered current expansions, process modifications and technology options, with respect to population projections for Saskatoon's growth. The new plan, covering a 30-year period from 2020 to 2050, provided a capital expenditures schedule and costing, which aligned with expected capacity, redundancy, and regulatory treatment objectives. This project was completed in May 2021.

Marquis Liquid Waste Haulers Station: Commissioning work continued in 2021 on this \$8.5 million project. The work includes construction of a waste hauler receiving facility containing liquid and solids receiving bays, programmable logic controls (PLC), infrastructure and Heating, Ventilation, and Air Conditioning (HVAC) equipment. This project will be integrated with the existing Marquis Odour Control Facility. This facility is expected to be open to waste haulers in 2022.

Wastewater Treatment Plant Digester and Heating Upgrade: This project included the design and construction of a fourth digester tank and a system to capture biogas from the digesters, clean it, and use it to fuel an upgraded heating system to provide the required heat for all four digesters and WWTP processes. Construction was awarded to Graham Construction and Engineering LP for \$33.2 million in July 2019. This project was completed in July 2021.

Wastewater Treatment New Spadina Lift Station and Force Main: This project includes the construction of a new lift station and piping to maintain conveyance of more than 60% of the City's collected wastewater. Construction was awarded to Graham Construction and Engineering LP for \$18.5 million in August 2021. Completion is expected in Summer 2023.



Figure 37: Spadina Lift Station

Jasper Sanitary Lift Station Pilot Project: Due to odour in the Nutana neighbourhood, an aeration system will be installed in the Jasper Sanitary Lift Station force main after a pilot study proved that the system was able to decrease odour. Engineering services were awarded to MPE Engineering Ltd. in 2021 with construction expected to begin in Fall 2022.

Wastewater Treatment Plant Bioreactor Gate Replacement: The existing bioreactor cell slide gates are used for level control, isolation of cells, and bypassing effluent through channels and have reached the end of life. In 2021, half of the slide gates were demolished and replaced. The remainder of the slide gates will be demolished and replaced in Summer 2022.

Wastewater Treatment Lift Station PLC Upgrade Strategy: The PLC Upgrade Strategy Project identified and prioritized Lift Stations throughout the city at-risk due to outdated controls system and dial-up internet connections. An initial contract with Delco Automation was retained in 2021 to provide design-build services to upgrade the Jasper Sanitary Lift Station with instrumentation to provide real-time control and monitoring. Construction is expected to be complete in Fall 2022. Further contracts will follow in 2022 and beyond to address stations at-risk as identified in the Strategy.

Wastewater Treatment Biosolids Handling Facility Force Main Twinning: Two 12 km long pipelines transfer digestate from the WWTP to the Biosolids Handling Facility which is located North of Saskatoon. The existing pipes were constructed in 1984 and 2005 and have accumulated a large amount of struvite, a rock-like precipitate that forms along the inside walls of the pipes. As well, the limited number of manholes and removeable

couplings located at various locations along the pipes creates maintenance challenges and results in a lack of redundancy. These pipes are now reaching the end of their life and require replacement, as well as an evaluation to determine the optimal corridor for the new pipes. Conceptual design services were awarded to AECOM Canada Ltd. and the design work is expected to be complete by Winter 2022. Future contracts to support construction services will follow.

Wastewater Treatment Plant Digester Tank A Refurbishment: The WWTP utilizes anaerobic sludge digestion to breakdown organic sludge into Biosolids that can be applied as a Class B fertilizer on agricultural land. Two digester tanks were originally constructed in 1969 (Digester Tank A and C), with additional tanks constructed in 1989 (Digester Tank B) and 2020 (Digester Tank D). Digester Tank A will be taken out of service in Spring 2022 to be cleaned and will require replacement of the roof membrane, gas handling equipment, and internal piping.

Distribution and Collection System Monitoring and Modelling

Table 7: Engineering and Planning Monitoring Locations in 2021

Water and Sewer Monitoring Program:

The Monitoring Group of Engineering and Planning develops, implements, and reports on environmental and hydraulic monitoring programs in the following categories:

- Sanitary and Storm System Hydraulics;
- Precipitation;
- Water Distribution Hydraulics;
- Water Quality;
- H₂S Monitoring;
- Storm Pond Bathymetry and Mapping; and
- Monitoring Equipment Test.

Program	Number of Monitoring Locations
Sanitary System	51
Storm System	15
Sanitary Tank	5
Rain Gauge	11
Hydrant Pressure	3
Hydrant Flow	52
PWM Pressure and Flow	6
Water Quality	3
H ₂ S Monitoring	10
Storm Pond Bathymetry	9

Northeast Swale Hydrology, Hydraulics and Water Quality Monitoring Report: Water quality and quantity monitoring and reporting of the Aspen Ridge neighbourhood development impact on the Northeast Swale continued in 2021.

Annual and Monthly Rainfall Reports: Reporting continued on major rain event classification, daily rainfall totals and accumulation, moisture condition in each neighbourhood based on the previous 30 days of rainfall, and historical comparison since 1900.

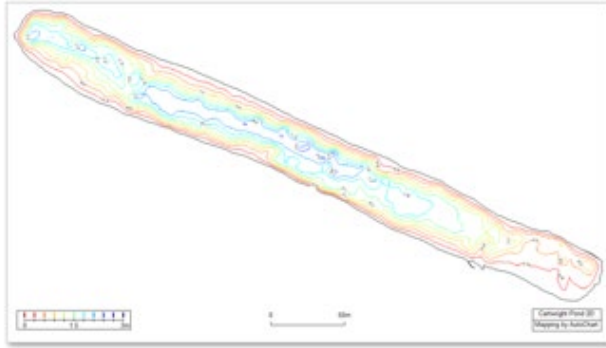


Figure 39: Cartwright Pond Bathymetric Map

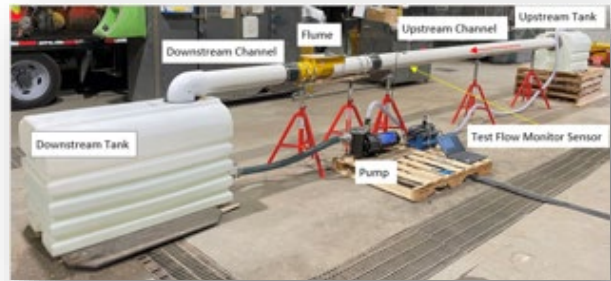


Figure 38: Photograph of Flow Bench for Equipment Test



Figure 41: Fire Flow Testing



Figure 40: Photograph of Rainfall and Wind Measurement Equipment

Water and Sewer Modeling: The water and sewer modeling group of the Engineering and Planning Section is responsible to develop, maintain, and update citywide water and sewer models using the best accepted modeling software packages in the industry. The current software packages include WaterCAD for the water distribution system, PCSWMM and InfoSWMM for sanitary collection and XPSWMM for storm water collection. The models are the basis for the City’s and regional water and sewer systems short and long-term planning, design, system capacity assessment for infill and greenfield developments, operational impact analysis and improvement, flood analysis and mitigation, flood mapping, etc.

Distribution and Collection System Planning

Long Term Capital Development and Expansion Planning: Functional water and sewer planning and updates progressed in 2021 as part of the Blairmore Sector Plan Amendment. A functional servicing plan has also been developed for the South East Concept Plan (SECP) regional growth area. On completion and acceptance of servicing strategies for these two growth areas, the master planning document will be updated with the latest design and costing information.

Saskatoon Freeway Planning Study: Collaboration continued with internal and external stakeholders including the Saskatchewan Ministry of Highways through the Technical Working Group (TWG) for transportation and utilities. Information was provided about regional drainage and utility easements required for future servicing near the proposed freeway.

The Willows Concept Plan Amendment: A developer's proposed amendment to the Willows Concept Plan triggered a substantial review of water and sewer models and design calculations, system capacity investigation, surveys, hydraulic analysis, and assessment of servicing options for the area.

Distribution and Collection System Servicing Designs

Engineering and Planning completes water, sanitary, and storm water system design work for Saskatoon Land and for other major City capital projects. Highlights for their 2021 work include the following:



Figure 42: Brighton Storm Trunk Installation

- **Brighton Phase D2A:** Completed designs for local water distribution, sanitary, and storm sewer collection systems.
- **Acadia Drive PWM:** Initiated stakeholder consultation and preliminary design of the Acadia Drive primary water main (1050 mm).
- **Faithfull Avenue Trunk Extension:** Completed designs of a primary water main (750 mm), sanitary trunk (900 mm), and storm sewers (1,500 mm to 1,800 mm). The designs will be tendered for construction in mid 2022.
- **Firehall #5 (Preston Avenue):** Completed detailed design of local water and sewer servicing including service connections.
- **Water Mains Rehabilitation (Multiple Locations):** Completed designs for water mains that needed to be replaced and/or upsized as part of the Capacity Upgrade Program.
- **Hampton Village Business Park:** Completed review of detailed design of the Kahkewistahaw First Nation Phase 1 area grading, temporary stormwater management ditches, stormwater retention area, and water and sewer design.
- **Hampton Village Business Park Sanitary Trunk:** Completed detailed design of a 450 mm size sanitary trunk along Glenwood Drive including Claypool Drive trenchless crossing.

