

2018 ANNUAL WATER QUALITY REPORT



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Access to Safe Quality Drinking Water – Your Expectation, Our Responsibility

The City of Saskatoon is proud to present the 2018 Annual Water Quality Report. This year's report covers details of the water treatment process, water quality test results, watershed protection, capital and operational development plans for the future, as well as many other initiatives and water quality topics.

Our citizens and customers expect high water quality. Through the ongoing dedication of our water quality team, we continue to provide safe, high-quality drinking water that adds to the quality of life in Saskatoon. As a water customer, you can do your part as a responsible environmental steward to protect and conserve our water resource through properly disposing of household hazardous wastes, being careful what goes down storm drains, and by using water responsibly.

The planning and construction of several facility expansions and process improvements are well underway. Intensified staff training and improved documentation have been undertaken as part of our succession management planning. These initiatives will enable us to continue to provide the highest standards for water quality and to meet the water demands of Saskatoon's expanding population.

We are proud to report that our drinking water surpassed all Health Canada and Water Security Agency water quality guidelines for 2018. For more information, you can visit our website at www.saskatoon.ca. If you have any further questions with regard to the information contained in this report or any aspect of water service delivery, please contact us at 306.975.2534.

Sincerely,

Reid Corbett, Director
Saskatoon Water

The Water Treatment Process

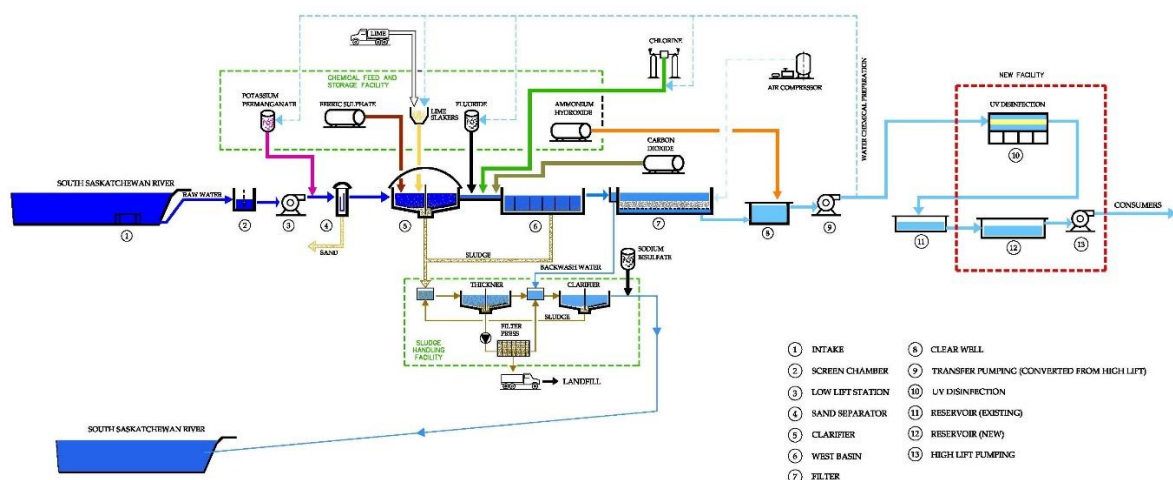
Treating and supplying quality water to Saskatoon and area residents require highly trained personnel, constant monitoring, and extensive infrastructure. Our competent team of plant operators, tradespersons, maintenance staff, engineers, technologists, chemists, and administrators all play an important role in the delivery of water to your household.

Every step of the water treatment process, from initial raw water intake to delivery to your tap, is as important as the next. The City of Saskatoon works hard to ensure its practices and treatment methods are of the highest quality, while continuing to work to reduce our impact on the environment.

The Raw Water Intake and Pump Station Facility is the primary raw water supply system for the City's Water Treatment Plant. Commissioned in 2012, the facility is a source of high-quality raw water and provides capacity to ensure that current and future raw water peak demands are met. In 2015, the Avenue H Reservoir and Pumphouse Expansion and 42nd Street Reservoir projects were completed, increasing water storage capacity from 42 to 83 million litres. This additional capacity will help manage peak demands, such as in the mornings and dinner time.

The Water Treatment Plant uses a multi-barrier water treatment process to ensure high-quality water is maintained as it travels from the South Saskatchewan River, through the stages of the treatment plant, and into the distribution system to your tap. In addition, each component of the treatment process is duplicated to provide redundancy in emergency situations to prevent a single point of failure.

