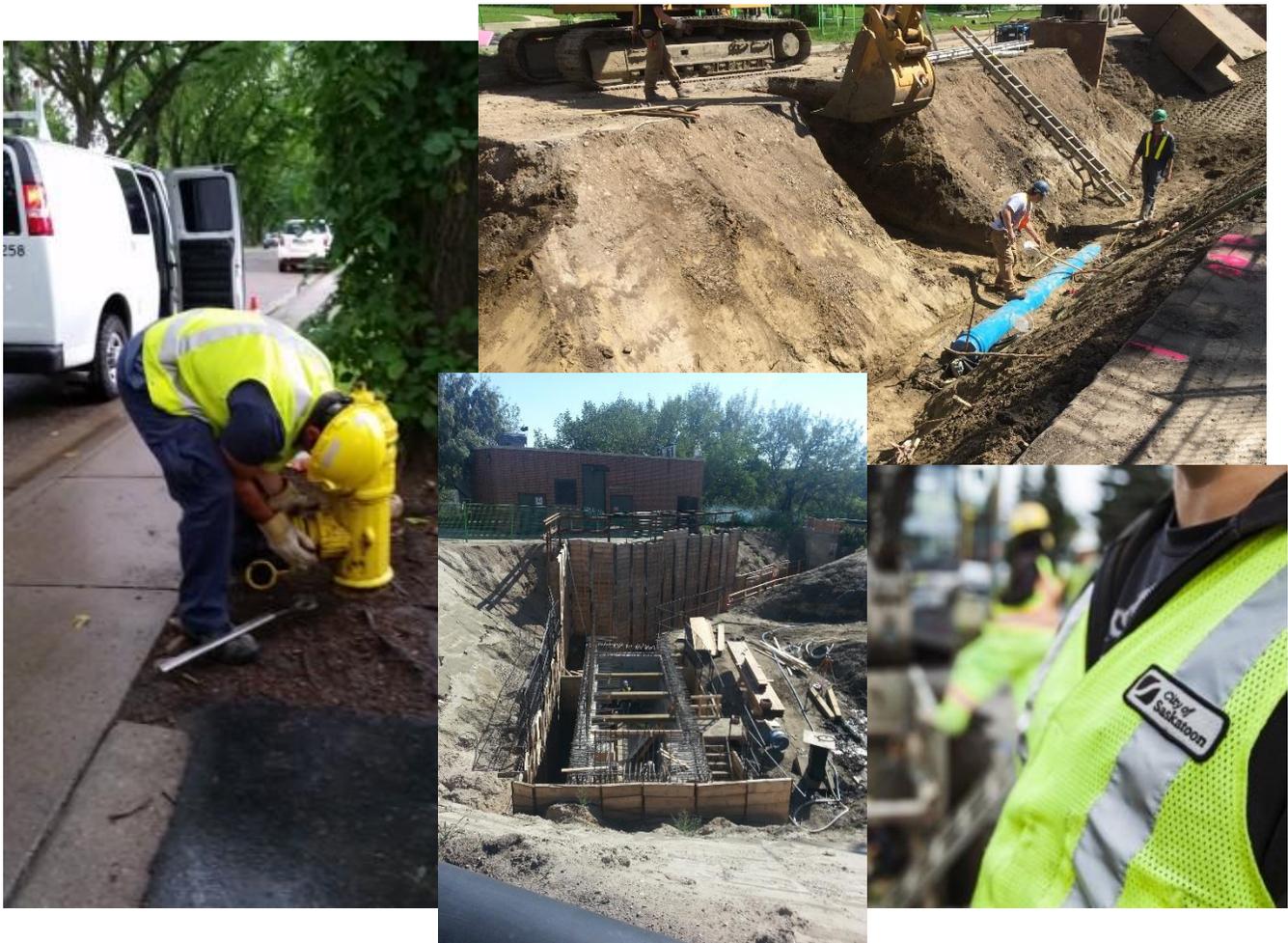


Saskatoon Water and Wastewater Utilities

2017 Annual Report



City of
Saskatoon

Transportation & Utilities Department

Saskatoon Water and Wastewater Utilities 2017 Annual Report

1.0 OVERVIEW	3
1.1 Introduction	3
Water & Waste Stream	3
Major Projects & Preservation.....	3
Water Treatment Plant	4
Wastewater Treatment Plant.....	4
Meter Shop	4
Engineering & Planning.....	5
Engineering Services	5
1.2 Strategic Linkages.....	5
Our Mission.....	5
Our Vision	5
Our Strategic Goals.....	6
Our Leadership Commitments	6
Our Corporate Values	6
2.0 OUR CUSTOMERS	7
2.1 Number of Customers	7
2.2 Rainfall and Temperature.....	7
2.3 Water Treatment Plant Volumes	8
2.4 Wastewater Treatment Plant Volumes	10
2.5 Meter Shop Customers	10
2.6 Customer Satisfaction	11
2.7 Citizen Calls	12
3.0 OUR FINANCES	13
3.1 Utility Bills.....	13
3.2 Financial Summary.....	15
3.3 Water Utility	19
3.4 Wastewater Utility.....	21

4.0 OUR PEOPLE	23
4.1 Number of Employees.....	23
4.2 Representative Workforce.....	23
4.3 Organizational Charts.....	25
4.4 Employee Safety.....	27
5.0 OUR WORK	29
5.1 Community Awareness and Engagement.....	29
5.2 Operating Highlights.....	30
5.3 Capital Projects.....	32
5.4 Continuous Improvement Initiatives.....	36
6.0 OUR ENVIRONMENT	37
6.1 Stewardship.....	37
6.2 Conservation.....	38
7.0 OUR CHALLENGES	39
8.0 CONCLUSION	41
9.0 APPENDICES	42
Appendix One: Water and Wastewater Infrastructure.....	42
Appendix Two: Understanding Your Residential Water-Based Utility Bill.....	43
Appendix Three: Abbreviations.....	44
Appendix Four: Glossary.....	45

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 and maintenance, and asset preservation falls within the following three Transportation & Utilities divisions:

- Saskatoon Water,
- Water & Waste Stream; and,
- Major Projects & Preservation.

Management and staff from the responsible divisions are committed to providing exceptional quality water and wastewater services in the most reliable and cost-efficient way for the citizens of Saskatoon. We are pleased to present our results in the Saskatoon Water and Wastewater Utilities 2017 Annual Report on behalf of our divisions.

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

Our financial statements show responsible stewardship of the resources that Saskatoon citizens have entrusted to us. We continue to provide excellent value to our citizens as we maintain the lowest average combined water and wastewater rates among major Prairie cities. Our utility rates are designed to fund the needed capital and operating costs for current and future water and wastewater services.

Management and staff place a strong emphasis on safety. The combined lost-time frequency rate for the labour intensive divisions was slightly higher than Saskatoon's corporate average; however, there was a significant reduction in lost-time days and severity rate.

The divisions have been focused on addressing growing demands, changing expectations, regulatory changes, and aging infrastructure for water-related services. In 2017, the utilities funded 82 active capital projects valued at \$267.6 million.

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.

Reid Corbett – Director of Saskatoon Water
Rob Frank – Acting Director of Major Projects & Preservation
Russ Munro – Director of Water & Waste Stream

EXECUTIVE SUMMARY

The Water and Wastewater Utilities fund all aspects of water services performed by Saskatoon Water, Water & Waste Stream, and Major Projects & Preservation that contribute to our city's quality of life by providing safe and reliable, high-quality drinking water, and wastewater collection and treatment that meets health and environmental regulatory standards.

The City of Saskatoon employs approximately 407 staff through these three divisions to operate and maintain the Water Treatment Plant, the Wastewater Treatment Plant, 24 lift stations, the Meter Shop, underground water and wastewater infrastructure, manage asset preservation for underground water and wastewater infrastructure, and provide engineering and planning services. The Utilities also fund a portion of Corporate Revenue for customer billing, meter reading, and collection services.

Saskatoon Water provides water services to approximately 74,000 residential and commercial water meters. The Water Treatment Plant supplies water to approximately 309,000 Saskatchewan residents. Average monthly residential water-related Utility Bills of \$114.59 was the lowest among other major prairie cities in 2017.

In 2017, the Water and Wastewater Utilities collected \$145.4 million in revenues, incurred \$142.4 million in expenses, and contributed \$3.0 million to stabilization and capital reserves. Compared to 2016, total revenues in 2017 increased by 9.3% as a result of growth and development, rate increases; and the phase-in of roadways, redevelopment levies, a Return on Investment, and other revenue increases.

In 2017, 49% of total revenues, or \$69.8 million, was allocated to capital to fund longer-term, water-related infrastructure projects. Significant capital projects in 2017 included Water Treatment Plant transfer pumping and electrical upgrades, Water Treatment Plant filter upgrades, Water Treatment Plant source water study, Advanced Metering Infrastructure, lift station upgrades, cell relining at Bio-solids Handling Facility, upsized Fletcher Road force main, long-term master planning of water and sewer servicing to a population of one million, water main lining and replacement, lead service line replacement, and sewer main lining.

WATER AND WASTEWATER UTILITIES

1.0 OVERVIEW

1.1 Introduction

The Water and Wastewater Utilities fund Water & Waste Stream, Major Projects & Preservation, and Saskatoon Water who are collectively responsible for the planning, designing, operating, maintenance, and capital for all water and wastewater services for existing and future citizens and businesses. The Utilities also fund a portion of Corporate Revenue for customer billing, meter reading, and collection services.

The utilities have assets with a replacement value estimated at over \$7.4 billion (2014 dollars) – see Appendix One for details.

Water & Waste Stream ensures the maintenance, repair, and replacement of all underground water, wastewater, and storm water infrastructure. Lined up end-to-end, the underground pipes (not including service connections) that make up Saskatoon’s water distribution, sanitary sewer collection, and storm water collection systems total 2,979 km.



Major Projects & Preservation consist of two sections with the Preservation Section 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. Construction & Design provides construction engineering services to deliver the required capital projects to upgrade the water and sewer assets.

Saskatoon Water consists of five sections. The following summarizes the responsibilities of each of these sections.



The **Water Treatment Plant** (WTP) supplies all consumers with safe and reliable, high-quality drinking water that meet high provincial and federal regulatory standards. Core functions include operating and maintaining 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 high provincial and federal regulatory standards before being returned to the South Saskatchewan River. The wastewater's system includes the WWTP, 24 lift stations, the Heavy Grit Facility, and the Biosolids Facility where solids from the treatment process are handled and disposed. Sales of the plant's slow-release fertilizer create additional revenues.



The **Meter Shop** is responsible for the purchase, installation, testing, repair, and replacement of water meters; the installation and termination of water services; as well as the installation and commissioning of Advanced Metering Infrastructure. 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 (City) potable water.



Engineering & 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 & Planning also manages the Storm Water Utility and provides storm water engineering expertise. The section also monitors and mitigates damage to public property from riverbank settlement and instability due to high ground water levels.

Engineering Services provides capital planning and feasibility studies, design and project management services for Saskatoon Water's capital expansions and asset replacements.



1.2 Strategic Linkages

The City's [Strategic Plan 2013-2023](#) provides the direction that guides Saskatoon Water's activities. The following section outlines our Mission, Vision, and linkages to the Corporate Strategic Goals, Leadership Commitments, and Values.

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.

Our Vision

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

Our Strategic Goals

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

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

Asset and Financial Sustainability: Implement capital preservation and expansion plans that provide the most cost-effective, water-related infrastructure for current and future citizens and businesses.

Environmental Leadership: Implement leading-edge innovations for environmentally responsible water-related infrastructure and services.

Sustainable Growth: Work closely with other divisions to provide efficient and resilient designs for water and wastewater infrastructure for new developments.

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.

Our Leadership Commitments

Our employees support leadership commitments in our day-to-day work:

- Reliable and Responsible Service
- Strong Management and Fiscal Responsibility
- Effective Communication, Openness, and Accountability
- Innovation and Creativity

Our Corporate Values

Trust: We build trust with citizens and colleagues by providing accurate technical information, analysis, and responses in a timely manner.

Integrity: We lead by example, making the best decisions and striving to work beyond the scope of the position.

Respect: We build on each other's strengths; respectfully acknowledging individual beliefs.

Honesty: We are honest to each other, and encourage frank, honest discussions while being sincere, admitting mistakes, and learning from them.

Courage: We take smart risks, thinking through challenges, suggesting new approaches, and embracing change to enhance our level of service.

Safety: We put safety at the forefront of all decision making and never compromise on the safety or well-being of ourselves, coworkers or the public.

2.0 OUR CUSTOMERS

2.1 Number of Customers

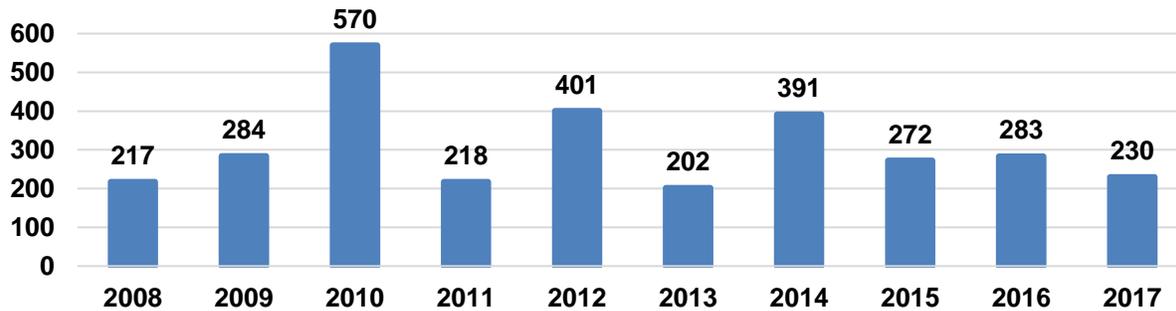
Water treatment and distribution and wastewater collection and treatment services are provided to 271,000 residents and to commercial, industrial, and institutional customers in Saskatoon. The Water Utility also sells treated water to SaskWater, which receives this water at seven supply points around the city's perimeter and re-distributes it to 37,900 customers outside of Saskatoon.