- **Yarrow Storm Water Pond:** Completed detailed design of the Yarrow storm water management pond in Kensington including outstanding inlets/outlet structures.
- **Neault Road PWM:** Completed detailed design of the Neault Road primary water main (600 mm) extension south of Kensington Gate West.
- **Neault Road Storm Sewer:** Initiated area grading and storm sewer design for the Neault Road project between new 33rd Street and 22nd Street.
- **Marquis Phase 9:** Initiated design of local water distribution, and sanitary and storm sewer collection systems.
- **Churchill Park Storm Pond:** Completed detailed design of the storm water detention pond including storm sewer collection system and inlet structures.
- **Private Development Applications:** Reviewed 108 applications and advised on water or sewer servicing considerations for proposed re-zonings, subdivisions, condo developments, discretionary uses, utility installations, concept plan amendments, etc.

Distribution and Collection System Preservation

Water Distribution and Sewer Collection Assets: Water and Sewer preservation programs are selected annually based on the condition of assets (water and sewer mains and service lines) as well as approved levels of service and funding plans. Funding for the water and sanitary programs comes from the Water and Wastewater Infrastructure Levies. The City has the following annual programs for preservation of water and sewer assets:

- **Water Main Replacement: 6.5 km in 2021**
 - **Capacity Program:** Focuses on areas where water main capacity needs to be improved and there is a high density of lead service lines. Replacement of the water main is done via open trench excavation. Water main diameters are increased to improve flow capacity, typically from 150 mm diameter to 200 mm diameter, and lead service lines are replaced at the same time as the water main.
 - **Preservation Program:** Targets water mains that have had high numbers of water main breaks, prioritizing locations that have been breaking frequently in recent years. Since this program relies on water main break rates that are constantly changing and being updated, locations are prioritized and selected each year.
- **Sewer Main Lining: 15.2 km in 2021**
Sanitary and storm sewer mains are inspected using remote video cameras and assigned condition ratings. Based on these ratings and other risk factors, a long-term rehabilitation strategy has been developed. Lining for sewer mains uses the same method as water mains except that no excavation is required. Sanitary and storm mains

have access points (manholes) approximately every 150 m to 200 m that allow for liner installation. This method of rehabilitation for sanitary and storm mains has been used in Saskatoon since the 1990s and has been so effective that open trench replacement of sewer mains has been phased out, except for an extreme circumstance where a liner cannot be installed.

- Water and Sewer Service Line Replacements: 503 lines in 2021
Water Service Lines and Tar Fiber Sewer Service Lines are replaced:
 - In conjunction with open trench water main replacement;
 - Prior to certain roadway preservation treatments; and
 - On an emergency basis.
- At current funding levels, the remaining Lead Service Line (LSL) inventory in the city will be completely replaced by the end of 2026.

Table 8: 2020-2023 Projected Budgets – Technical Services

Program	2020 Budget (\$M)	2021 Budget (\$M)	2022 Budget (\$M)	2023 Budget (\$M)
Water Preservation	\$6.64	\$7.07	\$7.53	\$8.02
Water Capacity	\$5.96	\$7.64	\$6.26	\$6.42
Sewer Preservation	\$3.47	\$3.07	\$3.56	\$3.64
LSL Replacements	\$4.92	\$3.90	\$4.57	\$4.80
Sewer Service Lines	\$1.29	\$1.33	\$1.36	\$2.09
TOTALS	\$22.28	\$23.01	\$23.28	\$24.97

5.7 Continuous Improvement Initiatives

Saskatoon Water, Water and Sewer, and Technical Services are committed to Continuous Improvement through improved customer service and continually implementing innovations to improve efficiencies and reduce costs. In addition to the operating and capital projects described above, the departments have undertaken the following Continuous Improvements initiatives:

Fusion (SAP): The Fusion project is one initiative in the City’s Workplace Transformation. To support our growing population and have the right tools in place for our employees to be successful, we had to change the way we approached our work. One way we are doing this is by adopting industry recommended practices and implementing one master database for information. In January 2021, The City launched SAP and related software modules for Finance, Supply Chain Management, and select areas of Human Capital Management. Saskatoon Water also adopted the Enterprise Asset Management module, as a pilot in advance of the rest of the Corporation. The Fusion project aims to replace the roughly 280 systems which were previously in place across the Corporation. While the initial effort to manage this change in 2021 has been extensive, SAP will allow the City to fuse our many diverse processes and integrate them, creating a new energy and a unified approach to managing our resources.

Improved Sewer Operations and Procedures: The Planning and Scheduling Group (PSG) was established in 2018 to support the Water and Waste Operations and Roadways and Fleet Support Departments in planning, scheduling, and coordination of jobs. The Group continues to contribute to more efficient and organized operations and maintenance workflow by designing planned maintenance programs, distributing work, and providing regular progress tracking reports with Key Performance Indicators for improved accountability. Supervisors and superintendents are able to spend less time in the office and more time in the field.

Water and Sewer Repairs for Roadway Restoration Locations: The PSG lead a coordination effort to streamline scheduling and communications for Water and Sewer inspection and repair work performed in advance of roadway restoration projects. This effort was successful in creating a proactive approach rather than the largely reactive model previously in place.

Water and Sewer Maintenance Backlog Restructure: In 2021, the PSG continued to make improvements to reduce backlogs through implementing “Microsoft Planner” to schedule and confirm maintenance activities. The backlog list is continually reassessed and updated to remove items that are obsolete or have been completed.

The Valve App Project: The valve application, in use since 2018, has been used to record the on/off status of 31% of water valves (5,083 out of 16,581 total valves). Using this app reduces miscommunication and saves time for staff and contractors completing important repair and installation work in the field. Valve status also is used to interpret water pressure monitoring and modelling results, contributing to data-driven decisions about water flow.

New West Side Handling Site: Water and Sewer uses handling sites to store operating equipment and process materials such as gravel. In late 2020, a new handling site west of Highway 7 came into full service to replace the Dundonald handling site which had been re-allocated for the Recovery Park expansion. The new west side handling site has augmented the Nicholson Yards handling site on 8th Street and is expected to significantly increase operating efficiency.

Digital Application Reviews: In 2021, digital applications continued to be received and reviewed from developers for proposed re-zonings, subdivisions, condominiums, discretionary uses, etc., saving time and costs compared to the previous paper-based process. Engineering and Planning tracks all applications and summarizes review responses in a single accessible digital file.

Microsoft Teams Communication: Online Teams meetings continued to replace many in-person meetings in 2021, saving travel time and costs.

Modelling Software: An evaluation of modelling software was completed, resulting in acquiring PCSWMM and reducing the number of licences acquired, which is expected to save almost \$85,000 over next five years.

Saskatoon Water Energy Management: In 2021, Saskatoon Water continued work in energy management by completing the following activities:

- Created an Energy Management Policy for the Department indicating commitments to energy management at Saskatoon Water.
- Established baseline, benchmarks, and set energy goals for water and wastewater operations.
- Conducted energy assessments on the solar photovoltaic (PV) feasibility at both Plants, the HVAC and lighting systems at both plants, and the ultraviolet (UV) disinfection system at WWTP.
- Created an Energy Strategy for the WWTP providing timelines and budgets for energy reduction initiatives such as Nitrification Expansion, Digester Tank A Refurbishment, Ostara Dryer Replacement, and UV and other process changes.
- Developed a Communications Plan for Energy Management accomplishment and ongoing activities.

Motion Sensors and LED Lighting: Motion Sensors and LED lighting is replacing conventional lighting systems at the WTP and WWTP, reducing power consumption and maintenance requirements.

Water Treatment Plant Filter Plant Upgrades: The WTP is upgrading the 1964 filter plant actuators to allow for enhanced control and feedback. The 1964 plant filters are also receiving upgraded turbidity meters. A trial run of new media in one filter was initiated at the beginning of 2020 and is completed. The assessment indicates that there is potential for increased filter capacity when new media is installed. Installation plans will align with long term capital development plans for the WTP.