The Water Treatment Process



The Path our Water Takes

Raw water intakes in South Saskatchewan River – Water Treatment Plant – Water Reservoirs and Pumping Stations – Water Distribution System – The Consumer – Wastewater Collection System (Sewer pipes) and Lift Stations – Wastewater Treatment Plant – Outfall to the South Saskatchewan River

Water Standards and Testing

Did you know your tap water is monitored and regulated more closely than most bottled water to ensure the highest quality and standard? If you are looking for freshness and quality from your water, you can't find much better than Saskatoon's tap water. And tap water costs less than a penny per litre!

Highly trained and certified operating staff closely monitor the Water Treatment Plant and reservoir operations 24 hours a day, 365 days a year, to ensure the quality, safety, and reliability of our water supply. The City of Saskatoon is proud to have many of our operators certified to Level 4, the highest level of certification, while many other staff hold various other levels of certification. Saskatoon Water has developed a comprehensive, hands-on training program to ensure we continue to have a highly competent operations staff with an in-depth knowledge of our specific water treatment process and related systems. Saskatoon Water maintains a Canadian Association for Laboratory Accreditation Inc. accredited water-testing laboratory to ensure standards are met and water quality is never compromised.

In addition, the Plant's comprehensive maintenance and equipment inspection program ensures Saskatoon's Water Treatment Plant meets the requirements of a Class 4 facility, the highest standard in North America.

The City's water and wastewater treatment, distribution, and collection systems are regulated by Permits to Operate issued by the Water Security Agency. In 2018, Saskatoon Water conducted a combined total of over 73,000 water quality tests at both treatment plants and within the distribution and collection systems. The results of the tests showed that the quality of the drinking water was well within the acceptable limits under the Permit to Operate. The wastewater effluent was within the acceptable limits under the Permit to Operate, except for two exceedances due to anomalies resulting from continual optimization of the treatment process. Construction of Digester #4 will significantly reduce the risk of this reoccurring.

The City's water treatment and distribution systems are regulated by a Permit to Operate issued from the Water Security Agency. 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*. These regulations set standards to ensure treated water is safe for consumption. The City of Saskatoon consistently complies within these drinking water quality standards.

Chlorine Use in the Treatment Process

Chlorine is used to ensure water is safe for consumption by eliminating harmful viruses and bacteria. Chlorine is added at the Water Treatment Plant and the concentration is maintained throughout the distribution system to ensure safe water quality at your tap. Extensive testing is carried out to verify Saskatoon's water consistently meets Health Canada guidelines.

Fortunately, Saskatoon has an excellent source of water that is naturally low in organics. When these organics in the source water react with chlorine, they form Trihalomethanes (THMs), which is a concern due to their potential to cause cancer. Saskatoon's Water Treatment Plant process reduces organics before chlorination, thereby decreasing the potential for THMs to form. Saskatoon's drinking water consistently has levels of THMs well below the Health Canada's regulatory limit of 0.1 mg/L.

Saskatoon's water is also consistently well below maximum acceptable concentrations (MAC)* for heavy metals, chemical pesticides, synthetic organic chemicals, and radiological compounds regulated by the Guidelines for Canadian Drinking Water Quality. The annual [Drinking Water Quality and Compliance Report](#) provides a detailed chemical analysis, which is available on the City of Saskatoon's website, www.saskatoon.ca, or for more information, please contact 306.975.2534.

* Maximum Acceptable Concentrations are determined based on safe exposure levels for continuous consumption over a lifetime.

City of Saskatoon Typical Water Quality

WATER QUALITY CHARACTERISTIC	REPORTED AS	TREATED WATER	REGULATORY LIMITS	SOURCES
Physical Characteristics				
pH		8.2	6.5 - 9.0	
Turbidity	NTU	0.14	1.0	Soil erosion and runoff
Inorganic Constituents				
Aluminum	mg Al/L	0.02	0.1	Naturally present in our environment
Total Hardness	mg CaCO ₃ /L	180	800	Occurring dissolved minerals
Chlorine Residual	mg Cl ₂ /L	2.0 ^A	3.0 ^A	Additive in water treatment process for disinfection
Copper	mg Cu/L	0.003	1	Naturally present in our environment
Fluoride	mg F/L	0.7	1.5	Additive in water treatment process to prevent tooth decay
Lead	mg Pb/L	<0.0002	0.01	Naturally present in our environment
Potassium	mg K/L	3.5	n/a	Naturally present in our environment
Sodium	mg Na/L	30	300	Naturally present in our environment
Nutrient Constituents				
Nitrate (Dissolved)	mg NO ₃ /L	1.0	45 (32)	Agricultural use of fertilizers
Microbiological				
E. Coli	CFU/100ml	<1	<1	Naturally present in the intestines of warm-blooded animals
Total Coliform	CFU/100ml	<1	<1	Naturally present in our environment
Disinfection By-products				
Total Trihalomethanes	mg/L	0.04 ¹	0.1	By-product of drinking water disinfection using chlorine