In 2017, Saskatoon Water provided water services to approximately 74,000 residential and commercial water meters.

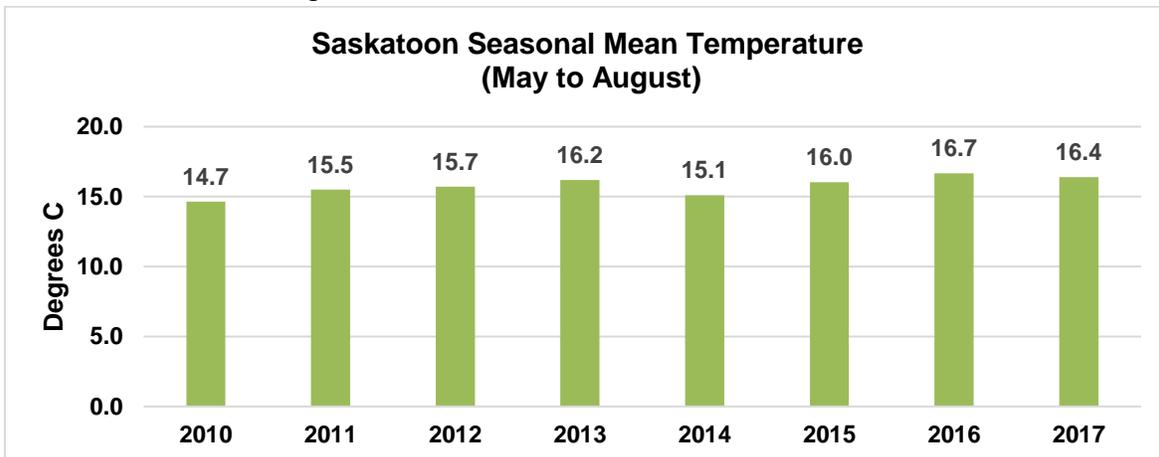
2.2 Rainfall and Temperature

Variations in annual water sales correlate closely with summer rainfall and temperatures, which show irrigation is a significant portion of total sales volume. In 2017, Saskatoon registered 230 mm of rainfall, which is lower than the ten-year average rainfall of 307 mm.

**Saskatoon Annual Rainfall
(April to September) (mm)**



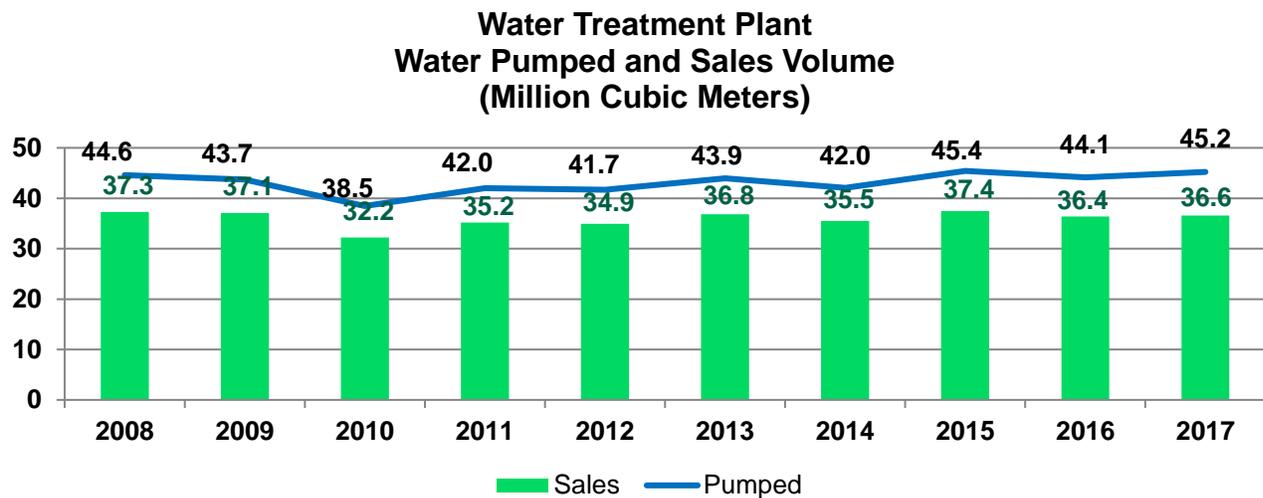
Average summer (May to August) temperatures in 2017 were 0.5° C warmer than historical summer averages.



2.3 Water Treatment Plant Volumes

Based on customer meter readings, 36.6 million cubic meters of water were sold in 2017 which is slightly higher than the ten-year average of 35.9. Although the population has grown by 27.5% since 2008, demand has stayed relatively constant. This can be attributed to lower consumption per capita due to low-flow faucets, toilets, and washing machines and an increased water conservation awareness. It is anticipated demand will rise in correlation with population in the future once all fixtures are converted to low-flow and conservation is fully realized.

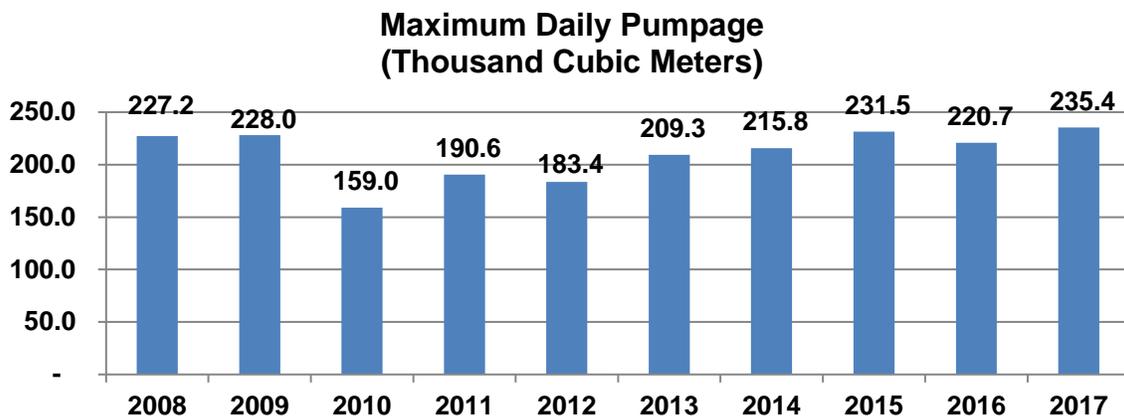
Highest rainfall volumes in 2010 and 2012 resulted in the lowest annual water sales in the last decade.



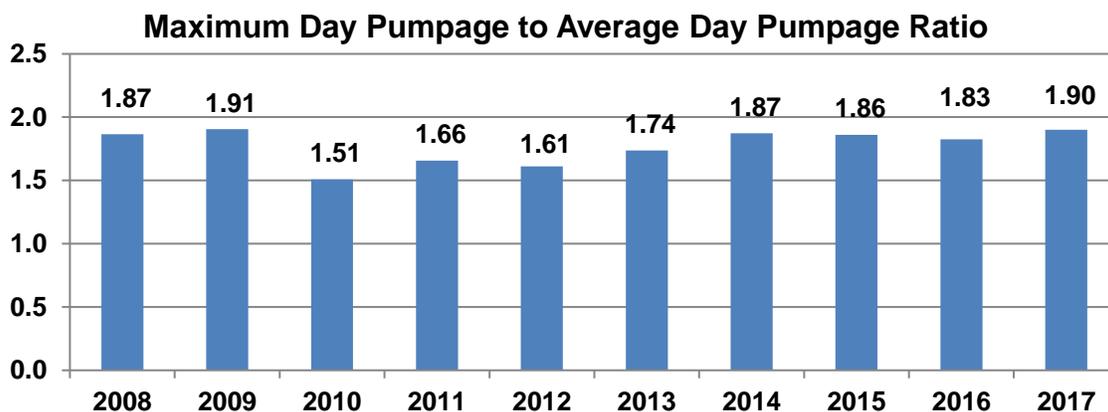
The chart above compares the annual volume of treated water pumped from the WTP into the distribution system and the volume of water sold. Due to a water meter failure, the pumpage was estimated from 2010 to 2013 based on an assumed water leakage rate of 16.2%. In 2017, unmetered water was 19.0% of total water pumpage. 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
- Water meter accuracy

Maintenance and investment in the water distribution system and the recently introduced water audit program will reduce water loss and lower water treatment operating costs.



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. The large volatility in the maximum daily demand is mostly due to weather conditions and population growth. Conservation initiatives have helped to mitigate maximum daily pumpage, even with population growth.



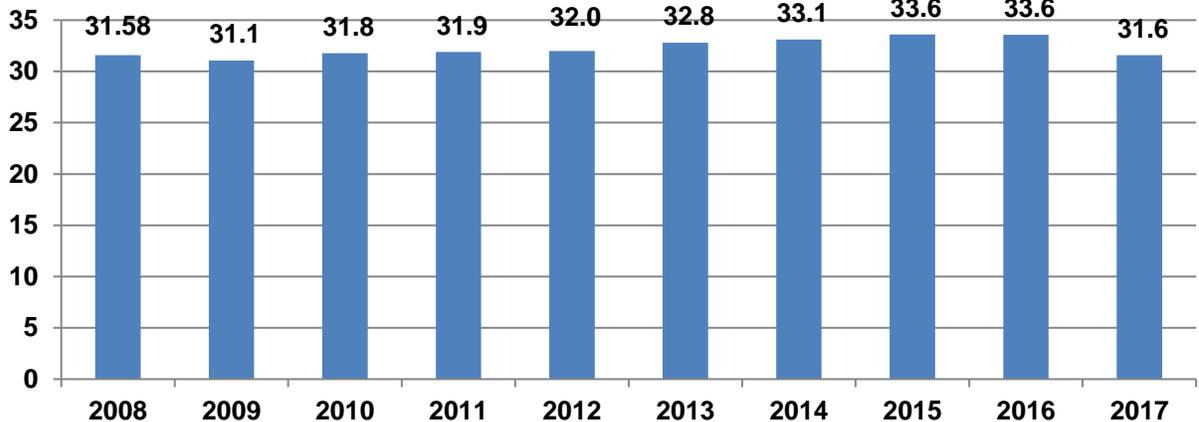
The chart above reflects the extra capacity required for the maximum daily volume of water consumption at the height of summer irrigation relative to average daily water consumption throughout the entire year.

In 2017, the maximum day pumpage to average day pumpage ratio of 1.90 was higher than the ten-year average of 1.78 due to lower than average rainfall. This ratio is highly volatile as it is largely dependent upon weather in the summer. Hot, dry weather yields high ratios, while cool, wet weather yields low ratios. This variable 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 must be re-assessed and possible peak demand management initiatives implemented.

2.4 Wastewater Treatment Plant Volumes

Wastewater Treatment Plant Effluent Flow (Million Cubic Meters)



*2011 was estimated due to missing flow data. The monitoring instrumentation was replaced.

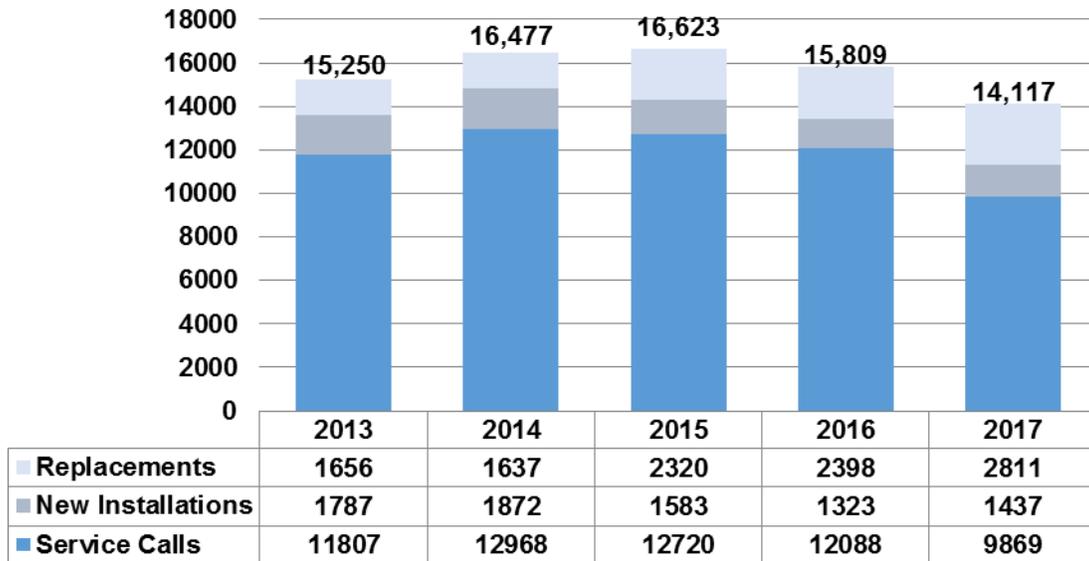
In 2017, WWTP effluent was lower than the ten-year average of 32.3 million cubic meters. WWTP effluent flow increases as the population grows and decreases when households install water-saving appliances, such as low-flush toilets, resulting in relatively constant demand over the last decade. Wet weather 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.