Employee Onboarding and Training: Saskatoon Water completed a project aimed at enhancing employee onboarding, along with training processes and resources. Deliverables included an employee orientation and welcome video, an updated employee handbook, a formalized training procedure, and a comprehensive training matrix which outlines minimum training requirements for each position within the department.

Cross Connection Control Program: In 2021 Saskatoon Water initiated a project to identify continuous improvements for the Cross Connection Control Program. The goal is to recommend ways to optimize efficiency and effectiveness of service delivery, and reduce the risk associated with water backflow from private properties into the potable water distribution system. Work will continue through 2022 and beyond to implement recommendations.

Quality Decision Making: Quality decision-making is vital to not only achieve the City's Strategic Goals, but also to support our Purpose, live our Values, and realize our workplace transformation vision. In 2021, Saskatoon Water initiated a project to support employees in their efforts to make quality decisions. A combined decision-making process and framework was introduced which has been proven to capture the art, the science, and the practice of achieving optimum value in decisions. Additional training and resources have been made available to support employees as they apply this collaborative philosophy.

Continuous Quality Management System: Technical Services began developing written Administrative Procedures for all of its essential services in 2020. In 2021, Technical Services is planning to complete an Administrative Procedure for emergency water main break response with contractor forces, which will mark the completion of Administration Procedures for all essential services in the department's portfolio. In 2021, Saskatoon Water revised its Document Control and Management Procedure, and implemented a sustainable system to ensure Policy and Procedural documents are reviewed on a set schedule.

6.0 OUR ENVIRONMENT

6.1 Stewardship

Protecting the river and its surrounding watershed is vital to the long-term sustainability of our water supply. The City is committed to responsible watershed management and stewardship that meet citizens' expectations. The City is a member of the South Saskatchewan River Watershed Stewards Incorporated, a community-based organization that was formed to implement the South Saskatchewan River Watershed Source Water Protection Plan. The WWTP consistently meets or exceeds all regulatory limits for effluent discharged to the river under the WSA's Permit to Operate a Sewage Works.

Saskatoon Water and Water and Sewer support the Provincial Operator Certification Program for both the Water and Wastewater Treatment Plants, and the water distribution and collection systems, which help protect both the public and the environment.

Water and wastewater activities accounted for a third of total municipal government greenhouse gas (GHG) emissions in 2019.

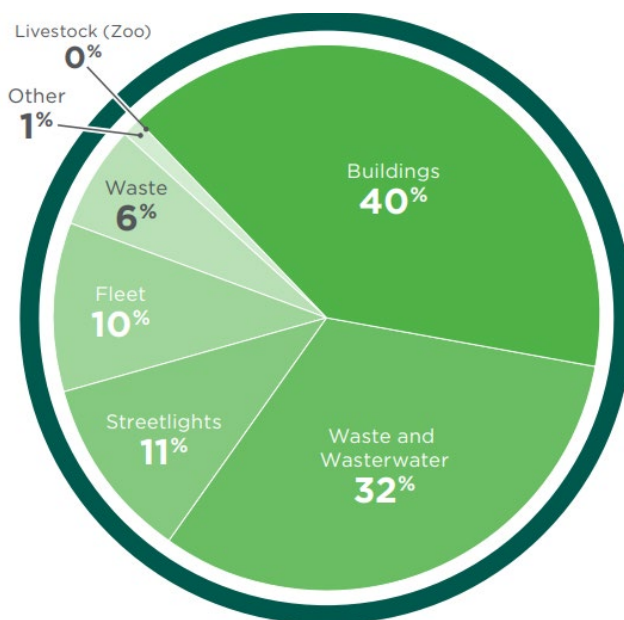


Figure 43: Municipal Government GHG Inventory Chart, 2019
Source: Sustainability Department

Achieving a balance between efficiency, renewable energy, and water conservation is part of an integrated approach to reducing emissions in the water system.

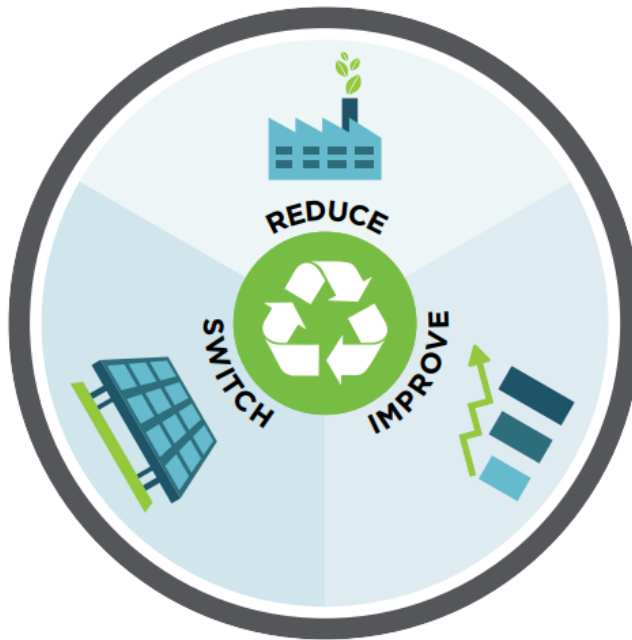


Figure 44: A Three-Pronged Approach to Reducing Water-Related Emissions: Reduce, Improve, Switch

The WWTP and WTP have committed to managing energy use through the development of a Department Energy Policy and plant specific strategies. Energy teams have been created at both plants to conduct energy studies, capital projects, and process optimizations. Results, achievements, and external collaborations from energy management will be communicated to through annual reports.

In 2021 the WWTP commissioned a new Digester and Heating Building. The new heating building included biological biogas filters that have greatly increased the plant's ability to utilize biogas for heating and therefore lowering the amount of natural gas consumed. The WWTP is also currently studying technologies to improve the final effluent ammonia quality, with the goal of far exceeding current regulatory limits, and getting ahead of future regulations in alignment with the City's goal of being environmental leaders.

In addition to the Energy Management Project (outlined above), and the Water Conservation Strategy (described below), a Renewable and Low-Emissions Energy Strategy, to switch to low carbon energy sources, is in development for the City.

6.2 Conservation

Providing the community with safe and high-quality drinking water is a top priority for the City. Water conservation can help ensure that we can meet the community's water needs in the long term, even with a growing population.

A Water Conservation Strategy was under development in 2021 and, at the time of this writing in May 2022, was being brought to City Council for approval. The Strategy will be a road map of actions to reduce peak summer use, to ease demands on capacity-limited

infrastructure, and to meet the community's many goals including water conservation, emission reduction, water affordability, and capital-cost management. There are many reasons to conserve water in Saskatoon, including:

1. Fostering equality by helping households and business moderate their water use;
2. Reducing greenhouse gas emissions;
3. Increasing water system resiliency and prepare for a changing climate; and
4. Managing water demand to ease the strain on the City's water system.

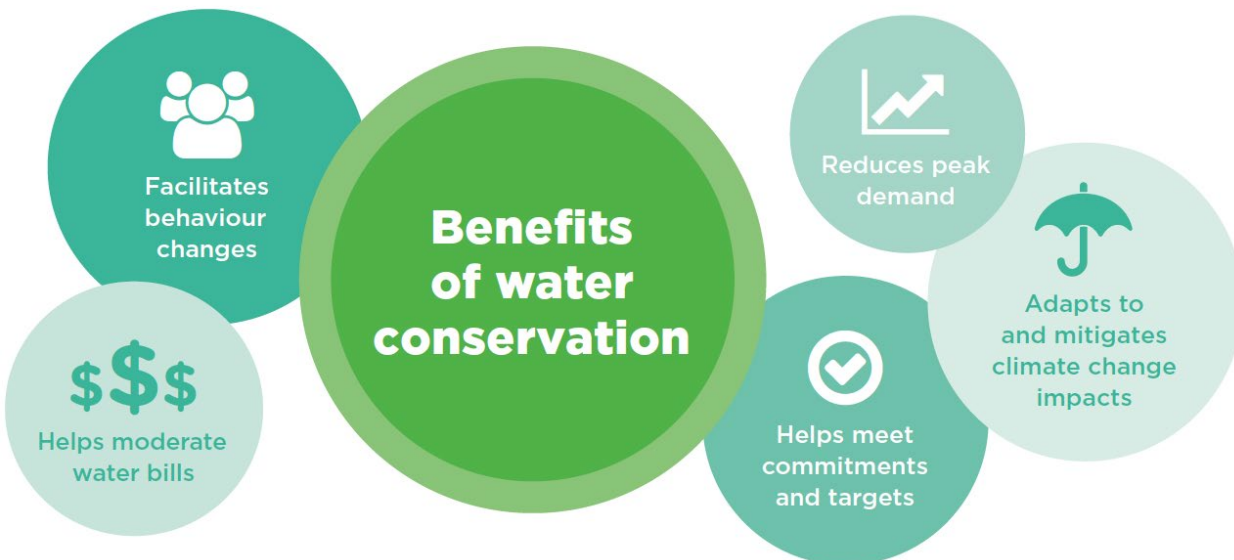


Figure 45: Infographic Outlining the Benefits of Water Conservation

The Strategy is based on the water conservation targets set in the [Low Emissions Community Plan](#). Action 25 is a 5% reduction in absolute water demand by 2026 through efficiency, monitoring, and leak reduction. Action 26 is a 20% outdoor and 30% indoor water use reduction by 2050 through residential and commercial education and water efficiency incentive programs.