^AAs Chloramine

¹Tested in Distribution System

mg/L is equivalent to parts per a million (ppm)

Reducing Our Environmental Impacts

The Water Treatment Plant is committed to reducing the environmental impacts of its operations through a variety of measures included in the Environmental Management System – a structured process to identify, manage, and continually improve the Plant's most environmentally significant aspects. Current environmental objectives identified by the Water Treatment Plant include reducing energy use, minimizing greenhouse gas emissions, and minimizing effluents created by the water treatment process.

New pumping systems at the Avenue H Reservoir, 42nd Street Pump Station, and future transfer pumping station were designed to meet high-efficiency standards for the pumping system. Electricity for pumping is the largest form of power use in the treatment process, and high-efficiency strategies for pumping provide long-term environmental benefits regarding emissions.

Saskatoon Water continues to promote and sponsor water quality and water conservation initiatives with the Sustainability division. Using low-maintenance and low-watering gardening practices (xeriscaping) and collecting rainwater for various purposes (rainwater harvesting), are encouraged to promote the responsible stewardship of our water resources.

Water Returning to Our River

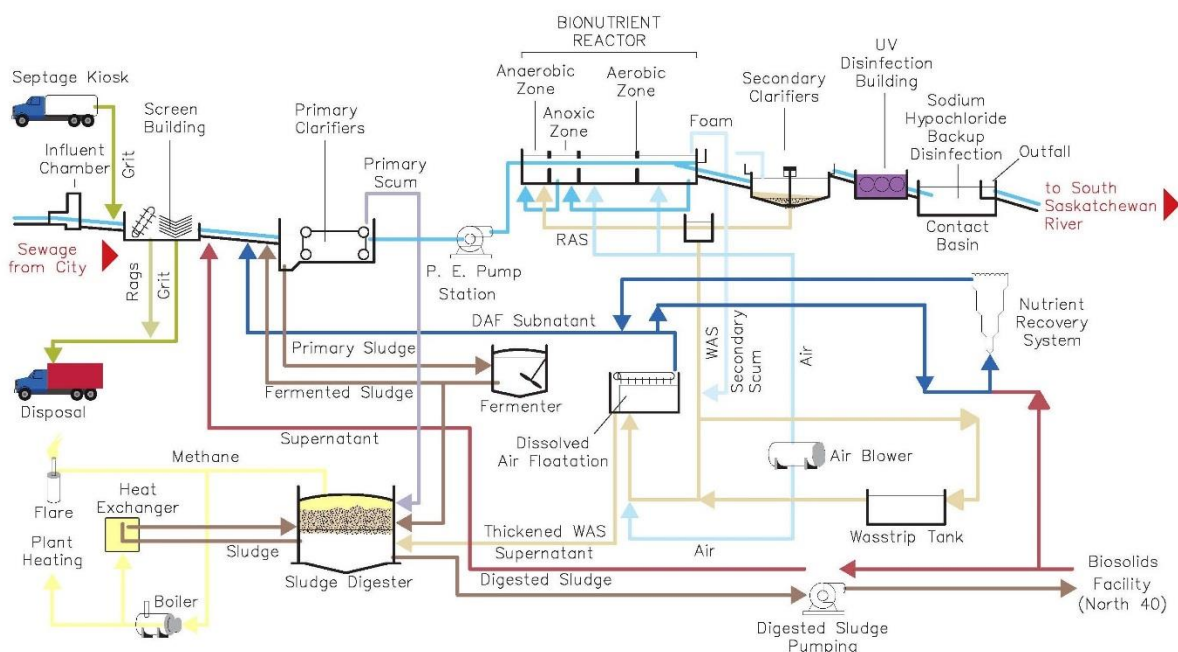
In 1996, the City of Saskatoon invested over \$50 million in improvements to the Wastewater Treatment Plant with the introduction of a Biological Nutrient Removal process. This process significantly reduces the levels of nitrogen and phosphorous in the treated wastewater being discharged to the South Saskatchewan River. These elements, in high concentrations, can cause damage to natural ecosystems within the river and its watershed.