2.5 Meter Shop Customers



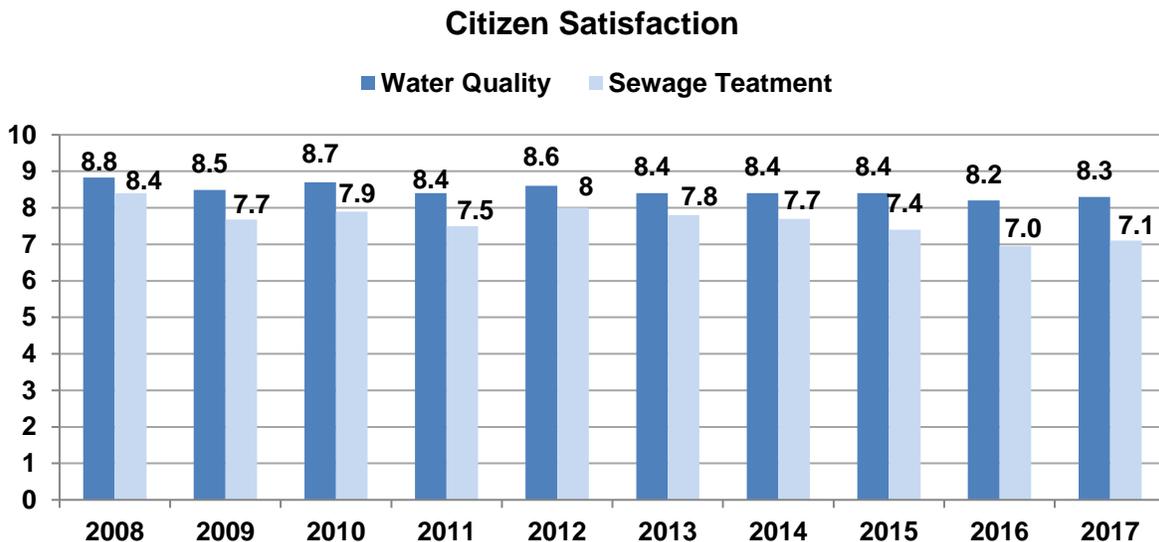
In 2017, the Meter Shop undertook 14,117 total jobs, a decrease of 10.7% compared to 2016. This reduction was due to significant long-term leaves and a retirement which lead to a small reorganization of the section. Jobs included; 2,811 meter replacements, 1,437 new meter installations, and 9,869 service calls, which result from work orders generated by Corporate Revenue to check malfunctioning meters or for cut-offs and reconnects. New meter installations were higher due to annual growth and the number of meter replacements increased by 17.2%.

Meter Shop Service Calls, New Meter Installations and Replacements



Presently, there are 8,565 active backflow prevention devices that are required to be tested annually. In 2017, 904 new devices were installed and 96.3% of all devices were tested. Most of the 3.7% of devices not tested were inactive due to construction or City parks seasonal connections not completed on time.

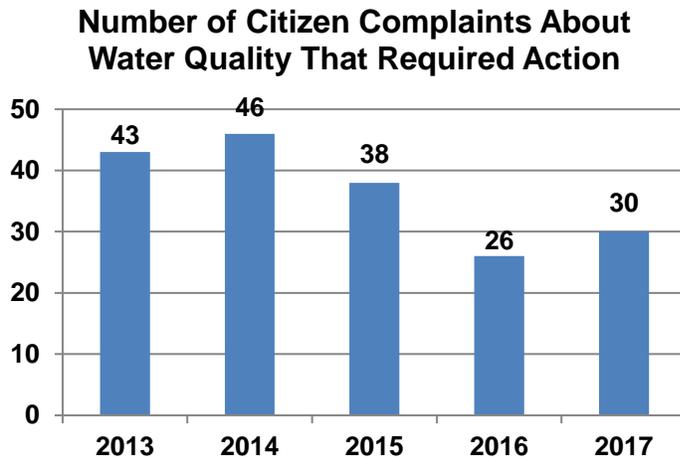
2.6 Customer Satisfaction



Saskatoon citizens ranked water treatment and wastewater treatment as two of the most important civic services, with drinking water quality being the most important service in the [2017 Annual Civic Services Survey](#). A score of ten means “excellent” and five means “average”. In 2017, the average citizen satisfaction for water quality was 8.3

and sewage treatment was 7.1 out of ten. **Water quality has consistently received the highest Saskatoon citizen satisfaction rating of all civic services.**

2.7 Citizen Calls



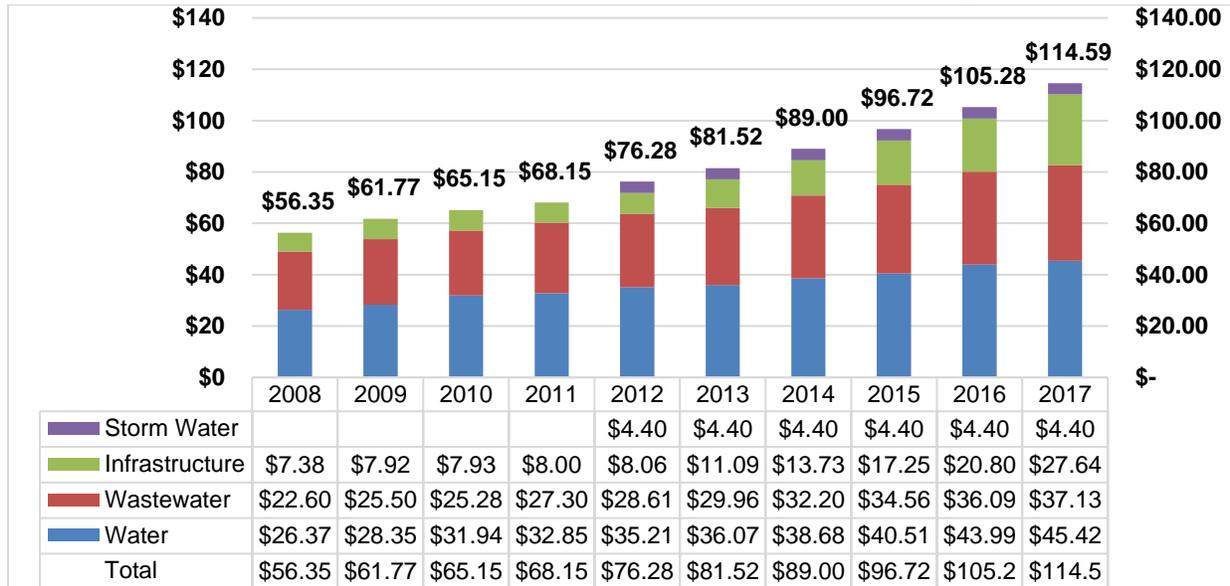
In 2017, citizen calls resulted in lab personnel making 30 on-site visits to conduct water quality testing for bacteria and inorganic material to ensure safe, high-quality water is maintained.

One call about WWTP odour was received in 2017.

3.0 OUR FINANCES

3.1 Utility Bills

**Average Residential Monthly Water-Related Utility Charges
3/4 inch meter and Volume of 900 ft³ / 25.5 m³)**



Total residential water-related utility charges were \$114.59 per month in 2017 based on a standard 3/4 inch meter connection and a monthly water volume of 900 ft³.

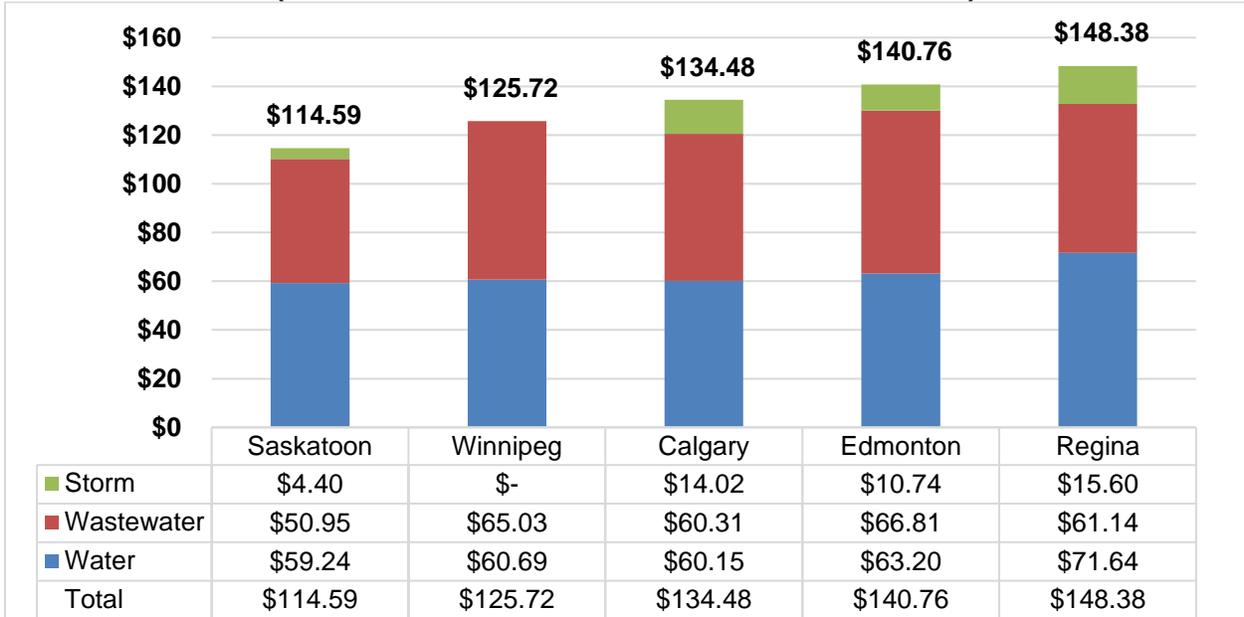
Saskatoon residents with smaller 5/8 inch water meters, which are common in core neighbourhoods, pay \$9.48 less per month on the fixed portion of their Utility Bill. In 2017, 54% of meters for single residential homes were 5/8 inch and 46% were 3/4 inch. All new homes are fitted with 3/4 inch meters, which meet citizen expectations for higher water demand, for example, watering larger lawns.

Infrastructure Levies include the Roadways Levy and Redevelopment Levy, which were phased in between 2014 and 2016, and its funding is split between the Water and Wastewater Utilities. See Appendix Two for more information about Utility Bill charges.

In 2016, the City implemented a \$3.0 million Return on Investment (ROI) that will be phased in to an estimated \$11.19 million (10% of revenue) by 2020. In 2017, the ROI was increased to \$6.675 million.

Saskatoon's total Water, Wastewater, and Storm Water Utility Bill remains significantly less at average water volumes than other cities in Alberta, Manitoba, and Saskatchewan. Based on the standard water meter size and monthly water volume of 900 ft³, the utility bill in Saskatoon was 9.7% less than in Winnipeg, the second lowest utility.

**2017 Water, Wastewater & Storm Water Monthly Charges by Utility
(3/4 inch meter and Volume of 900 ft³ / 25.5 m³)**



Under Saskatoon’s inclining block rate system, water and wastewater rates increase at volumes of 600 ft³ (17 m³) and 1,200 ft³ (34 m³). Of the western benchmark cities, only Winnipeg has lower charges for water volume, less than 600 ft³ (17 m³) per month.

3.2 Financial Summary

The Water and Wastewater Utilities are based on a user-pay principal and are fully funded through their rates. In 2017, the two utilities collected \$145.4 million in total revenues and had \$142.4 million in total expenses for a positive variance of \$3.0 million.¹

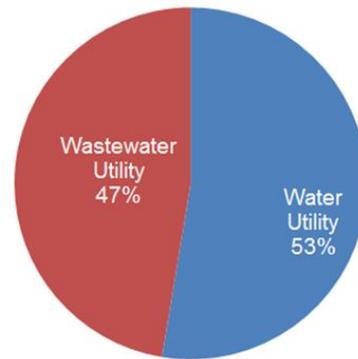
Water and Wastewater Utilities				
Statement of Revenues and Expenditures				
(\$1,000s)				
	Water Utility	Wastewater Utility	Consolidated	Consolidated
	2017	2017	2017	2016
Total Revenues	\$ 76,496	\$ 68,902	\$ 145,397	\$ 133,023
Expenditures				
Utility Operations	\$ 12,947	\$ 10,690	\$ 23,637	\$ 22,660
Public Works Operations	13,476	6,957	\$ 20,434	18,949
Administration & General	1,559	825	\$ 2,384	3,832
Corporate Services & Billing	3,619	2,331	\$ 5,950	5,984
Capital Charges	19,799	14,680	\$ 34,479	36,200
Flood Protection Charges		3,934	\$ 3,934	3,899
Infrastructure Services Capital Reserve	14,864	20,518	\$ 35,382	25,976
Grants-in-lieu of Taxes	5,491	3,996	\$ 9,487	9,153
Return on Investment	3,523	3,152	\$ 6,675	3,000
Total Expenditures	\$ 75,277	\$ 67,084	\$ 142,362	\$ 129,653
Revenues less Expenditures	\$ 1,218	\$ 1,817	\$ 3,036	\$ 3,370
(To)/From Stabilization/Capital reserves	\$ (1,218)	\$ (1,817)	\$ (3,036)	\$ (3,370)

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. The Stabilization Reserve has a maximum 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.