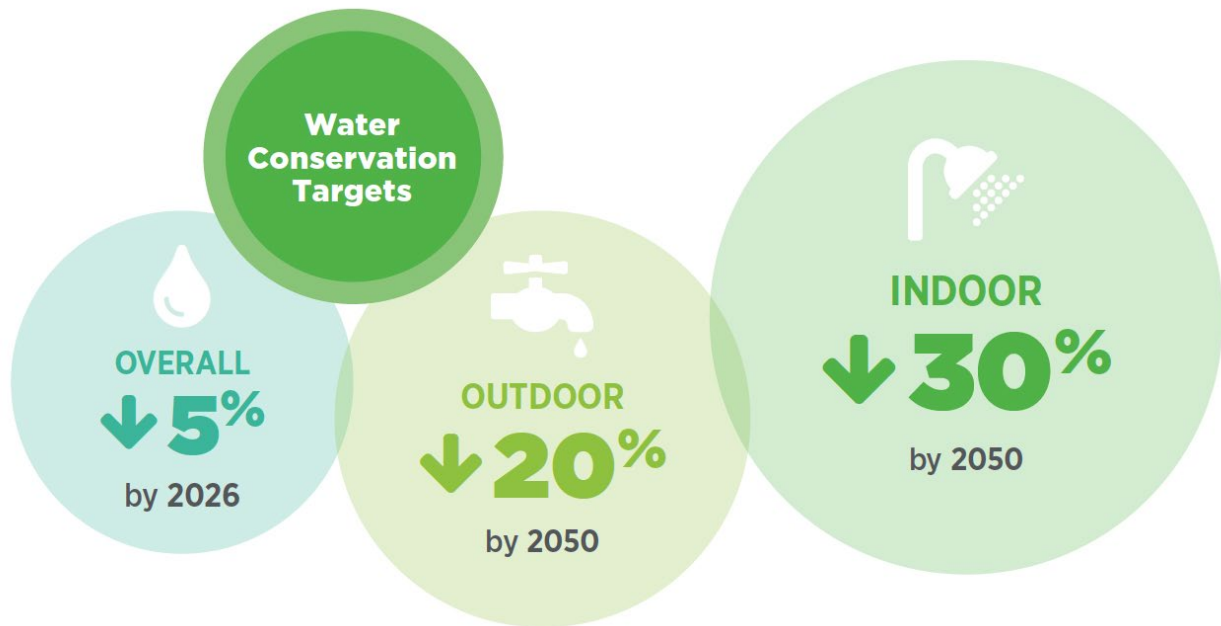


Figure 46: Infographic Outlining Water Conservation Targets from the Low Emissions Community Plan

From February 2020 to June 2021, stakeholders and the public were engaged on the Water Conservation Strategy. A total of 985 participants took part in the engagement activities, including various stakeholder meetings, surveys, and a youth workshop. There was strong support for water conservation and the top reasons for conserving water were:

1. Reducing unnecessary water usage;
2. Caring for the environment;
3. Reducing my water bill;
4. Saving energy; and
5. Reducing greenhouse gas emissions.

Out of the proposed barriers that prevent people from improving their water efficiency, participants identified the following ranking as important:

1. I don't know if I currently use too much water;
2. Upgrades are too costly;
3. I have already made my home/business water efficient;
4. I don't know what to do and there are not enough resources; and
5. There are few funding programs and opportunities that help me.

Participants were also asked to identify the top three programs they feel the City should prioritize. A summary of the results from industry and public participants is as follows:

Table 9: Water Conservation Strategy Public Engagement: Summary of Public and Industry Priorities

Top Programs - Public		Top Programs - Industry
Maximize watering efficiency in parks	1	Residential toilet rebate
Residential toilet rebate	2	Maximize watering efficiency in parks
Develop a grey-water strategy	3	Maximize efficiency of spray parks/paddling pools/pools
Increase naturalized areas in parks	4	Maximize efficiency of City facilities and operations
Maximize efficiency of City facilities/operations	5	Residential low-water landscaping program

Results from public engagement, along with best practice research and internal City considerations inform the development on the Strategy. For more information about the Water Conservation Strategy, please visit www.saskatoon.ca/waterconservation. For more information on water quality and water use in Saskatoon, please visit the Environmental Dashboard www.saskatoon.ca/environmental-initiatives/environmental-dashboard/water.

7.0 OUR FINANCES

7.1 Utility Bills

Residential water-related utility charges were \$145.27 per month in 2021, based on a standard 3/4-inch meter connection and a monthly water volume of 25.5 m³ (900 ft³). Saskatoon residents with smaller 5/8-inch water meters, which are common in core neighbourhoods, pay \$12.58 less per month on the fixed portion of their utility bill. In 2021, 52% of meters for single residential homes were 5/8 inch and 48% were 3/4 inch. All new homes are fitted with 3/4-inch meters, which meet customers expectations for water demand (e.g., for watering lawns).

Infrastructure Levies include the Roadway Levy and the Redevelopment Levy, which were phased in between 2014 and 2016. See Appendix Three for more information about utility bill charges. Saskatoon's total water, wastewater, and storm water¹ utility bill remains low at average residential water volumes compared to other cities in Alberta, Manitoba, and Saskatchewan. Based on the standard water meter size and monthly water volume of 25.5 m³, the utility bill in Saskatoon was 7.2% higher than in Calgary, which has the lowest utility bill. Saskatoon Flood Protection charge is included with Storm in the graph below.

Under Saskatoon's inclining block rate system, water and wastewater rates increase at volumes of 17 m³ (600 ft³) and 34 m³ (1,200 ft³).

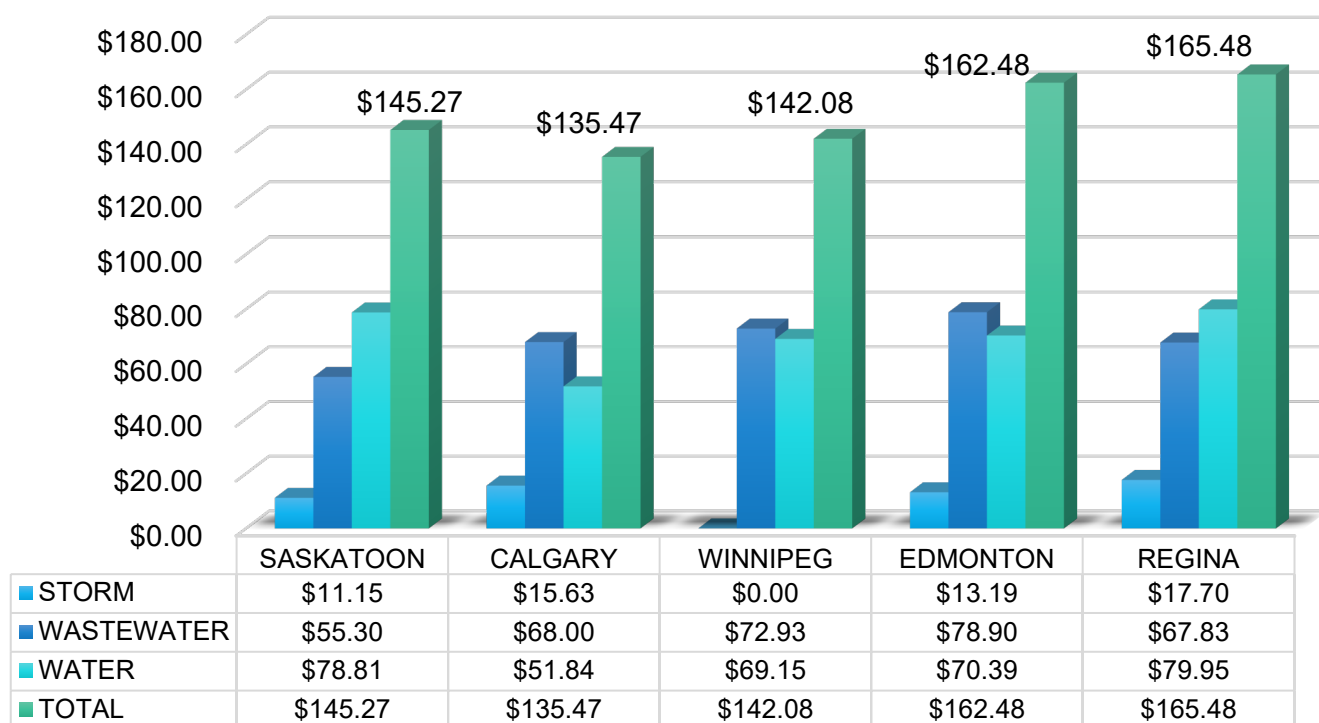


Figure 48: Residential Water, Wastewater, and Storm Water Monthly Charges by Utility (3/4 inch meter and volume of 25.5 m³ (900 ft³))

¹ The 2021 Storm Water Utility Annual Report documents Saskatoon's storm water financial information and other highlights.