In early 2009, the Wastewater Treatment Plant commissioned a Septage Kiosk for liquid waste haulers. This allows for careful monitoring of liquid waste and prevents process disruption caused by dumping of inappropriate effluent.

The Ultraviolet Disinfection Facility was constructed in 2009 and eliminates the requirement of chlorine disinfection. The Ultraviolet Disinfection step in the process is more effective at destroying bacteria, still present in the Plant's effluent, than simple chlorine disinfection and improves the quality of the final effluent being discharged to the South Saskatchewan River.

In 2012, Saskatoon opened the Ostara Nutrient Recovery Facility at the Wastewater Treatment Plant. This facility transforms phosphorous and nitrogen recovered from waste streams into Crystal Green®, a marketable, eco-friendly fertilizer, while improving reliability of the Wastewater Treatment Plant.

The Wastewater Treatment Process



Watershed Protection

The City of Saskatoon is actively involved in protecting our water source through its involvement and support for the South Saskatchewan River Watershed Stewards Inc., which is a community-based, nonprofit corporation that was formed to implement the South Saskatchewan River Watershed Source Water Protection Plan. The Plan identifies recommendations and key actions to help ensure the source water in the South Saskatchewan River watershed is protected. To review the final document and find other resources, please go to <http://www.southsaskriverstewards.ca/ssrws-i-documents.html>

The City's Green Infrastructure Strategy emphasizes the incorporation of natural drainage and storm water ponds to provide improved quality of runoff to the watershed. See <https://www.saskatoon.ca/environmental-initiatives/climate-change/green-strategy>.

Where Does Our Water Come From?

Saskatoon residents get their drinking water from the South Saskatchewan River. Glaciers, melting snowpack, precipitation, and runoff feed the river and its tributaries, which impacts on the supply of water for Saskatoon and other communities along the South Saskatchewan River. The Bow River, Red Deer River, and Oldman River are all upstream of the South Saskatchewan River, which passes through Lake Diefenbaker before reaching Saskatoon. After passing Saskatoon, water from the South Saskatchewan River passes by many other communities and merges with the North Saskatchewan River before finally reaching Hudson Bay.

You can do your part to protect the South Saskatchewan River!

- Reduce or eliminate the use of fertilizers, pesticides, and other harmful chemicals.
- Don't pour household waste, chemicals, or paint down a storm water catch basin.
- Wash your car at a carwash to prevent contaminants such as oils, metals, and phosphates from entering the storm water system.
- Pick up any trash or animal waste on your property before it is washed into the storm water system.
- Dispose of hazardous materials properly! One quart of oil can contaminate 945,000 litres of water, effectively eliminating that much water from our water supply.
- Do not pour oils and grease down the drain. These substances can clog your sewer connection, making your property more susceptible to sewer back up
- Flushable wipes can also clog up the sewer system. Not only does it pose a risk for your property, these wipes also block equipment which causes costly damage
- Avoid cosmetic products that contain silicone. When these products are washed through the sewage system it causes scale build-up on equipment
- Avoid personal care products that contain microbeads. These beads are too tiny to be processed at the Wastewater Treatment Plant and end up in the river.

Plans for the Future

CH2M HILL Canada Limited completed a Water Treatment Plant Long Term Capital Development and Expansion Plan in 2009 and then was updated in 2014. The study provides a strategic development and expansion vision to 2040. The Water Treatment Plant is taking additional steps to revisit the long term plan to ensure it matches the expected service levels for the citizens of Saskatoon. A study on source water resiliency review was completed on December 13, 2018, to identify and give options to mitigate potential risk to our water system.

A similar study was completed in October 2012 for the Wastewater Treatment Plant. The plan, conducted by Stantec Consulting Ltd., outlines needs for the next 30 years. Both plans will guide the capital budget process for the two utilities.

Major Projects in Progress

2014-2019 Wastewater Odour Abatement System - \$9.4 Million

Following recommendations to maximize odour reduction, the design and construction of an odour abatement system at the Wastewater Treatment Plant was initiated in 2015. Construction has been substantially completed and Operations have integrated the upgrades into the treatment process.