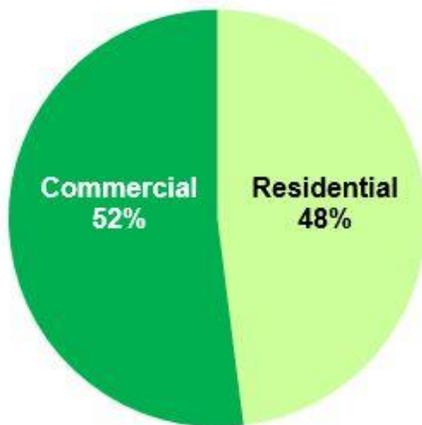
Total utility revenues increased by 9.3% in 2017 as a result of the infrastructure levy phase-in, rate increases, population growth, and increased other revenue, which offset the decrease in volumetric and fixed revenue.

The Water Utility accounts for 53% and Wastewater for 47% of revenues.

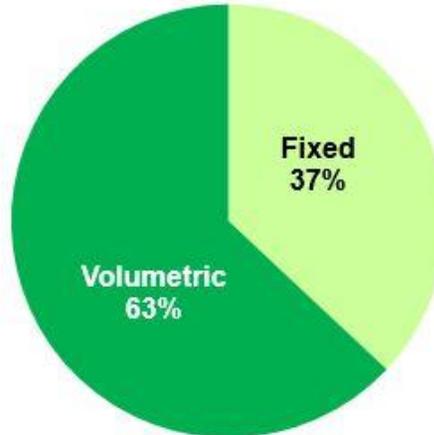
**Total 2017 Revenues
\$145.4 Million**



Water and Wastewater Revenue by Customer Class



Water and Wastewater Revenue by Rate Type

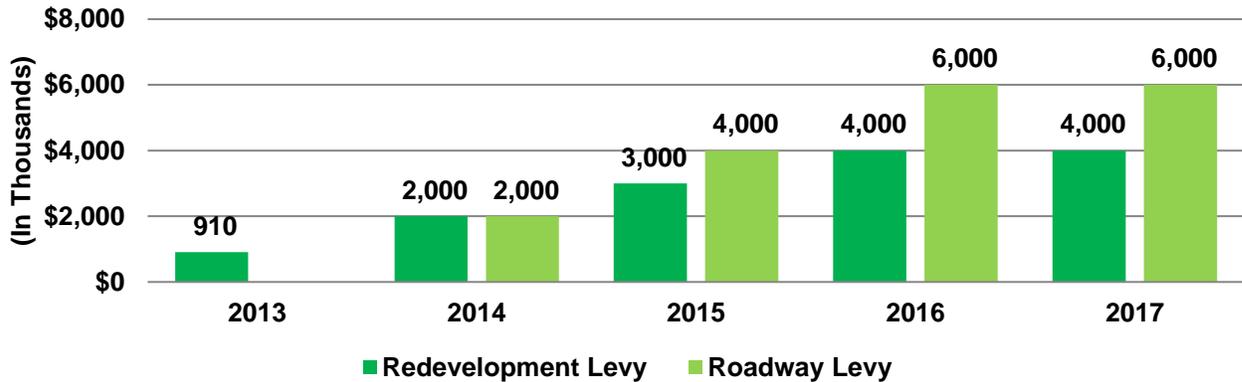


Commercial customers account for just over half of Water and Wastewater's total revenues.

About 63% of revenues are based on volumetric charges and 37% are from fixed charges.

In 2017, total expenditures were 9.8% higher than 2016 due to a spending freeze in 2016, also growth, inflation, additional water treatment processes to meet higher standards, and increased contributions to the Infrastructure Services Capital Reserve. Despite below budget revenues in 2017 due to cool, wet weather, the overall expenditures were below budget resulting in the positive balance of \$3.0 million, which was allocated to the Water and Wastewater Revenue Stabilization Reserve and to Capital Reserves.

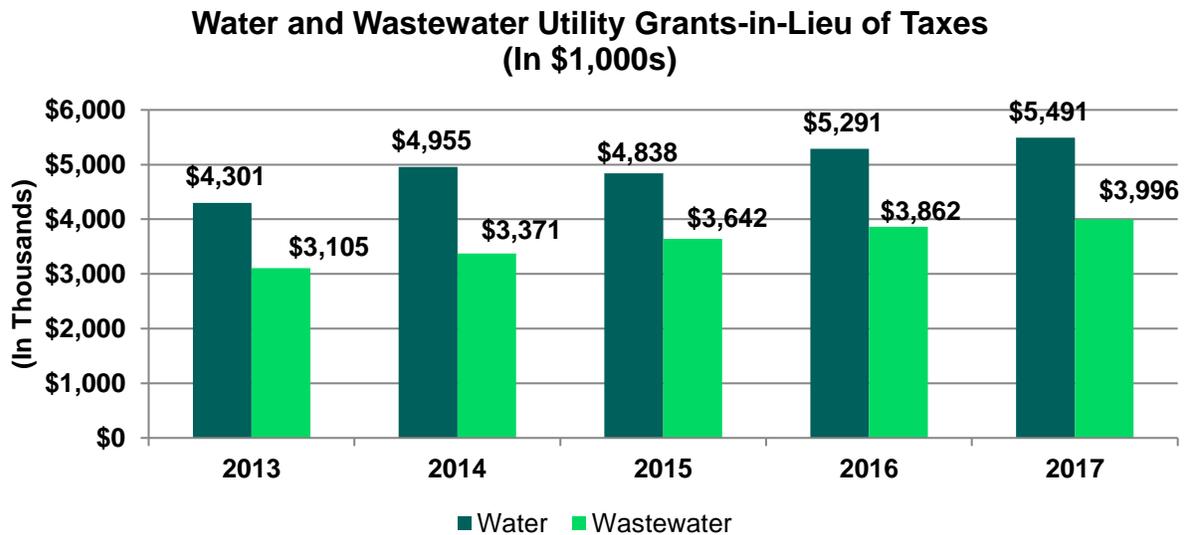
Redevelopment and Roadway Levy Phase-In Budget (In \$1,000s)



Funding to Roadways & Operations and Water & Waste Stream to deliver the day-to-day operation and maintenance of the water distribution, collection, and drainage systems accounted for 14% of total expenditures. Funding for the Infrastructure Services Capital Reserve accounted for another 25% of expenditures, and in 2017, Saskatoon Water paid \$6.675 million (4.7%) ROI. 2017 is the second year of a five-year phase-in plan to establish an ROI from the Water and Wastewater Utilities to 10% of metered and fixed revenue.

The Infrastructure Levy was originally implemented to fund the Infrastructure Services Capital Reserve for water distribution and wastewater collection system rehabilitation and replacement projects needed to address aging infrastructure (e.g. eliminate the water main replacement backlog to meet current service levels). In 2013, a Redevelopment Levy was added to the Infrastructure Levy, with a four-year phase-in period to generate \$4.0 million annually by 2016. In 2014, a Roadway Levy was added to the Infrastructure Levy with a three-year phase-in period to generate \$6.0 million annually by 2016. The new levies accounted for \$10.0 million in 2017.

The Water and Wastewater Utilities paid \$9.48 million in 2017 to the City as a Grant-in-lieu of Taxes.



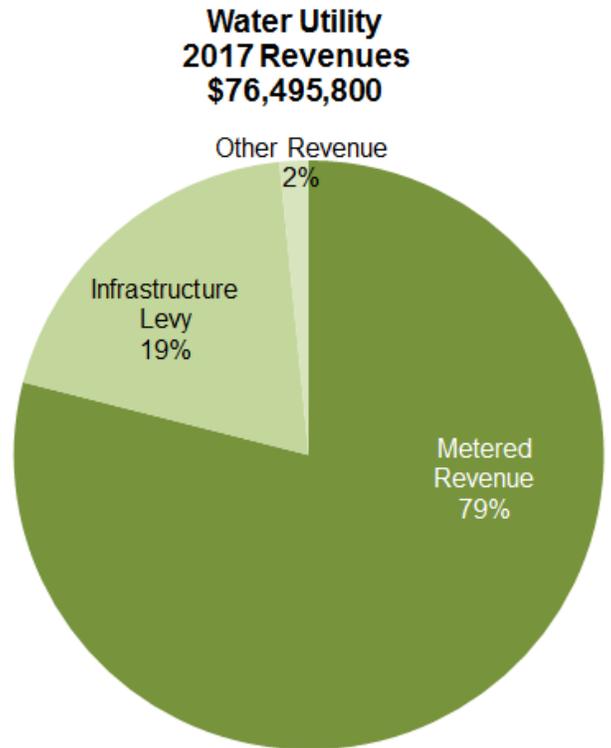
The Water and Wastewater Utilities had a positive variance of \$3.0 million, of which, \$469,741 was allocated to maximize the allowable balance in the Water and Wastewater Revenue Stabilization Reserve and the remainder was transferred to capital reserves to support capital projects and reduce debt requirements.

3.3 Water Utility

Revenues

The Water Utility's 2017 total revenues of \$76.5 million were \$474,000 or 0.6% less than budgeted. Total revenues were \$6.0 million or 8.5% more in 2017 than in 2016. Infrastructure Levy revenues, a volumetric charge, increased by 36.2% in 2017.

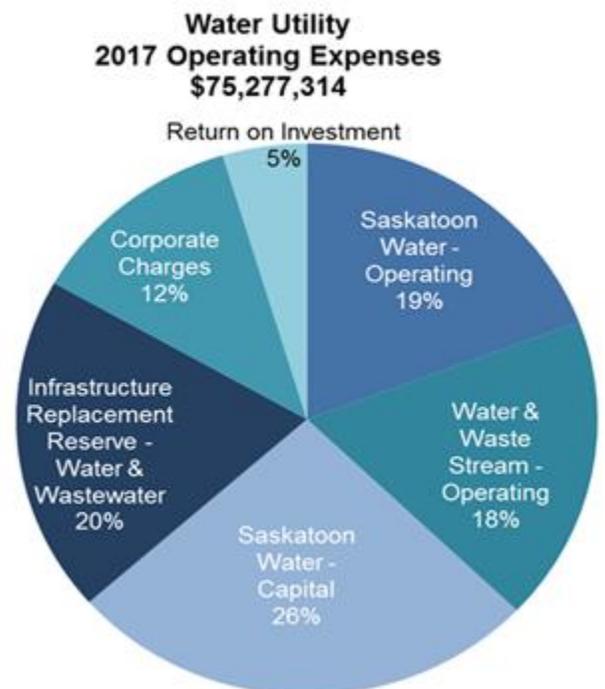
Other revenues included the fire protection charge, late payment penalties, and some miscellaneous revenue.



Expenses

The Water Utility's \$75.2 million expenses in 2017 included the following:

- Saskatoon Water Operating expenses, of \$14.5 million, include water treatment, pumping, storage, Meter Shop, administration, and general expenses incurred by Saskatoon Water.
- Water & Waste Stream Operating expenses, of \$13.4 million, include funding to Water & Waste Stream to operate and maintain the water distribution system.
- Saskatoon Water Capital, of \$19.8 million, funds all capital work related to the WTP and reservoirs, including debt servicing costs.
- Infrastructure Replacement Reserve – Water and Wastewater, of \$14.9 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 \$9.1 million, include the Grant-in-Lieu of taxes, cross-charges for customer billing and collections, and corporate administration.
- ROI, of \$3.5 million. 2017 is the second year of a five-year phase-in plan to establish an ROI from Water Utility based on 10% of metered and fixed revenue.



The Water Utility's 2017 total expenses were 2.2% under budget, primarily due to a discretionary spending directive and a hiring freeze and were 9.6% more than in 2016, reflecting the 2016 spending freeze, inflation, higher costs for additional new treatments, increased maintenance, and increased contribution to the Infrastructure Services Capital Reserve.

Financial Statement

Water Utility			
Operating Revenues and Expenses			
(\$1000s)			
	2017 Budget	2017 Actual	2016 Actual
Revenues			
Metered revenue	\$ 61,183	\$ 60,413	\$ 58,426
Infrastructure Levy	14,775	14,864	10,910
Other revenue	1,012	1,219	1,168
Total Revenue	\$ 76,970	\$ 76,496	\$ 70,504
Expenses			
Water Treatment, Pumping, Storage	\$ 13,292	\$ 11,347	\$ 10,481
Water Meters	\$ 1,819	\$ 1,600	1,606
Water Administration & General	\$ 1,755	\$ 1,559	2,377
Corporate Services	\$ 3,652	\$ 3,619	3,638
Distribution (Public Works)	\$ 12,698	\$ 13,476	11,598
Capital Charges	\$ 19,964	\$ 19,799	21,040
Provision to Infrastructure Services Capital	\$ 14,775	\$ 14,864	10,910
Grants-in-lieu of Taxes	\$ 5,491	\$ 5,491	5,291
Return on Investment	\$ 3,523	3,523	1,740
Total Expenses	\$ 76,970	\$ 75,277	\$ 68,682
Revenues less Expenses	\$ -	\$ 1,218	\$ 1,823
(To)/From Stabilization/Capital Reserves	\$ -	\$ (1,218)	\$ (1,823)

The positive balance of \$1.2 million was allocated to the Water and Wastewater Revenue Stabilization Reserve and to Capital Reserves.