7.2 Financial Summary

The Water and Wastewater Utilities are based on a user-pay principal and are fully funded through their rates. In 2021, the two utilities collected \$182.4 million in total revenues and had \$177.8 million in total expenses for a positive variance of \$4.6 million.

Table 10: Water and Wastewater Statement of Revenues and Expenditures (\$1000s).

Water and Wastewater Statement of Revenues and Expenditures (\$1000s)				
	Water Utility 2021	Wastewater Utility 2021	Consolidated 2021	Consolidated 2020
Total Revenues	101,714	80,699	182,413	169,122
Expenditures				
Utility Operations	15,888	12,123	28,011	25,730
Public Works Operations	16,997	9,216	26,213	20,941
Administration & General	1,366	869	2,234	2,602
Corporate Services & Billing	2,972	2,311	5,283	5,198
Capital Charges	30,309	20,636	50,945	51,451
Infrastructure Services			40,075	
Capital Reserve	16,832	23,244		35,368
Grants-in-lieu of Taxes	7,231	4,851	12,082	12,160
Return on Investment	8,063	4,860	12,923	11,190
Total Expenditures	99,657	78,109	177,766	164,640
Revenues less Expenditures	2,057	2,590	4,647	4,482
(To)/From Stabilization/ Capital Reserves	(2,057)	(2,590)	(4,647)	(4,482)

¹ Positive Water and Wastewater variances fund the Water and Wastewater Revenue Stabilization Reserve which is utilized in years when there is an operating deficit (negative variance). The Stabilization Reserve has a maximum allowable balance of 5% of the current year's budgeted metered revenue and Infrastructure Levy. Any amount that exceeds the maximum is transferred to the Waterworks Capital Projects Reserve, the Sewage Treatment Capital Reserve, or the Infrastructure Replacement Reserve.

Total Utility revenues increased by 8.0% in 2021 as a result of the infrastructure levy and ROI increases, rate increases, and population growth, as well volumes sold.

The Water Utility accounts for 56% and Wastewater for 44% of revenues.

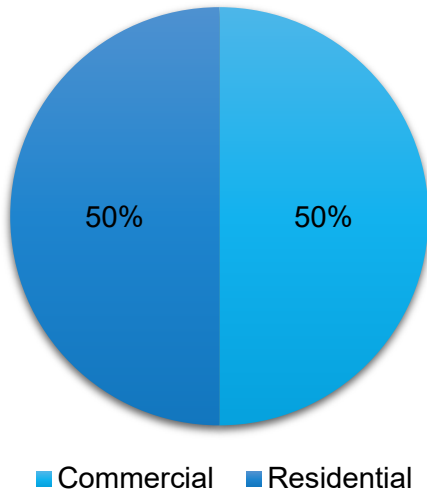


Figure 50: Water and Wastewater Revenue Chart, by Customer Class

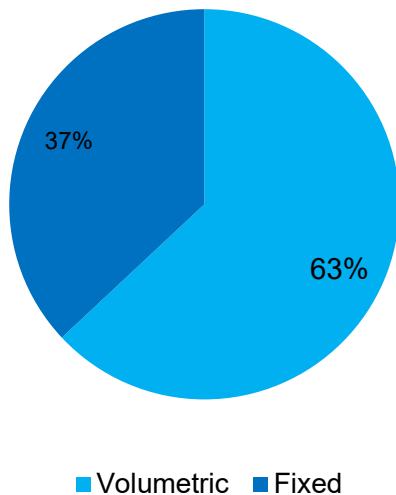


Figure 51: Water and Wastewater Revenue Chart, by Rate Type

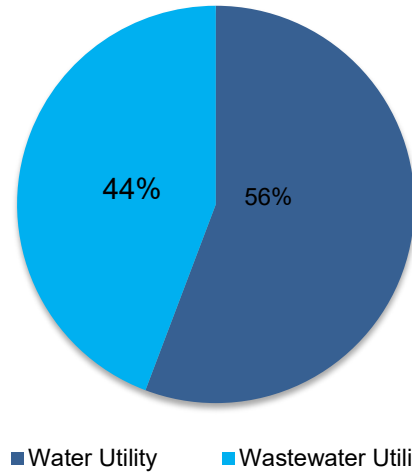


Figure 49. Percentage of Revenue by Utility (Water or Wastewater)

Commercial customers account for half of Water and Wastewater’s total revenues. About 63% of revenues are based on volumetric charges and 37% are from fixed charges.

In 2021, total expenditures were 8.0% higher than 2020 as a result of increased contributions to Grants-in-Lieu of Taxes and ROI as well as staff compensation, contractor costs and capital investment which were partially offset by decreased maintenance work due to capital investment, and reduced electrical expenses resulting in actual expenses 2.4% more than budgeted. Total 2021 revenue was 5.1% more than budgeted, resulting in a positive balance of \$4.6 million, which was transferred to the Water and Wastewater Revenue Stabilization Reserve.

Funding to the Roadways, Fleet and Support and Water and Waste Operations departments to deliver the day-to-day operation and maintenance of the water distribution, collection, and drainage systems accounted for 14.8%

of total expenditures. Funding for the Infrastructure Services Capital Reserve accounted for another 22.5% of expenditures.

An original Infrastructure Levy was implemented to fund the Infrastructure Services Capital Reserve for water distribution and wastewater collection system rehabilitation and replacement projects needed to address aging infrastructure and eliminate the water main replacement backlog to meet service levels. In 2013, a Redevelopment Levy was added and in 2014, a Roadway Levy was added, which respectively now generate \$3.7 million and \$6.0 million annually for a total of \$9.7 million in 2021.

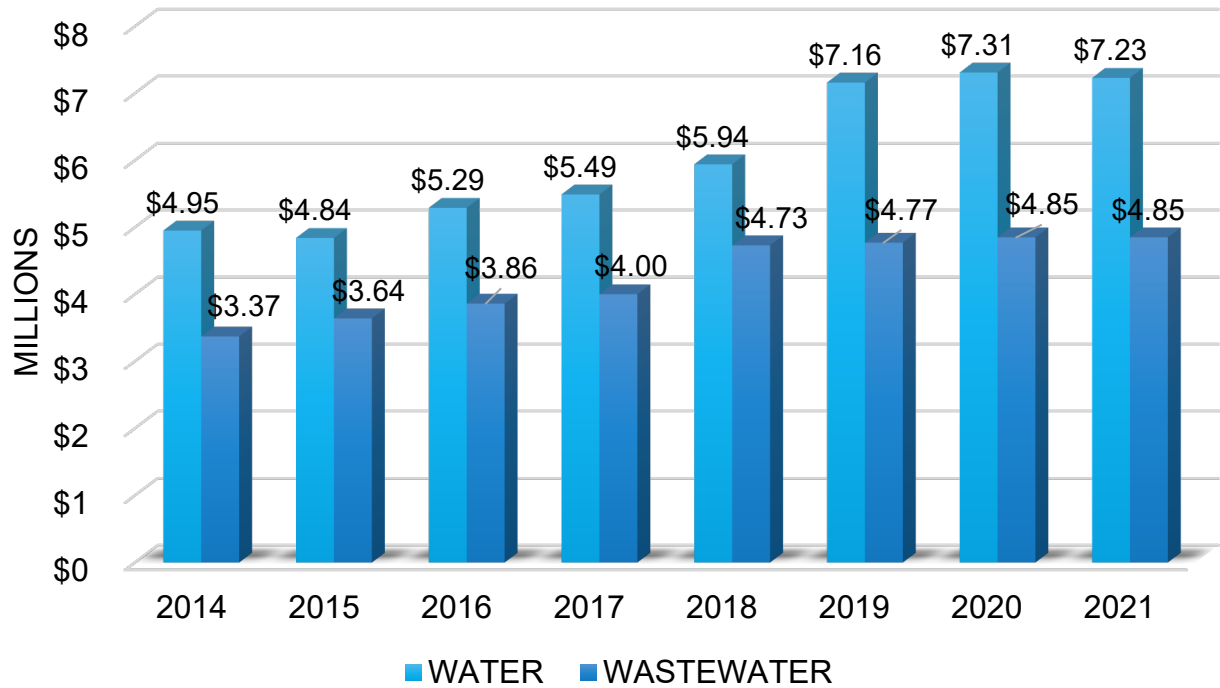


Figure 52: Water and Wastewater Utility Grant-in-Lieu of Taxes (\$ Millions)

In 2021, the Water and Wastewater Utilities paid \$12.9 million (11.0%) Return on Investment (ROI). 2020 was the final year of a five-year, phase-in plan for the ROI which after that was to be 10% of budgeted metered revenues. The Utilities also paid \$12.1 million in 2021 to the City as Grants-in-Lieu of Taxes.