2015-2019 Wastewater Treatment Liquid Waste Haulers Station - \$8.5 Million

Design began in 2015 of a new Waste Hauler Facility including determining a location, detailed design, and construction to replace the existing station at the Plant. The new station will accommodate simultaneous unloads and will be located where truck traffic is in an industrial setting. Construction started in 2017 and will be substantially completed in 2019.

2016-2022 Water Treatment Plant Transfer Pumping and Electrical Upgrades - \$36.5 Million

The Transfer Pumping and Electrical Upgrades project continues work outlined in the capital plan to install dedicated pumps for filtered water from the main Plant to the Ultraviolet Disinfection Facility. The work includes upgrading existing electrical infrastructure as well as new electrical power supply for dedicated transfer pumps. Design has been completed and construction is scheduled to take place from 2018-2022.

2018-2022 Wastewater Treatment Plant Digester Tank Four and Heating Upgrades - \$33.0 Million

The addition of a fourth digester tank is intended to maintain the conventional biosolids handling retention time within industry standards, and allow one tank to be out of service for cleaning and maintenance and will add flexibility for the Plant. Design is to be completed in 2019 with construction scheduled for 2019-2022. The project includes upgrades to the boilers, as well as new gas scrubbing technology.

2017-2018 Water Treatment Plant Filter Upgrades - \$2.0 Million

Upgrades to the 1928, 1948, 1957, and 1964 filter plants began in 2017 and included the demolition of existing influent and effluent piping, removal of filter media, and the installation of new stainless steel filter troughs. Construction was completed in 2018. The completion of this work sets the Plant up to continue with filter upgrades to increase treatment capacity.

2016-2019 Wastewater Treatment Plant 25kVa Loop - \$4.0 Million

In order to mitigate risk of power failure or single points of failure at the Wastewater Treatment Plant, the 25kVa Loop project was undertaken to complete the electrical distribution ring around the site. Design has been completed and construction is scheduled for 2018-2019.

2016-2019 Wastewater Treatment Plant Mechanical Screen Replace - \$700,000

The replacement of the existing two screens and improvement of the inlet channel controls are driven by the need to reduce maintenance, improve capture of primary solids, and to maintain hydraulic capacity of the entire Wastewater Treatment Plant. Construction completion is scheduled for 2018-2019.

2017-2018 Wastewater Treatment Plant Lift Station Assessments

The Lift Station Assessment project is a study currently underway to identify critical upgrades needed for the 31 lift stations owned by the City. The results of the study will be utilized for capital planning and prioritizing of work.

2017-2020 Water Treatment Plant Security Enclosure - \$4.0 Million

Following studies on the state of security at the Water Treatment Plant, City Council has made the decision to close the public roads that run through the Plant. A security fence will be designed and constructed to protect the treatment process, ensure the safety of staff as well as the public, and allow further development of safety protocols. This project includes road work to close Spadina Crescent, traffic calming installations, and upgrades to Dundonald Road to mitigate traffic through neighbourhoods surrounding the Plant.

Water Conservation

There are many places around your home and yard where you can help protect the environment by reducing water use.

What can you do? BE WATER WISE!

In Your Yard

- Avoid watering during the heat of the day or during windy times to minimize evaporation.
- Water your lawn deeply, but not more than once a week. During periods of extended rain, water even less frequently.
- Water new lawns every other day until the grass reaches five cm; then water less frequently.
- Set a tuna can in each of your sprinkler zones and time how long it takes to fill it with water. That's how long you should run your sprinkler once a week if your lawn is dry.
- Ensure your sprinklers are working properly and are targeted away from sidewalks.
- Use drip irrigation and/or sprinkler systems that are timed to turn on and off automatically. Remember to turn them off if it's raining.
- Collect rain water in rain barrels – it contains minerals and nutrients that are good for plants. Be sure barrels are properly covered to discourage mosquito larvae from developing.
- Use mulch and drought-tolerant plants (xeriscaping) in your flower beds to reduce your need to water frequently.

Around Your Home

- Install a dual flush or low-flow toilet.
- Install a low flow showerhead. This will reduce the water flow from approximately nine litres to 19 litres per minute.
- Instead of washing by hand, use an Energy Star dishwasher. Remember to run full loads to maximize water savings.
- Chill water in the refrigerator, rather than running the tap.
- When buying a new washing machine, consider purchasing a front loading model. Front loading machines use approximately 40% less water than top loading.