3.4 Wastewater Utility

Revenues

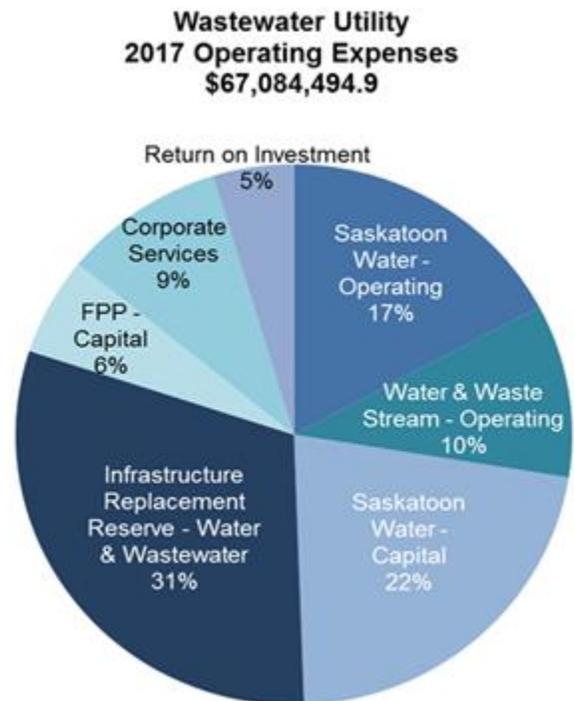
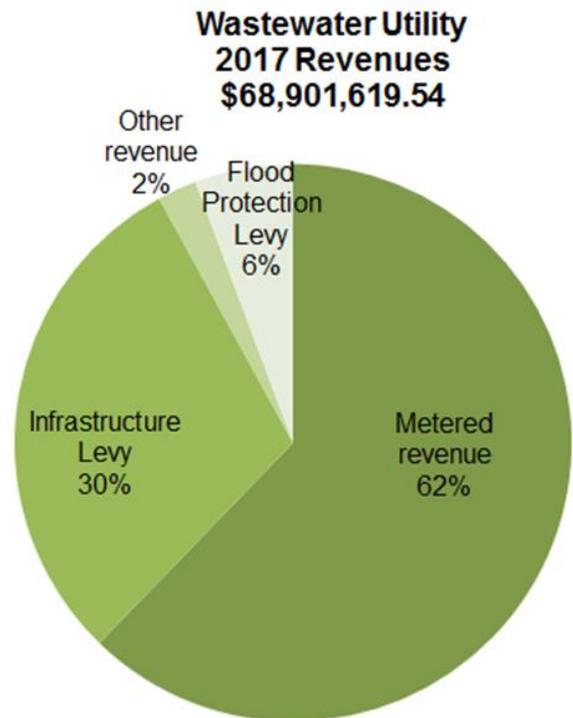
The Wastewater Utility's 2017 revenues, of \$68.9 million, were about 1.6% less than budgeted.

Revenues increased by 10.2% from 2016 due to rate increases including the Roadways and Redevelopment Levies. The plant also received more revenues from liquid waste haulers due to its growing industry.

Expenses

The Wastewater Utility's 2017 expenses of \$67.1 million included the following:

- Saskatoon Water Operating expenses, of \$11.5 million, include wastewater treatment, pumping, sludge handling and disposal, administration, and general expenses incurred by Saskatoon Water.
- Water & Waste Stream Operating expenses, of \$7.0 million, include funding to Water & Waste Stream to operate and maintain the wastewater collection system.
- Saskatoon Water Capital, of \$14.6 million, funds capital work related to the WWTP.
- Flood Protection Program (FPP) Capital, of \$3.9 million, funds projects that reduce sewer back-ups during major storms.
- Infrastructure Replacement Reserve – Water and Wastewater, of \$20.5 million, funds capital replacement of the wastewater collection systems, roadway damage associated with the utility, and wastewater upgrades for core areas.
- Corporate Charges, of \$6.3 million, include the Grant-in-lieu of Taxes, cross-charges for customer billing and collections, and corporate administration.
- ROI, of \$3.2 million. 2017 is the second year of a five-year phase-in plan to establish an ROI from Wastewater Utility based on 10% of metered and fixed revenue.



The Wastewater Utility's 2017 expenses were 4.2% less than budgeted and about 10% more than in 2016, which reflected the 2016 spending freeze, the increase to the Infrastructure Replacement Reserve – Water and Wastewater, and inflation.

Financial Statement

Wastewater Utility Operating Revenues and Expenses (\$1000s)			
	2017 Budget	2017 Actual	2016 Actual
Revenues			
Metered revenue	\$ 44,515	\$ 42,881	\$ 41,948
Infrastructure Levy	20,404	20,518	15,066
Other revenue	1,083	1,568	1,605
Flood Protection Levy	4,000	3,934	3,899
Total Revenues	\$ 70,001	\$ 68,902	\$ 62,518
Expenses			
Wastewater Treatment	\$ 8,992	\$ 7,662	\$ 7,262
Wastewater Lift Stations	1,738	1,585	1,522
Wastewater Sludge Handling & Disposal	1,941	1,443	1,789
Wastewater Administration & General	809	825	1,454
Corporate Services	2,353	2,331	2,345
Collection (Public Works)	8,157	6,957	7,351
Capital Charges	14,785	14,680	15,160
Flood Protection Program	4,000	3,934	3,899
Provision to Infrastructure Services Capital	20,404	20,518	15,066
Grants-in-lieu of Taxes	3,996	3,996	3,862
Return on Investment	2,827	3,152	1,260
Total Expenses	\$ 70,001	\$ 67,084	\$ 60,971
Revenues less Expenses	\$ -	\$ 1,817	\$ 1,548
(To)/From Stabilization/Capital Reserves	\$ -	\$ (1,817)	\$ (1,548)

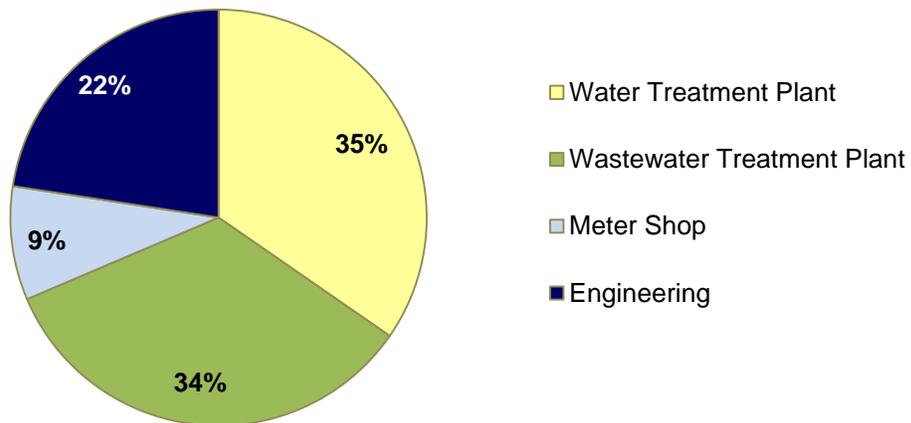
The positive balance of \$1.8 million was allocated to the Water and Wastewater Revenue Stabilization Reserve and to Capital Reserves.

4.0 OUR PEOPLE

4.1 Number of Employees

Saskatoon Water had 165 employees as of December 2017. The graph shows the distribution in major areas. (Engineering includes Engineering Services and Engineering & Planning sections.)

**Employee Distribution within
Saskatoon Water**



Water & Waste Stream had 237 employees as of December 2017 and Major Projects & Preservation had five.

4.2 Representative Workforce

Saskatoon Water participated in diversity programs with Employee Experience and Performance and other organizations to increase awareness among under-represented groups of career opportunities with Saskatoon Water. Examples of programs include Gabriel Dumont Institute Work Experience for Aboriginal People, Women in Trades - Grade XII Girls, and Open House for New Canadians.

Relative to goals set in 2014 by the Saskatchewan Human Rights Commission (SHRC) and adopted as corporate targets by the City, Saskatoon Water had a higher proportion of self-declared visibility minority employees and lower proportions of employees who self-declared as Aboriginal, female, or with a disability as of December 2017.

Percentage of Employees Self-Declared as an Equity Group Member December 2016			
Equity Group	Saskatoon Water	City of Saskatoon	SHRC Goal
Self-Declared as Aboriginal Ancestry	5.1%	7.1%	14.0%
Self-Declared as Visible Minority	16.5%	11%	11.0%
Self-Declared as Person with Disability	2.5%	3.7%	12.4%
Self-Declared as Female	17.1%	37.0%	46.0%

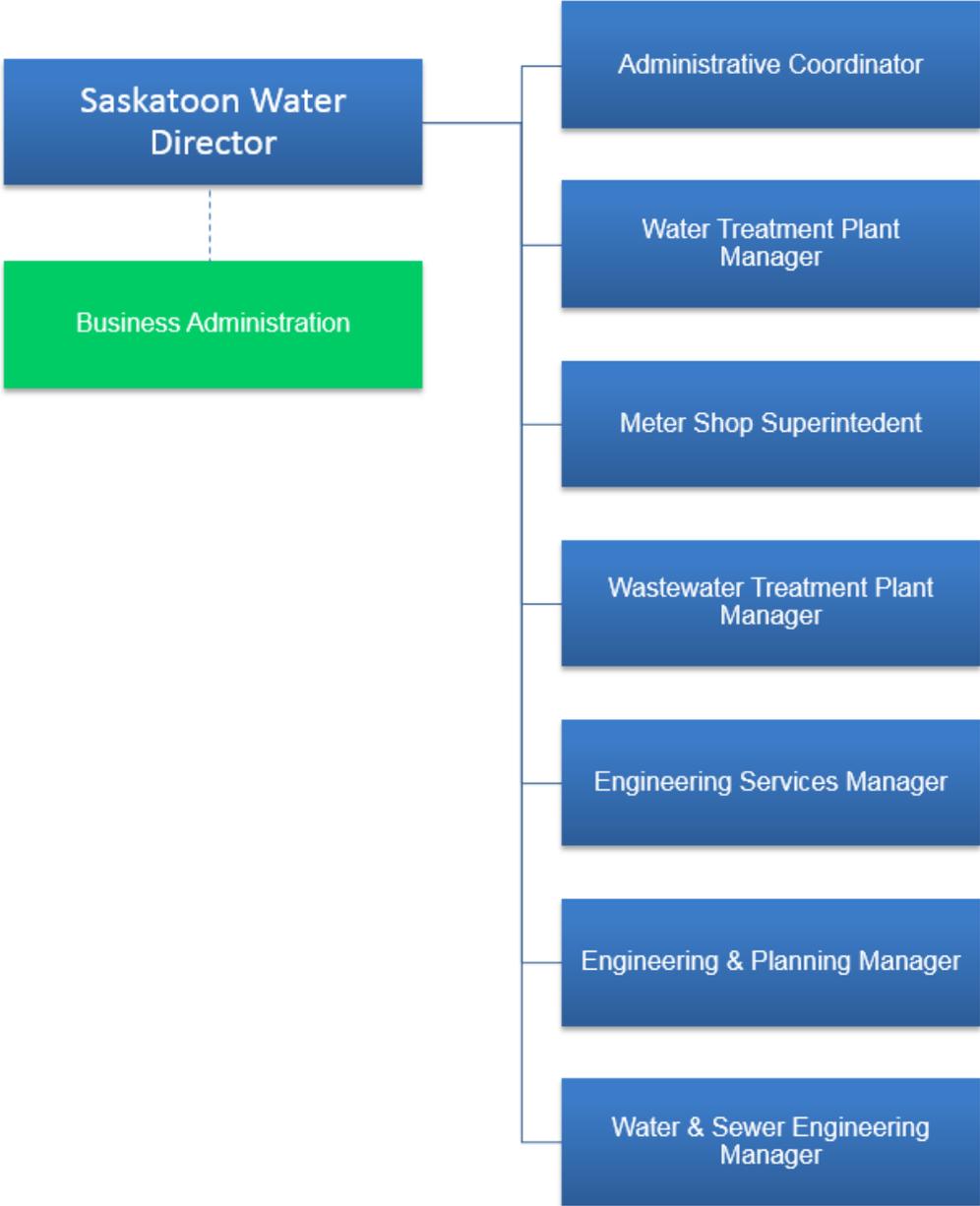
The chart below summarizes the progress made in 2017 by the City of Saskatoon toward its long term strategy to “offer an inclusive workplace that embraces diverse backgrounds.”