7.3 Water Utility

Revenues

The Water Utility's 2021 total revenues of \$101.7 million were \$5.0 million or 5.2% more than budgeted. Total revenues increased by 5.3% from 2020, with Infrastructure Levy revenues, a volumetric charge, decreasing by 1.3%.

Other revenues included the fire protection charge, late payment penalties, and some miscellaneous revenue.

Expenses

The Water Utility's 2021 expenses of \$99.7 million included the following:

- Saskatoon Water Operating expenses, of \$17.3 million, include water treatment, pumping, storage, Meter Shop, administration, and general expenses incurred by Saskatoon Water.
- Water and Waste Operations operating expenses, of \$17.0 million, include funding to the department to operate and maintain the water distribution system.
- Saskatoon Water Capital, of \$30.3 million, funds all capital work related to the WTP and reservoirs, including debt servicing costs.
- Infrastructure Replacement Reserve – Water and Wastewater, of \$16.8 million (funded by the Infrastructure Levy), includes capital replacement of the water distribution systems, roadway damage associated with the utility, and water upgrades for core area developments.
- Corporate Charges, of \$10.2 million, include the Grants-in-Lieu of taxes, cross-charges for customer billing and collections, and corporate administration.
- ROI of \$8.1 million.

**Water Utility
2021 Revenues
\$101,714,000**

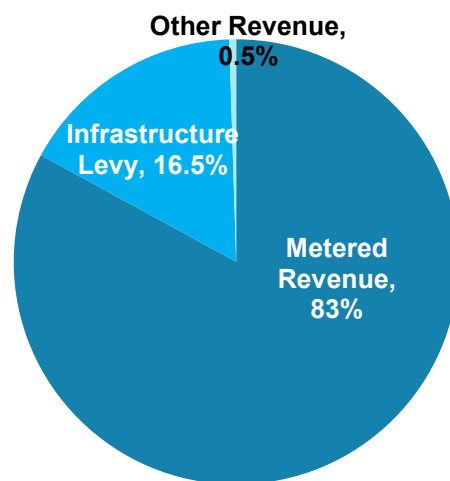


Figure 53: Water Utility Revenue

**Water Utility
2021 Operating Expenses
\$99,657,000**

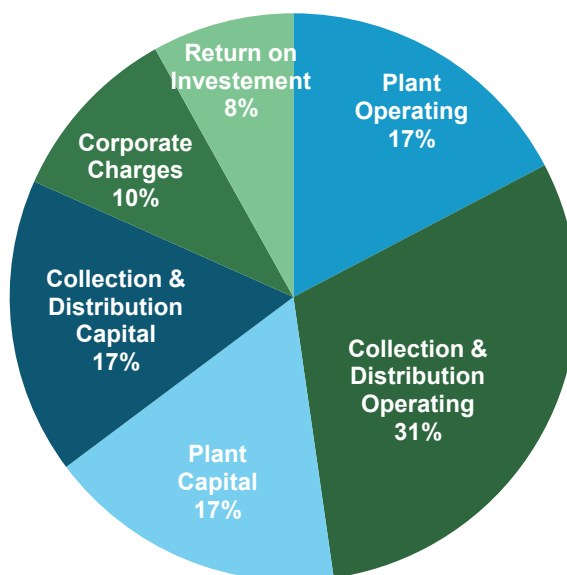


Figure 54: Water Utility Operating Expenses

The Water Utility's 2021 total expenses were 3.0% over budget due to an additional 1% in ROI, increased distribution costs, and increased transfers to Capital Reserves. Expenses were 5.5% more than in 2020 due to inflation, ROI, and Grants-in-Lieu of Taxes increases, and an increased contribution to the Capital Reserves, offset by various savings such as for electrical charges and chemicals.

Financial Statement

Table 11: Water Utility Statement of Operating Revenues and Expenses (\$1000s)

Water Utility			
Operating Revenues and Expenses			
(\$1000s)			
	2021 Budget	2021 Actual	2020 Actual
Revenues			
Metered revenue	80,342	84,376	78,492
Infrastructure Levy	15,870	16,832	17,050
Other revenue	510	507	1,059
Total Revenue	96,722	101,714	96,602
Expenses			
Water Treatment, Pumping, Storage	14,732	13,747	12,955
Water Meters	2,161	2,142	1,350
Water Administration & General	1,225	1,366	1,466
Corporate Services	3,132	2,972	3,109
Distribution (Public Works)	15,676	16,997	13,548
Capital Charges	30,205	30,309	31,215
Provision to Infrastructure Services	15,870	16,832	17,050
Capital			
Grants-in-lieu of Taxes	7,231	7,231	7,307
Return on Investment	6,491	8,063	6,490
Total Expenses	96,722	99,657	94,491
Revenues less Expenses	-	2,057	2,111
(To)/From Stabilization/Capital Reserves	-	(2,057)	(2,111)

The positive balance of \$2.06 million was transferred to the Water and Wastewater Revenue Stabilization Reserve.

7.4 Wastewater Utility

Revenues

The Wastewater Utility's Revenues increased by 11.3% from 2020 due to greater than anticipated growth in metered revenues and an increase in Infrastructure Levy revenue.

Expenses

The Wastewater Utility's 2021 expenses, of 78.1 million, included the following:

- Saskatoon Water Operating expenses, of \$13.0 million, include wastewater treatment, pumping, sludge handling and disposal, administration, and general expenses incurred by Saskatoon Water.
- Water and Waste Operations operating expenses, of \$9.2 million, include funding to Water and Waste Operations to operate and maintain the wastewater collection system.
- Saskatoon Water Capital, of \$20.6 million, funds capital work related to the WWTP.
- Infrastructure Replacement Reserve – Water and Wastewater, of \$23.2 million, funds capital replacement of the wastewater collection systems, roadway damage associated with the utility, and wastewater upgrades for core areas.
- Corporate Charges, of \$7.2 million, include the Grants-in-Lieu of Taxes, cross-charges for customer billing and collections, and corporate administration.
- ROI, of \$4.9 million, is provided to the City for general operations.

Wastewater Utility 2021 Revenues
\$80,699,000

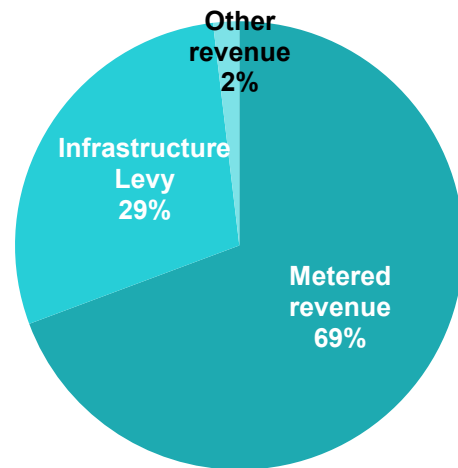


Figure 55: Wastewater Utility Revenue

Wastewater Utility 2021 Operating Expenses
\$78,109,000

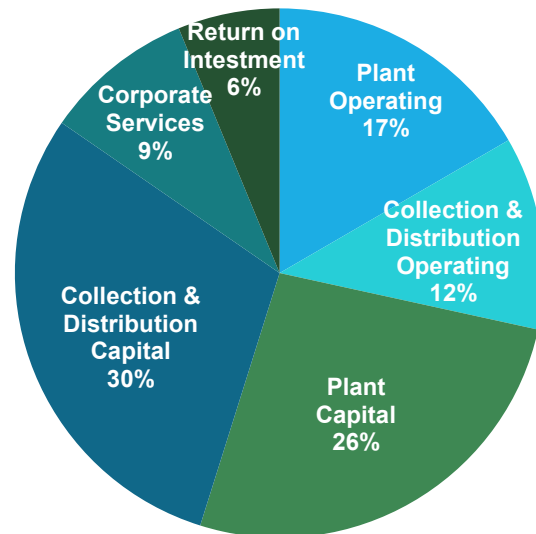


Figure 56: Wastewater Utility Operating Expenses

The Wastewater Utility's 2021 expenses were 1.7% greater than budgeted and about 11.3% greater than in 2020. This is due to increases in ROI, transfers to capital, and collections maintenance costs.