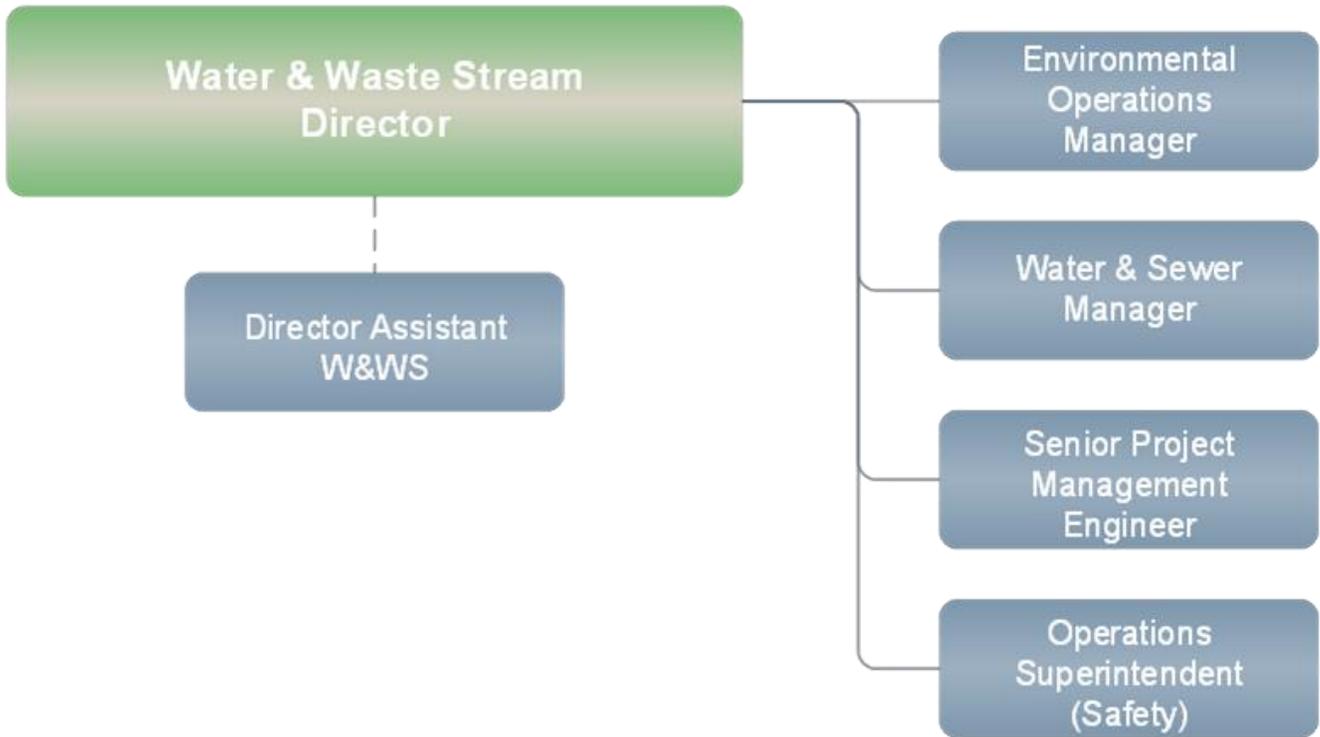
This report is based on the City’s workforce as at July 31, 2017, and December 31, 2017. The July 31st reporting date captures a representation of the City’s seasonal and temporary workforce. The December 31st reporting date captures a representation of the City’s permanent workforce. Both of these periods are important due to the significant difference in the total employee population during each of the time frames. The City’s estimated workforce, for the purposes of diversity and inclusion statistics, in July was 3,563. This number decreases to 2,988 in December.

Percentage of Employees Self-Declared as an Equity Group Member			
Equity Group	TARGETS 2017	July 2017	Dec 2017
Self-Declared as Aboriginal Ancestry	14.0%	8.4%	7.1%
Self-Declared as Visible Minority	12.4%	3.7%	3.7%
Self-Declared as Person with Disability	11.0%	10.5%	11.0%
Self-Declared as Female	46.0%	37.5%	37.0%

4.3 Organizational Charts

The following organizational charts provide a high level overview of how Saskatoon Water and Water & Waste Stream are organized and key positions in 2017.

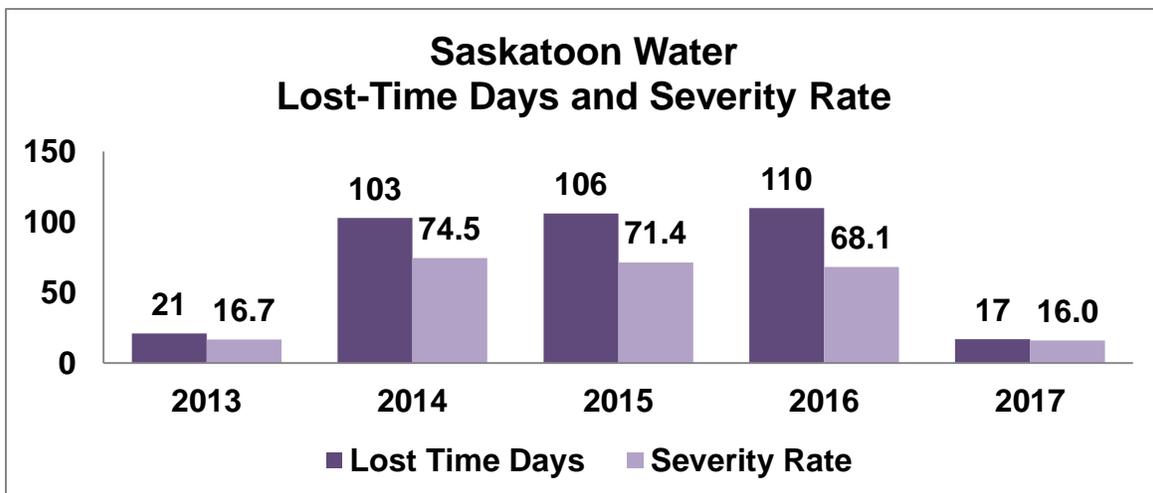
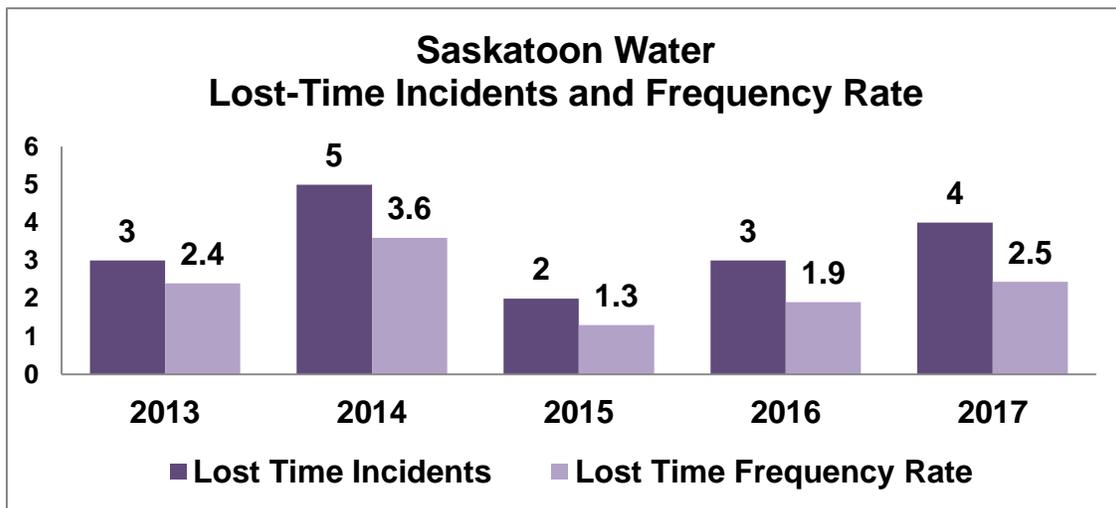




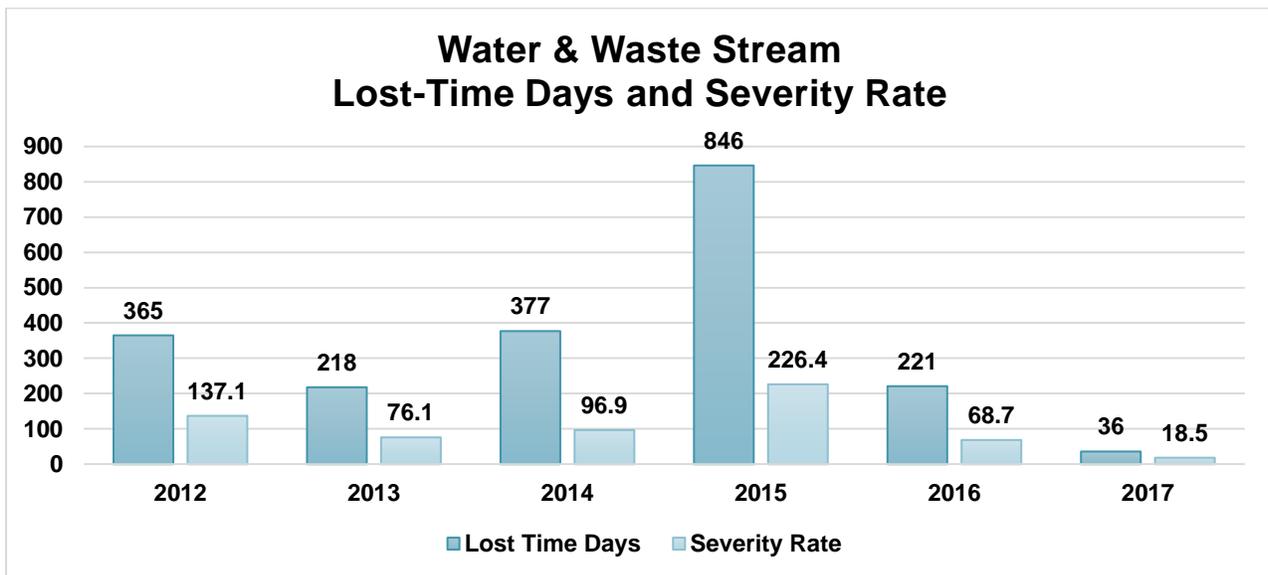
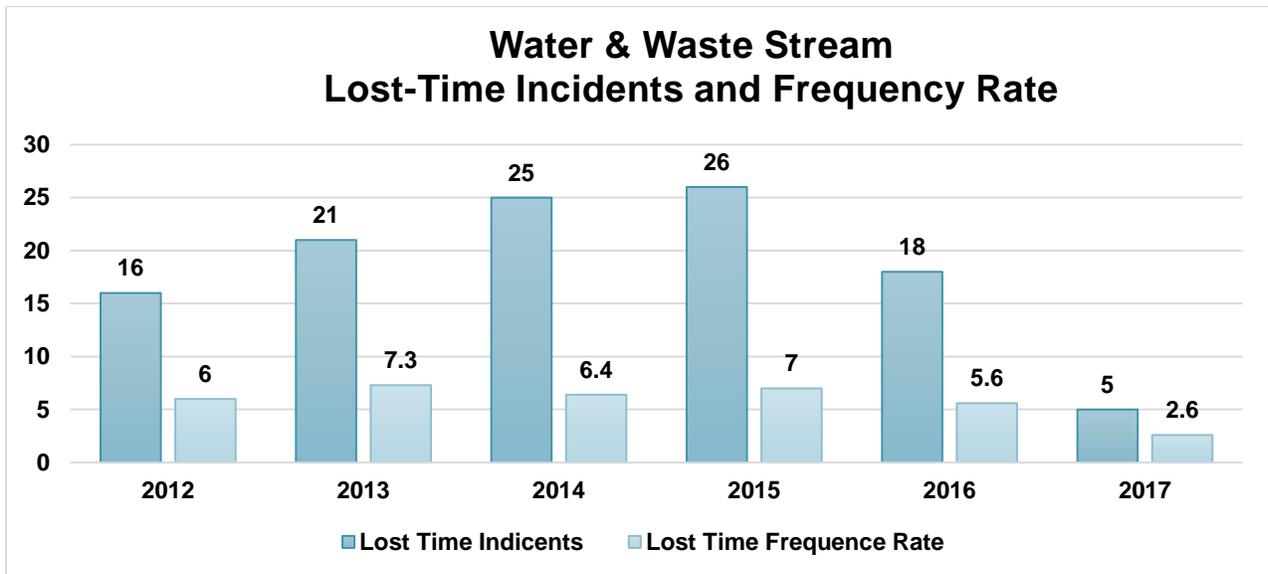
4.4 Employee Safety

Management and staff place a strong emphasis on safety in the workplace to strive to meet the corporate target of zero lost-time injuries. Water & Waste Stream has implemented safety initiatives over the last few years and lost-time injuries have been decreased but not eliminated. Saskatoon Water is currently implementing recommendations from a 2014 safety audit through engagement from management and staff, with the goal of eliminating work-place incidents/injuries. The divisions will continue to follow the Health Management and Safety Program and Disability Assistance Program to support employees from the first day of injury or illness to their pre-injury job or an accommodation.

Saskatoon Water employees' lost-time incidents and frequency rate of 2.5 in 2017 was higher than the 2.28 average for all City employees. Employees had four lost-time incidents in 2017, compared to three incidents in 2016. Although there was a slight increase in lost-time incidents, there was a significant reduction in lost-time days and severity. Staff at the WWTP had zero lost-time incidents in 2016 and 2017.



In 2017, Water & Waste Stream had a lost-time incidents and frequency rate of 2.6, which is significantly lower than the frequency rate of 5.6 for 2016. There was also a significant decrease in the lost-time days and severity rate.



5.0 OUR WORK

5.1 Community Awareness and Engagement

Water Quality Reporting: The Water Security Agency (WSA) requires that at least once each year, Saskatoon Water provide notification to consumers of the quality of water produced and supplied, as well as information on the performance of the waterworks in submitting samples as required by a Minister's Order or Permit to Operate a Waterworks. In compliance with this order, Saskatoon Water produces the [Drinking Water Quality and Compliance](#) report annually.

For general information on water quality, water and wastewater treatment processes, environment, major capital projects, and water conservation, Saskatoon Water posts [Saskatoon Water's Annual Water Quality Report](#) on the City's website.

Guided Tours of Water Treatment and Wastewater Treatment Plants: Guided tours are 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. In 2017, the WTP had 360 people booked on 18 tours and the WWTP recorded 175 participants on 16 tours.

Water Week: Saskatoon's City Council declared March 20 to March 26, 2017 Water Week in Saskatoon, as an opportunity to recognize all of the City staff who each play important roles to keep the drinking water, storm water, and sanitary sewer systems running smoothly and citizen satisfaction high. The City hosted its first live Facebook chat called *Why Infrastructure Renewal Matters* and invited local media on a tour of the Water Treatment Plant and Avenue H Reservoir.

Advanced Metering Infrastructure System: Water meters with a new communication module installed will improve billing for customers utilizing remote meter reading and monthly billing based on current usage, not estimates. Installations are occurring by neighbourhood and citizens can book an appointment online or by calling the AMI Customer Service Centre once they receive a notification letter. Improvements have been made to staff productivity by securing adequate field programming equipment required for staff to complete installations of AMI modules independently. This coupled with proactive calling of residents to schedule appointments resulted in higher installation rates within targeted neighborhoods.

Water & Sewer Videos: In 2017, Water & Sewer shared in the development of an internal video used in the orientation of new employees to demonstrate how frequently the average citizen encounters or uses a City service. A second video was developed in partnership with Service Saskatoon to help customers understand what to do when a sanitary sewer service backs up, including what to expect when a maintenance crew is requested to inspect the sanitary sewer connection.

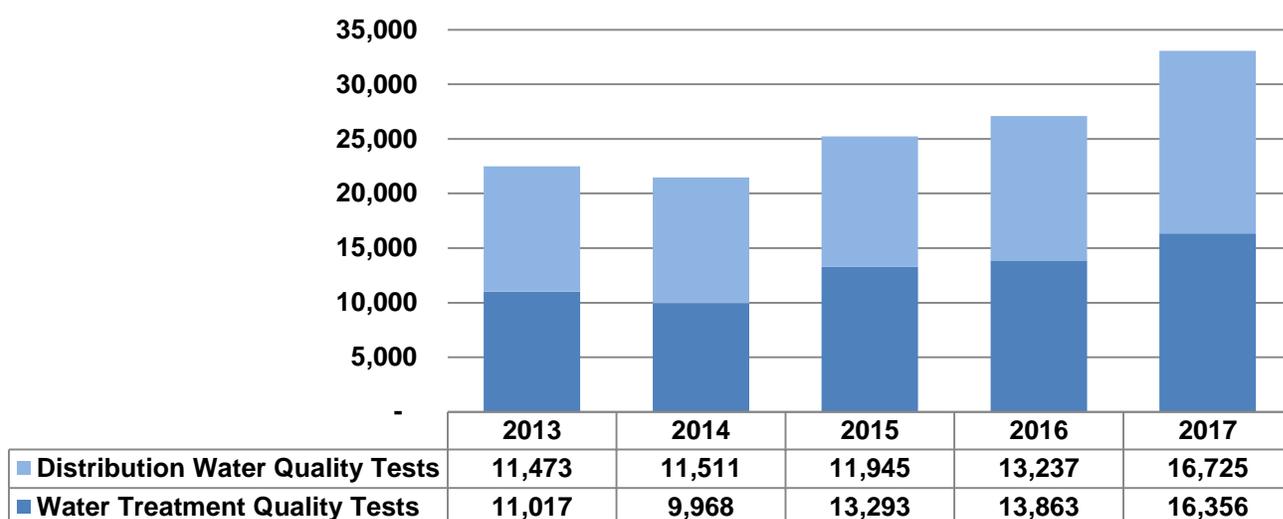


5.2 Operating Highlights

Water Quality: The City’s water treatment and distribution systems are regulated by a “Permit to Operate a Waterworks” issued by the Water Security Agency (WSA). Our drinking water quality is further regulated by Health Canada’s *Guidelines for Canadian Drinking Water Quality* and Saskatchewan Environment’s *The Water Regulations, 2002*. Water quality is closely monitored 24 hours a day, 365 days a year.

The WTP’s comprehensive Maintenance and Equipment Inspection Program meets the highest standard in North America. In 2017, a total of 16,356 water treatment quality tests and 16,725 distribution water quality tests were conducted by our WTP Laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Additional quality tests were conducted at every step of the treatment process for a total of over 33,000 tests.

Number of Water Quality Laboratory Tests



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.

Water Distribution System Values						
	2013	2014	2015	2016	2017	Allowable Values
Yearly Total Chlorine Median (mg/L)	1.8	1.78	1.83	2.00	1.93	> 0.5
Yearly Turbidity Median (NTU)[1]	0.12	0.14	0.18	0.13	0.11	< 1.0
0.12	0	0	0	0	0	0

In addition to the *Drinking Water Quality and Compliance* report, the *2016 Waterworks System Assessment* was completed to meet the WSA’s requirements for a thorough

five-year reporting of the WTP and distribution system. 2017 capital and maintenance work addresses issues identified in the condition assessment report.

Wastewater Quality: 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 is further regulated by Saskatchewan Environment’s *Sewage Works Regulations, 2010, Saskatchewan Environmental Code, 2015*, and the *Federal Wastewater System Effluent Regulation, 2012*. Final effluent water quality is closely monitored 365 days a year.

The WWTP’s comprehensive Maintenance and Equipment Inspection Program meets the highest standard in North America. Environmental Laboratory is a CALA accredited laboratory to ISO/IEC 17025:2005 standard. In 2017, a total of 10,828 tests were conducted in relation to WWTP Permit to Operate a Sewage Works and over 10,000 tests for the WWTP process control. Environmental laboratory also conducted over 4,500 water quality tests for other monitor and sampling programs such as groundwater, ponds, storm water outfalls, industries, and the river.

The following table shows the results of some of the many types of testing completed by Saskatoon Water, which are well below the maximum allowable values under the Permit to Operate a Sewage Works.

Wastewater Distribution System Values						
	2013	2014	2015	2016	2017	Wastewater Effluent Standard
Yearly Median CBOD ⁴	4.6	4.3	3.9	3.4	3.5	<25 mg/L
Yearly Median TSS ⁵	8.8	10	8	7.2	7.3	<25 mg/L
Yearly Median Total Phosphorous (TP)	0.26	0.24	0.2	0.247	0.31	<0.75 mg/L
Yearly Median E.coli ⁶	<10	<10	<10	<10	<10	<200 mpn/100mL

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.

⁴ 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.

Sewer Main Maintenance Operations: Performs two types of maintenance activities. 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 14 km of sanitary sewer mains were brushed, and 68 km of sanitary sewer mains were cleaned using flushing. Approximately 4 km of storm sewers were flushed.

5.3 Capital Projects

The Water and Wastewater Utilities funded 82 capital projects in 2017, budgeted at \$267.6 million, of which, \$110 million is unspent. The following table summarizes the active capital projects by section:

Active Capital Projects as of December 31, 2017			
Section	# of Active Projects	Approved Funding	Unspent Funding
Water Treatment	33	\$158,115,908	\$56,811,302
Wastewater Treatment	38	\$ 89,383,223	\$53,191,264
Major Projects & Preservation	11	\$ 20,107,000	\$ 0.00
Total	82	\$267,606,131	\$110,002,566

The following section describes some of the major capital projects funded by the water-related utilities.

Water Treatment Plant Transfer Pumping and Electrical Upgrades: Detailed design was nearing 50% completion in December 2017, with tendering planned for May 2018. The project will replace the short term transfer pumping system, increasing efficiency, and address single points of failure within the electrical system.

Water Treatment Plant Filter Plant Upgrade: Construction work began in June 2017 on this \$2.0 million project. The work includes replacement of corroded material, removal of piping, and aesthetic upgrades to the plant filter banks.



Filter Plant Upgrades

Water Treatment Plant Source Water Resiliency Study: A request for proposals was issued in 2017 for consultants to review the threat of source water contamination within the South Saskatchewan River. Results from the study will assist capital planning and develop mitigation processes should an event occur.

Advanced Metering Infrastructure: AMI is used to transmit electrical and water consumption data directly from individual meters to the utilities. The most immediate benefit to consumers is their monthly bill is based on actual consumption as opposed to estimates. The water portion of the project is currently funded at \$11.7 million and is 29.3% complete as of 2017 year-end.

Wastewater N40 Cell 1 Relining: Relining of Cell 1 at the North 40 was designed and construction was completed in November 2017. A bentonite liner with concrete surface protection was installed to extend the life of the cell. Upgraded piping was installed to connect the cell to the overall process through the existing valve house.

Wastewater Treatment Plant Digester and Heating Upgrade: A request for proposal was issued in 2017 for engineering services to design and manage construction of a fourth digester tank as well as heating system upgrades at the WWTP. Construction of the project is expected to start in early 2019.

Lift Station Upgrades: This is an ongoing project for the upgrades and refurbishment of the 24 lift stations in the city. In 2017, lift station assessments were undertaken on all the stations to set a baseline on condition and assist in identifying upgrade work and priority.



Spadina Lift Station

Fletcher Road Force Main Design: Capacity constraints were identified within the existing sanitary system on Fletcher Road. Design was completed to twin the sanitary sewer and upsize the sanitary force main on Fletcher Road. Construction of a new 300 mm sanitary sewer and 300 mm shallow bury force main with insulation was completed in 2017.

Long Term Capital Development and Expansion Planning: Master planning work for the water distribution system, fill mains, and reservoirs within city limits, as well as for the region was completed in 2016. Sanitary and storm planning for growth within city limits and further into regional growth areas continued in 2017.

Nodes and Corridors Capacity Study (Growth Plan): A water and sewer capacity analysis was completed for the major nodes and corridors within the Growth Plan. The monitoring equipment were installed at Corridors as well as off Corridors locations with potential capacity constraint. The monitoring data was analysed and used to validate

the modelling results. The capacity assessment maps and proposed upgrades with their associated costs were prepared. This project is in last stages with consideration of some changes for the densifications along the Nodes and Corridors and some additional densification along the proposed new Bus Rapid Transit routes.

Water Distribution and Sewer Collection Assets: Water and Sewer preservation programs are selected annually based upon the condition of assets (water and sewer mains and service lines) as well as approved levels of service and funding plans. Funding for these programs comes from the Water and Wastewater Infrastructure Levies and the Storm Utility.

The City has the following annual programs for preservation of water and sewer assets;

- **Water Main Replacement:** 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.
- **Water Main Lining:** Targets water mains that have had high amounts 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. Water main lining is only used on water mains where capacity is not a concern, there are minimal lead services, and the road surface is not scheduled for a preservation treatment. Small excavations are required at each end of the work limits, as well as at hydrants and valves. From these excavations a liner is pulled inside the existing water main. The liner hardens and seals the pipe against future leaks and water main breaks. The finished liner has the strength and characteristics of a new plastic PVC pipe. Water main lining has traditionally been about 66% of the cost of open trench water main replacement.
- **Sewer Main Lining:** Sanitary and storm sewer mains are visually inspected and assigned condition ratings. Based on these ratings and other risk factors, a long-term rehabilitation strategy has been developed. Lining for sewer mains is the same method as water main except that no excavation is required. Sanitary and Storm mains have access points (manholes) approximately every 150m to 200m that allow for installation of the liner. This method of rehabilitation for sanitary and storm mains has been used in Saskatoon since the 1990's and has been so effective that open trench replacement of sewer mains has been phased out except for in extreme circumstance where a liner cannot be installed.
- **Lead Service Line Replacements:** At current funding levels the remaining lead line inventory in the city will be completely replaced by 2027. In conjunction with the long-term strategy that is being developed for water main replacement, a strategy for all remaining lead line replacements is being developed so that residents will have information on when they can expect their lines to be replaced.

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 emergency basis.

Service lines are replaced using a trenchless method called “pipe-bursting”. This involves excavations above the main line in the street, at the property line, and at the building (either outside the building at the foundation or a small hole in the basement). The old service lines are removed by pulling them out of the ground from excavation to excavation and new service lines are inserted into place in the tunnel created by removing the old lines.

Whenever a lead service line is worked on (planned or emergency), replacement is required from the main line to the water meter. Tar fiber sewer lines are replaced from the main line to property line and the homeowner has the option whether or not to replace their portion.

The City is responsible for costs in the public right-of-way and the property owner is responsible for costs on their property. This cost is split by the City paying approximately 60% of contract costs and the property owner paying approximately 40%. The City has cost deferral programs that the property owner can use to add their costs to their annual property taxes.

2018-2020 Projected Budgets – Major Projects & Preservation

The following table outlines the budgets for 2017.

Program	2017 Budget (\$M)
Water Preservation	\$5.495
Water Capacity	\$0.560
LSL Replacements	\$2.404
Sewer Preservation	\$3.118
Sewer Service Lines	\$0.630
City portion of CWWF** funding	\$7.900
Provincial portion of CWWF funding	\$7.900
Federal portion of CWWF funding	\$15.800
Totals	\$43.807

** Clean Water and Wastewater Fund

5.4 Continuous Improvement Initiatives

Saskatoon Water, Water & Waste Stream, and Major Projects & Preservation are committed to Continuous Improvement (CI) 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 divisions have undertaken the following CI initiatives:

Wastewater Treatment Plant Lab Upgrades: Engineering Services carried out the design and construction management of upgrades to the existing laboratory at the plant. This is in-line with the commitment to take on design work with City resources.

LED Lighting: LED lighting is replacing conventional lighting systems on a continual basis at both the WTP and WWTP. Energy efficiency incentives offered by SaskPower are being utilized to ensure the changes are cost effective and provide low cost maintenance throughout the life cycle.

Lighting Motion Sensors: WTP Staff continue to replace light switches with motion sensors and low power LEDs throughout the plant, reducing power consumption and maintenance requirements.

Sand Separator Instrumentation Upgrades: Instrumentation staff successfully installed a pilot sand separator unit with upgraded instrumentation panel. This improvement was designed and installed by I&C staff in anticipation of full upgrades throughout the building.

WTP Electrical Upgrades: WTP electricians worked closely directing consultants on electrical upgrade requirements throughout the WTP. Plant staff have identified potential risks within the electrical system and have ensured the issues have been addressed in the upcoming Transfer Pumping and Electrical Upgrades Project.