Financial Statement

Table 12: Wastewater Utility Statement of Operating Revenues and Expenses (\$1000s)

Wastewater Utility Operating Revenues and Expenses (\$1000s)			
	2021 Budget	2021 Actual	2020 Actual
Revenues			
Metered revenue	53,904	55,939	52,544
Infrastructure Levy	20,942	23,244	18,318
Other revenue	1,956	1,517	1,658
Total Revenues	76,802	80,699	72,520
Expenses			
Wastewater Treatment	9,778	8,815	8,050
Wastewater Lift Stations	2,059	1,862	1,888
Wastewater Sludge Handling & Disposal	1,849	1,445	1,488
Wastewater Administration & General	874	869	1,136
Corporate Services	2,376	2,311	2,089
Collection (Public Works)	8,670	9,216	7,392
Capital Charges	18,545	20,636	20,236
Provision to Infrastructure Services Capital			
Grants-in-lieu of Taxes	22,929	23,244	18,318
Return on Investment	5,009	4,851	4,853
Total Expenses	4,713	4,860	4,700
	76,802	78,109	70,149
Revenues less Expenses			
	-	2,590	2,371
(To)/From Stabilization/Capital Reserves			

The positive balance of \$2.59 million was transferred to the Water and Wastewater Revenue Stabilization Reserve.

7.5 Water and Wastewater Reserves

Maintaining balances in reserves is essential for the Utilities to have the capacity to pay for revenue shortfalls or unexpected operating expenses that are higher than budgeted and for large long-term capital projects such as plant improvements and expansions.

As of December 31, 2021, balances for Water and Wastewater Utility reserves were \$25.0 million. The Water and Wastewater Revenue Stabilization Reserve balance is \$8.7 million. This reserve is funded from operating surpluses up to a maximum balance of 5% of revenues and is used to fund annual operating deficits. Other reserves fund longer-term capital asset replacements, expansions, and enhancements needed to meet water and wastewater service levels that customers expect and regulatory requirements. End-of-year Capital and Replacement Reserve balances total \$7.9 million for Water, \$5.4 million for Wastewater, and \$3.4 million for Water and Sewer infrastructure (e.g. manholes, pipes). See the table below for reserve details.

Table 13: Operating Stabilization and Capital Reserves Balances, as of December 31, 2021 (\$1000s)

Operating Stabilization and Capital Reserves Balances as of December 31, 2021 (\$1,000s)	
W/WW Revenue Stabilization Reserve	\$ 8,652
Waterworks Capital Projects Reserve	\$ 7,867
Water Replacement Reserve	\$ 41
Wastewater Capital Projects Reserve	\$ 2,465
Wastewater Replacement Reserve	\$ 2,941
Water and Sewer Infrastructure Replacement Reserve	\$ 3,447
Total	\$25,412

8.0 OUR CHALLENGES

Saskatoon Water, Water and Sewer, and Technical Services have been proactive in anticipating and managing the following ongoing challenges:

COVID-19 Pandemic: Through 2021, the City of Saskatoon, and those departments supporting the Water and Wastewater Utilities, continued to optimize exposure control plans for the COVID-19 pandemic in accordance with public health measures and *The Occupational Health & Safety Regulations* of Saskatchewan. Some highlights include:

- Implemented a risk mitigation framework to keep staff safe and services going, and to ensure transparency and predictability for all;
- A heavy emphasis on education and communication for employees through email updates, safety meetings, and signage;
- Deploying rapid on-site COVID-19 testing in key workplaces;
- Coordinating vaccination clinics and launching a mandatory employee COVID-19 proof of vaccination or proof of negative test program;
- Regular workplace inspections to ensure the effectiveness of exposure control plans; and
- Maintaining the extensive list of controls outlined in the 2020 annual report.

Despite the challenges, Water and Wastewater Utility employees continued to adapt to the ever-changing conditions of the pandemic.

Keeping Up with Growth: Saskatoon's growth in population and development has required additions to water infrastructure with large up-front capital expenditures. Construction costs fluctuate depending on competing demands for contractor services. Saskatoon Water is continually coordinating multiple capital projects to respond to growth and has identified ways to defer some capital capacity expenditures. Long-term Capital Development Plans are continually updated for the Water and Wastewater Plants and for the water distribution and collection systems.

Infill Development: Cumulative impacts of infill development are placing higher demands on the carrying capacity of existing water and sewer infrastructure. Adding water and sewer underground linear infrastructure in developed areas is more expensive, technically challenging and disruptive, than adding infrastructure in new greenfield areas.

Condition and Capacity of Existing Infrastructure: Some infrastructure has entered into a "replacement era" where asset sustainability and reliability will be at risk if not properly managed. Some of the infrastructure is over 100 years old and does not meet modern design standards for new development areas. Monitoring and assessing the physical condition and capacity of the infrastructure has been initiated as a foundation for an asset management program to better maintain our assets, prolong life, and increase resiliency.

Climate Change: Changing temperature and rainfall patterns impact demand for water, with high peak demands during dry stretches. Wet weather conditions and extreme rain events can cause storm water infiltration to the sanitary system resulting in sewer back-

ups and flooding. Extremely cold weather and freeze/thaw cycles can increase water main breaks, creating challenges to meet repair service levels.

Reducing Greenhouse Gases and Our Environmental Footprint: Steps are being taken to reduce greenhouse gases and optimize energy usage through the Energy Management Project initiated in 2020. Measures are also being undertaken to reduce water leakages and conserve water through the Water Conservation Strategy. Saskatoon Water is updating Long-Term Capital Development Plans to include the energy optimization goals while working towards better water efficiency.

Regulatory Requirements: The provincial Permit to Operate impacts the required processes and standards for the WTP and WWTP. Further evolving federal and provincial regulations have the potential to impact discharges to the river. Saskatoon Water and Water and Sewer will continue to monitor regulatory trends and opportunities to be a leader in protecting our watershed.

Inflow and Infiltration: Identifying and removing the amount of inflow and infiltration entering the sanitary sewer system will help to protect the environment, reduce sewer back-ups, and reduce costs for collection and treatment. Partial treatment of high flows, which are mostly rain or groundwater, will be considered as the WWTP reaches capacity.

Inadequate Space for Personnel, Materials, and Equipment: Water and Waste Operations' current facilities are not optimal for accommodating current and expected future staff, material, and equipment necessary to meet the needs of a growing city. The Department has been improving communications with remote work sites and adapting existing spaces to meet requirements. The Department will continue to make creative short-term adjustments and work-towards suitable long-term replacement space.

Employee Retention: As a section, the majority of Water and Sewer's employees are unionized by CUPE Local 859, which provides opportunity for movement and growth within the corporation. Management turnover also has been relatively high. Employee turnover can cause stress to individual groups because of the change in work group dynamics and the time and expenditures to train employees in new roles.

Meeting Approved Level of Service: Water and Sewer aims to reach their level of service of no more than 48 hours of water outage after a main break. This goal, combined with the new planned work program, is harder to reach with current resources.

Incomplete Integrated Asset Management Approach: Water and Sewer lacks an integrated asset management strategy to maintain and replace assets based on lowest life-cycle cost. Work will continue on the development of an Asset Management Strategy and Policy for linear water and sewer infrastructure, with an annual maintenance workplan, including labour, materials, equipment, and schedules that are integrated with the other sections. Benchmarking data for Key Performance Indicators are expected to be defined to measure success. A funding plan will be identified to meet levels of service.

Non-standard Equipment: Water and Waste Operations has a range of non-standard equipment that has created maintenance and training challenges. The Department will continue to identify equipment needs, specifications and participate in procurement activities, with the objective of standardizing equipment where possible.

Incomplete Integrated Equipment Life Cycle Management Plan: Water and Waste Operations does not have a plan for managing equipment maintenance and replacement for lowest life-cycle costs. The Department will continue efforts to develop a life cycle management plan, including expansion, proactive maintenance, and optimized replacement plan. The Department will also continue to enhance equipment training and maintenance programs and develop service agreements with service providers where appropriate.

9.0 CONCLUSION

The year 2021 continued to be transformational for the Water and Wastewater Utilities. Workplace policies and procedures were revised to maintain reliable high quality essential water services during the ongoing pandemic. The launch of a new Enterprise Resource Planning system promises to fuse our many diverse processes and integrate them, creating a new energy and a unified approach to managing our resources. Significant progress was made on capital projects and long-term planning which will be vital for reliable water services, both now and in the future.

The Utilities' employees look forward to the challenges and the opportunities that the future presents, including the following areas of focus for 2022:

- Enhancing employee engagement and striving to meet all safety goals;
- Continuously improving operations to utilize resources as efficiently and effectively as possible to deliver the quality water and wastewater services that customers expect;
- Refining long-term strategies and funding plans to keep up with growth and to maintain and replace aging infrastructure based on lowest life cycle costs;
- Adapting to climate change impacts and optimizing energy usage to reduce greenhouse gases; and
- Minimizing risks to reliable water services during a pandemic through continued adherence to policies, procedures, and practices that reduce the spread of COVID-19.

The delivery of essential water and wastewater services is dependent on the dedication and skills of our employees. Our competent team of plant operators, tradespersons, maintenance staff, engineers, technologists, technicians, and administrators play a crucial role. The continued guidance and support of the General Manager, City Manager, and City Council is appreciated.

10.0 APPENDICES

Appendix One: Abbreviations

AMI: Advanced Metering Infrastructure

CALA: Canadian Association for Laboratory Accreditation Inc.

CBOD: Carbonaceous Biochemical Oxygen Demand

CFU: Colony Forming Unit

City: City of Saskatoon

IEC: The International Electrotechnical Commission

ISO: The International Organization for Standardization

MPN: Most Probable Number

NTU: Nephelometric Turbidity Units

ROI: Return on Investment

TP: Total Phosphorous

WSA: Water Security Agency

WTP: Water Treatment Plant

WWTP: Wastewater Treatment Plant

PSG: Planning & Scheduling Group

Appendix Two: Glossary

Abatement: To reduce the amount or lessen the effect of.

Backflow Prevention Device: A device installed to prevent liquids or solids from mixing with drinking water, whereby one or both of them becomes or may become contaminated or polluted. A backwater valve is a device that prevents sewage from backing up into basements.

Biosolids: Organic matter recycled from sewage.

Capital Reserve: Funding that is reserved for long-term infrastructure projects to be undertaken in the future.

Colony Forming Unit (CFU): A measure of viable bacterial cells.

Commercial customers: For this report, refers to all non-residential customers and includes retail, wholesale, industrial, and institutional customers.

Cross Connection Control Program: A cross connection is any link between the water supply and potentially contaminated sources. The Cross Connection Control Program ensures that proper backflow prevention devices are installed and tested to prevent foreign substances from entering the water distribution system.

Digester: One step of the wastewater treatment process used to decrease the amount of organic matter present.

Effluent: Treated water discharged back into the river.

Ferric: Iron-containing materials or compounds.

Grants-In-Lieu of Taxes: Money paid by the Water and Wastewater Utilities in place of taxes.

Infill (Development): Development of land within already developed areas.

Infiltration: Groundwater seeping into sanitary sewers through cracks and crevices, such as defective pipe joints and broken pipes.

Inflow: Water flowing into the sanitary sewer through large openings, such as cross connections and weeping tile.

Injury Frequency Rate: The number of injuries relative to the annual amount of time worked by 100 full time employees used to compare safety performance over time or between organizations. The formula is as follows:

(Number of lost time injuries x 200,000) divided by total hours worked)

Injury Severity Rate: The number of lost work days per 100 employees used as a proxy to measure the criticality of injuries and illnesses. The formula is as follows:

(Number of days off due to injury or illness x 200,000) divided by Total hours worked)

Irrigation: Artificial application of water typically due to low amounts of rainfall.

Lift Station: Facility designed to move wastewater or storm water from lower to higher elevations with pumps.

Low-Flow Fixture: Fixtures that use water efficiently to reduce overall water usage.

Meter Shop Service Calls:

- Meter Checks: Meter verifications completed when meter recording information is deemed likely to be inaccurate (i.e. not recording or low or change in consumption).
- Cut-offs: Water service is turned off because of arrears, seasonal (irrigation), demolitions, renovations, etc.
- Reconnects: Water service is turned on seasonally, after payment is made on an arrears account, demolition or renovations are completed, etc.
- Repairs/Other: Work is completed to fix module wiring or modules, test meters, etc.
- Lock ups: Visits to sites where access to meters is not possible (homeowner away or not allowing access). A card is left instructing the homeowner to contact the Meter Shop for information and to arrange an appointment.
- Replacements: Old meters that are no longer working, are leaking, or require replacement due to updates in technology are replaced with new meters.
- New installations: Meters are installed in new buildings in order to complete the water service connection.

Nephelometric Turbidity Units (NTU): A measure of the amount of light that is passed through a sample. A high turbidity level may result from a variety of sources and can indicate the potential for pathogens and lower clarity.

Potable: Safe to drink.

Procurement: The process of obtaining or purchasing.

Residual Handling Facility: Removes chlorine and solids, mostly consisting of sand and inert ferric material, from the Water Treatment Plant effluent that is discharged to the South Saskatchewan River.

Stabilization Reserve: Water utility revenues fluctuate due to rainfall and demand for irrigation. Annual operating surpluses, which are more likely during drier years, are

allocated to the Stabilization Reserve that can be used in years with an operating deficit. The Stabilization Reserve is capped at 5% of the current year's budgeted metered revenue, and any additional surplus is allocated to the Capital Reserve(s).

Surface Runoff: Rainfall flowing overland and into the storm sewer without being absorbed into the ground.

Turbidity: The cloudiness or haziness of a fluid caused by a large number of individual particles that are generally invisible to the naked eye.

Appendix Three: Understanding Your Residential Water-Based Utility Bill

The bill was simplified in 2019, and the details can be viewed on the City's website. The 2021 rate structure remained the same.

WATER, SEWER & INFRASTRUCTURE			Billing Period
Meter No. 123456789			May 18, 2021 - Jun 18, 2021
Current Billing Read	Previous Billed Read	Multiplier	Usage
Jun 18	May 18		
Actual 1236.33	Actual 1222.28	35.315	496.18 ft ³
			Amount
Water			\$23.32
Water Service Charge for 31 days			\$19.23
Sewer			\$12.08
Sewer Service Charge for 31 days			\$19.23
Infrastructure			\$17.48
			\$91.34
TEMPORARY FLOOD PROTECTION CHARGE			\$1.15
STORM WATER MANAGEMENT CHARGE			\$7.92
RECYCLING CHARGE			\$7.61

Figure 57: Sample Residential Water-Based Utility Bill

Water Service Charge: The fixed monthly charge for a 5/8 inch water meter is \$12.58, and for a 3/4 inch meter is \$18.87. The fee is prorated by the number of days in the month. A second water service charge is based on water usage (volumetric): \$4.700 per 100 ft³ for the first 600 ft³, \$5.297 per 100 ft³ for the second 600 ft³ and \$6.975 per 100 ft³ for over 1,200 ft³. The water service charges are used to fund water utility operations and capital projects.

Sewer Service Charge: The fixed monthly sewer service charge is based on the size of the water meter and is the same amount as the fixed water service charge. The sewer volumetric charge is 51.8% of the water volumetric charge. Rates are set on a cost recovery basis and recognize that not all water returns to the sanitary sewer: \$2.435 per 100 ft³ for the first 600 ft³, \$2.744 per 100 ft³ for the second 600 ft³ and \$3.613 per 100 ft³ for over 1,200 ft³. Sewer service charges fund wastewater operations and capital projects.

Temporary Flood Protection Charge: The charge is a fixed fee of \$1.125 per month, prorated by the number of days in the month. The fee is charged on each water meter and will be phased out by December 2021. The charge is being used to reduce flooding in high-risk areas during severe rain events.

Residential Infrastructure: The fee is \$3.522 per 100 ft³ of water usage. This fee is used for the capital replacement and upgrade of the water distribution and wastewater collection systems. The Redevelopment Levy to increase capacity of existing infrastructure to accommodate infill developments and the Roadways Levy that funds remediation of roadway damage associated with the utilities are included in the charge.

Storm Water Management Charge: The monthly charge for residential properties is a fixed amount of \$7.775 prorated by the number of days in the month. This fee is used to fund operations and capital projects for storm water and for stabilizing riverbank slumping.