Water and Sewer Maintenance Scheduling Internal Process Review: This review is in the implementation phase. The review team focused on the processes for scheduling and responding to water and sewer incidents. In the previous current state, maintenance and emergency repairs on City water and sewer assets were reactive for the most part. While emergency maintenance will always be reactive in nature this system did not leave the workgroup enough time to fix smaller less emergent issues catalogued in the group's defect log. Through the review, the team is finding efficiencies and improvements in their scheduling processes to allow both; time to address emergencies when they arise and time to tackle smaller issues in the defect log through a planned and preventative maintenance approach. This is a huge step forward as these smaller non-emergent defects can often build on one another and create emergency situations in the water and sewer asset network if left unaddressed over a long period of time.

The Valve App Project: New application being rolled out for internal and external use that provides live information about the status (“on”/“off”) of water infrastructure valves. Using this app reduces miscommunication and saves time for both staff and contractors completing important repair and installation work in the field.

The Water & Waste Stream Key Performance Indicator Dashboard: A project working to integrate all data sources used by the Water & Waste Stream team into a single Power BI dashboard. This dashboard will provide “at-a-glance” information to allow operations to make the best decisions possible for the team at any given time.

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 public expects, and the City of Saskatoon is committed to, responsible watershed management and stewardship. Saskatoon 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 WSA’s “Permit to Operate a Sewage Works”. Phosphorous is the key nutrient the WWTP removes because of its negative impacts on the South Saskatchewan River. The implementation of the Ultraviolet Disinfection Facility, to replace chlorine disinfection, has improved the quality of the final effluent being discharged to the South Saskatchewan River.

ISO/IEC 17025:2005 accreditation from CALA was maintained at both the WWTP Environmental Laboratory and the WTP Laboratory.

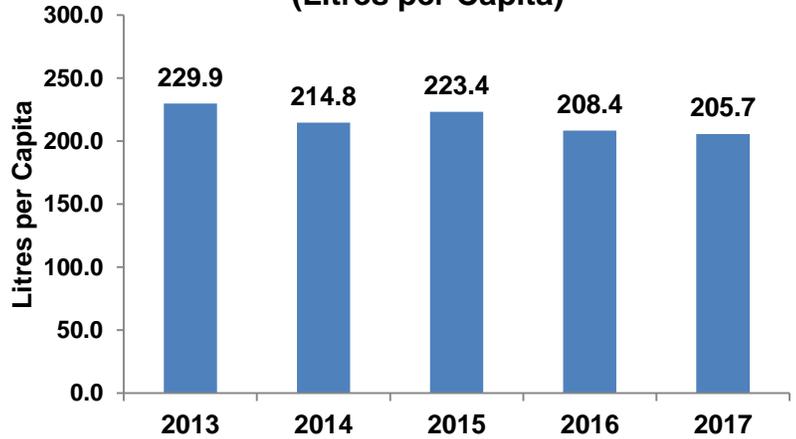
Saskatoon Water and Water & Waste Stream support the Provincial Operator Certification Program, for both the Water and Wastewater Treatment Plants, and the water distribution and collection systems which helps protect both the public and the environment.

6.2 Conservation

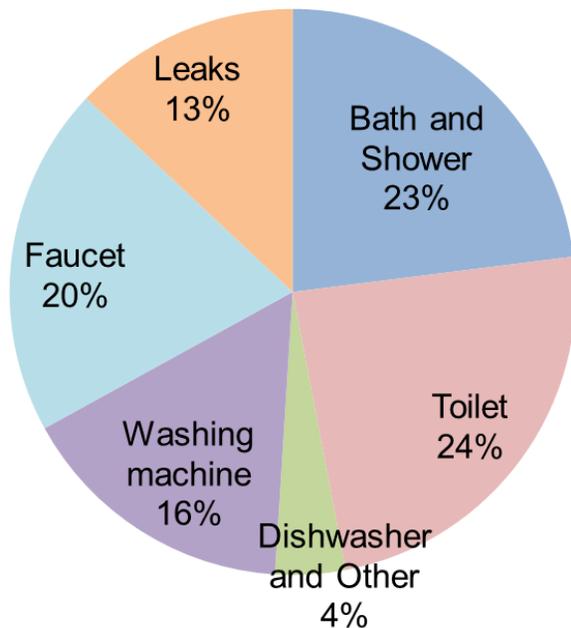
Saskatoon water rates are designed to encourage water conservation in order to defer the need for high capital intensive capacity projects. Customer education to reduce the summer maximum day volume (peak demand management) can also assist in deferring some capital expenditures.

Due to fluctuating seasonal irrigation demands, Saskatoon’s total average annual daily consumption varies significantly from year to year.

Annual Residential Average Daily Consumption (Litres per Capita)



Residential Indoor Water Use



A recent study conducted by the Water Research Foundation shows that indoor household water use in a single family home has decreased by 22% from 1999 to 2016. The City of Saskatoon has experienced a similar downward trend as citizens implement low-flow fixtures.

The chart provides an indication of how indoor water is consumed in average residential homes in Canada and the United States.

Source: Water Research Foundation, April 2016

7.0 OUR CHALLENGES

Saskatoon Water, Water & Waste Stream, and Major Projects & Preservation have been proactive in anticipating and managing the following ongoing challenges it faces:

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 have been higher because of the strong competing demands for contractor services. Saskatoon Water coordinated multiple capital projects, trained staff for new facilities, and identified ways to defer capital expenditures.

Infill Development: Cumulative impacts of infill development are placing higher demands on the carrying capacity of existing water and sewer infrastructure. More infill reduces greenspace and increases surface runoff so appropriate policies are needed to minimize surface flooding.

Age and Condition of Existing Infrastructure: Aging 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 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 and Rainfall: Changing rainfall patterns impact demand for water, with high peak demands during dry stretches. Wet weather conditions also have created drainage issues throughout the city. High groundwater levels have impacted neighbourhood drainage and resulted in east riverbank slumping and slope failure that damaged infrastructure.

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 & Waste Stream 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.

Growth Pays for Growth: As Saskatoon continues to grow, Saskatoon Water continues to explore alternate sources of funding. One such initiative, is “Growth Pays for Growth” in response to the Financial Growth Study. This initiative assigns capital costs that can be directly attributed to the off-site levies paid by developers. Obtaining appropriate funding for infill development, where off-site levies do not apply, will be a challenge for future nodes and corridor growth.

Inadequate Space for Personnel, Materials, and Equipment: Will work towards creating secure and functional space that accommodates people, material, and equipment while still meeting Occupational Health & Safety standards and a growing city. Will continue to renovate existing spaces or use creative alternatives to meet standards until a long-term facility is found. Find effective communication tools to communicate between multiple remote sites. Work with Saskatoon Land and Facilities & Fleet Management to ensure that long-term plans fit with Water & Waste Stream's service delivery under the growth plan to 500,000.

Lack of Integrated Asset Management Approach: Will develop an interim strategy for Water & Waste Stream to manage activities, assets, and inventory and train staff using existing tools so the eventual transition to an Enterprise Resource Plan is easier and there is already life cycle and asset data ready for the system. Continue to support the corporate development of an Asset Management Strategy and Policy.

Lack of Integrated Water & Waste Stream Annual Maintenance Plan: Will complete the development of an annual Water & Waste Stream work plan for each section including labour, materials, equipment (excluding fleet services vehicles), and schedules that are integrated with the other sections.

Non-standard Equipment and Lack of Funding, Replacement Strategies, and Training: Participate in the life cycle decision making process, specifications, and procurement. Identify what our equipment needs are, standardize equipment and identify what funding is required to meet levels of service. Update, improve, and expand all equipment training and maintenance programs. Develop service agreements with service providers where appropriate. Develop a fleet life cycle management plan including, expansion, proactive maintenance, and optimized replacement.

Inability to Track Work Done to Assets and Difficulty in Determining Success: Complete the interim asset management solution as defined above including cleanup of outstanding items and maximize effective reporting of benchmarking data through Key Performance Indicators programs.

Staff Development and Retention: Increase horizontal movement capability and create processes to allow for a more versatile staff. Work on staff engagement, succession planning, celebrating successes, shift balancing, and continue on Water & Waste Stream culture change. Implement staff and supervisor development programs and Individual Development Plan process for all staff while continuing to monitor our career paths and job descriptions.

8.0 CONCLUSION

Saskatoon Water has long-term strategic capital development and expansion plans. Water & Waste Stream and Major Projects & Preservation have long-term maintenance and asset management plans in place outlining levels of service and funding for annual maintenance and rehabilitation programs. Through its approved 2017 Operating Budget and the approved five-year Capital Plan, the City of Saskatoon was able to maintain operations and fund capital projects related to treated water and wastewater quality, city growth, and regulatory matters.

The success of Saskatoon Water, Water & Waste Stream, and Major Projects & Preservation is dependent on the dedication and skills of our employees, and their efforts are greatly appreciated. Our competent team of plant operators, tradespersons, maintenance staff, engineers, technologists, technicians, chemists, and administrators play a crucial role. The guidance and support of the General Manager, City Manager, and City Council is appreciated.

The staff of these divisions look forward to the challenges and the opportunities that the future will provide.

9.0 APPENDICES

Appendix One: Water and Wastewater Infrastructure

The replacement value of all water and wastewater infrastructure was estimated at over \$7.4 billion (2014 dollars). An update to the valuation of the WTP, water intakes, and reservoirs is planned in the near future.

The WTP and assets associated with water distribution have an estimated value of \$3.4 billion.

The WWTP and assets associated with the sanitary sewer collection system has an estimated replacement value of \$4.0 billion.

The **Water Distribution System** is used to deliver potable water from the WTP. The system is composed of approximately 1,175 km of water mains, 14,803 valves, 7,349 hydrants, and 71,500 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 1,062 km of gravity sewer mains, 52 km of pressurized force mains, 11,703 manholes, and 71,100 service lines.

Water Utility Assets		
Asset	2017 Inventory	Replacement Value (\$M)
Water Treatment Plant, Water Intakes and three Reservoirs		\$ 600
Water Pipes	1,175 km	2,073
Valves	14,803	175
Hydrants	7,349	76
Service Connections	71,500	519
Total		\$ 3,443
Wastewater Utility Assets		
Asset	2017 Inventory	Replacement Value (\$M)
Wastewater Treatment Plant		\$ 500
Lift Stations	24	132
Wastewater Pipes	1,062 km	2,686
Manholes	11,703	208
Forcemains	52 km	98
Service Connections	71,100	393
Total		\$ 4,017

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.

Appendix Two: Understanding Your Residential Water-Based Utility

Account Number: 123456789

Detail Summary for

		A	Water, Sewer, & Infrastructure		
Usage at Meter # 20161234			<u>Water Service Charge</u> 0.4615 per day for 32 days	14.77	
Customer Reference #			Residential Water		
Last Billed Read Jan 16	132.1	B	First 326.66 ft ³ x 0.03207 per ft ³	10.48	
Actual Read on Feb 01	137.02		Total Water.....		\$25.25
Estimate to Feb 17	141.35		<u>Sewer Service Charge</u> 0.4615 per day for 32 days	14.77	
Meter Consumption			Residential Sewer		
Billing Multiplier	35.3146		First 326.66 ft ³ x 0.01879 per ft ³	6.14	
Billed Consumption (ft ³)	326.66		Total Sewer.....		\$20.91
Total Billed Consumption	326.66		<u>Temp Flood Protection Chg</u> 0.1478 per day for 32 days	4.73	
		C	Residential Infrastructure		
			First 326.66 ft ³ x 0.02311 per ft ³	7.55	
			Total Infrastructure.....		\$12.28
		D	Total Water, Sewer & Infrastructure.....		\$58.44
			Billing Period: Jan 16 2016 - Feb 17 2016		
<hr/>					
		E	Storm Water Management		
			<u>Storm Water Mgt Charge</u> 0.1445 per day for 31 days	4.48	
			Total Storm Water.....		\$4.48
			Billing Period: Jan 17 2016 - Feb 17 2016		

Bill

A. Water Service Charge: The fixed monthly charge for a 5/8 inch water meter is \$9.36, and for a 3/4 inch meter is \$14.04. The fee is prorated by the number of days in the month

A second water service charge is based on water usage (volumetric): \$3.207 per 100 ft³ for the first 600 ft³, \$3.57 per 100 ft³ for the second 600 ft³ and \$4.70 per 100 ft³ for over 1,200 ft³. The water service charges are used to fund water utility operations and capital projects.

B. 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 58.6% of the water volumetric charge. Rates are set on a cost recovery basis and recognize that not all water returns to the sanitary sewer: \$1.879 per 100 ft³ for the first 600 ft³, \$2.092 per 100 ft³ for the second 600 ft³ and \$2.754 per 100 ft³ for over 1,200 ft³. Sewer service charges fund wastewater operations and capital projects.

C. Temporary Flood Protection Charge: The charge is a fixed fee of \$4.50 per month, prorated by the number of days in the month. The fee is charged on each water meter until December 2018. The charge is used to upgrade the sanitary sewer system to reduce the risk of sewer back-ups during severe rain events.

D. Residential Infrastructure: The fee is \$2.311 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.

E. Storm Water Management Charge: The monthly charge for residential properties is a fixed amount of \$4.40 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.

Appendix Three: Abbreviations

AMI – Advanced Metering Infrastructure

CALA – Canadian Association for Laboratory Accreditation Inc.

CBOD - Carbonaceous Biochemical Oxygen Demand

CFU – Colony Forming Unit

CI – Continuous Improvement

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

Appendix Four: Glossary

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

Backflow Prevention Device: 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 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.

Grant-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.

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.

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

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.

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.