

# Storm Water Utility 2018 Annual Report



Saskatoon Water  
Utilities and Environment Department

# SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

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# SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

## EXECUTIVE SUMMARY

The Saskatoon Storm Water Utility funds storm water management and flood protection services including ongoing operations and maintenance of assets with an estimated replacement value of \$2.6 billion. The Utility also monitors and stabilizes the East Riverbank to protect strategic public infrastructure. In 2018, the Storm Water Utility had revenues of \$6.5 million, with \$3.6 million for operating expenses and a \$2.7 million transfer to the capital reserve.

Work continued to implement the Storm Water Utility Business Plan. Highlights for 2018 include the following:

- The Flood Control Strategy, a \$54.0 million nine-year plan to enhance storm water capacity in ten areas that are prone to frequent flooding, was approved by City Council. An application was submitted to the Government of Canada requesting \$21.6 million towards the Strategy.
- The Storm Water Pond Safety Review was completed, and recommendations implemented including constructing a partial fence at the Dundonald Pond and enhancing signage around storm water ponds.
- A new Storm Water Management Credit program was established which allows for reductions in utility bills for commercial and multi-residential property owners who reduce the quantity or improve the quality of runoff through on-site measures.
- The Home Flood Protection Program was piloted in partnership with the Intact Centre for Climate Adaptation, with 113 home assessments completed.
- The Montgomery Place Culvert Inventory and Assessment Report was completed, with all culverts mapped and updated on the City GIS system.
- The multi-division Montgomery Place Culvert Drainage Study was completed in collaboration with other divisions. Several changes were made to the permitting and approval process to reduce non-compliant culverts, and an enhanced process for handling complaints about non-compliant culverts and ditch drainage was put in place.
- A total of 29 km of storm water sewers were flushed and the condition assessed.
- An in-house Geotechnical Engineering Specialist was hired and oversaw riverbank slope stability monitoring projects, 3D slope stability modeling, and geotechnical analysis of the slope by Eastlake Avenue.
- Two existing Storm Water Utility Bylaws were consolidated into [The Storm Water Management Utility Bylaw, 2019](#) and updates were made.

In 2018, Saskatoon experienced three localized rainfall events with estimated return periods of “two to five years”, but no instances of flood damage were reported from these rain events.

# SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

## 1.0 OVERVIEW

### 1.1 Introduction

The Saskatoon Storm Water Utility provides storm water management and flood protection through funding the storm water system's operations and maintenance, asset preservation, capacity enhancements, and drainage inspections. The Utility also monitors and mitigates damage to strategic public infrastructure caused by riverbank slumping.

Storm water services are provided to residential and to industrial, commercial and institutional (ICI) properties. In 2018, storm water charges were applied to approximately 64,500 single-residential properties and 4,700 multi-residential and ICI properties including City-owned properties.

Saskatoon's storm water infrastructure includes over 23,000 manholes and catch basins, 756 km of storm sewer pipes and culverts, 34 storm ponds, and other drainage infrastructure with a replacement value of approximately \$2.6 billion.

### 1.2 Strategic Linkages

#### *Our Vision*

The City of Saskatoon is a world leader in storm water design and asset management. We effectively collaborate with citizens and partners to utilize storm water as a resource and mitigate the risk of flooding.

#### *Our Mission*

The Storm Water Utility provides safe, efficient, and cost-effective storm water management to Saskatoon citizens through teamwork and innovation. We develop proactive strategies that ensure the effective long-term performance of our storm water systems, supported by sustainable, accountable, and responsive funding structures. Storm water management charges entrusted by citizens are used as effectively as possible to minimize storm water and snow melt impacts.

#### *Our Corporate Values*

- Trust
- Integrity
- Respect
- Courage
- Safety

#### *Leadership Commitments*

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

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### 2.0 OUR STORM WATER UTILITY TEAM

The Storm Water Utility is part of the Saskatoon Water Division in the Utilities and Environment Department. The Utility has two full-time employees and an engineering intern. The Utility also pays for services provided by staff in the following City divisions:

**Saskatoon Water's Engineering and Planning** section is responsible for overseeing the Storm Water Utility and providing storm water engineering expertise. Saskatoon Water (SW) provides the following storm water management services:

- Rainfall monitoring
- Assessing runoff factors of multi-residential and ICI properties for billing purposes
- Engineering support for drainage projects
- Community liaison for storm water issues
- Modelling storm system capacity relative to varying levels of rainfall volume and intensity
- Planning and design of storm water infrastructure for new land development

**Water & Waste Operations (WWO previously Water & Waste Stream)** provides the ongoing day-to-day operations and maintenance of storm water ponds, outfalls, and below ground storm water drainage infrastructure.

**Roadways, Fleet, & Support (RFS previously Roadways & Operations)** maintains above ground drainage, including culverts, and completes a fall street sweep.

**Major Projects & Preservation (MPP)** tracks the inventory, completes condition assessment, and oversees asset preservation for storm sewer infrastructure.

**Construction & Design (C&D)** operates the "Connection Desk" and provides project management services, including survey work and inspection, for storm water infrastructure construction projects.

**Community Standards** provides drainage inspections, drainage advice to residents and developers, [Drainage Bylaw](#) updates, and *Drainage Bylaw* enforcement.

**Sustainability (previously Environmental & Corporate Initiatives)** provides leadership in activities that contribute to storm water practices that protect our watershed and natural resources.

**Communications & Public Engagement (Communications)** assists in initiatives to enhance citizen awareness and engagement to improve flood resiliency.

**Corporate Revenue** provides storm water billing and collection services.

**Finance (previously Transportation & Utilities Business Administration)** provides accounting and administrative support.

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## 3.0 OUR INFRASTRUCTURE

The table to the right summarizes the City's storm water infrastructure with a replacement value of \$2.6 billion.

The Storm Water Utility's **minor system** consists of piping, manholes, catch basins, and outfall structures that are able to convey runoff from more frequent, lower intensity storm events (up to a "1-in-2-year" storm). The system includes 756 km of storm sewer pipes including culverts, 9,422 manholes, 13,615 catch basins, 3,057 service connections, and 112 outfalls.

The **major system** consists of overland street drainage, eight dry ponds, 26 wet ponds (including three natural ponds and two constructed wetlands), ditches, swales, and any other land that is required to convey runoff from less frequent, higher intensity storms that produce runoff in excess of what the minor system typically handles.

Asset	Type	2018 Inventory
Sewer Mains	Collectors	674 km
	Trunks	70 km
Manholes	Collectors	8,929 ea
	Trunks	493 ea
Force mains		4 km
Service Connections		3,057 ea
Catch Basins	Collectors	13,122 ea
	Trunks	493 ea
Leads	Collectors	150 km
	Trunks	7 km
Dry Ponds		8 ea
Wet Ponds		26 ea
Culverts		12 km
Outfalls		112 ea
Sub-drainage		44 km
Oil & Grit Separators		1 Ea
Lift Stations		2 Ea
Replacement value		\$ 2.593 B



**John Avant Storm Water Pond in Erindale**



# SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

## 4.0 OUR RESULTS

### 4.1 Surface Flooding

#### **Annual Rainfall**

Seven rainfall gauges were regularly monitored between April 1 and September 30, 2018 with a summary of Saskatoon's 2018 rainfall season provided in the [2018 Annual Rainfall Report](#). Overall, Saskatoon had a drier than average rainfall year with **206 mm** of rainfall accumulating compared to the 265 historical average and 569 mm record high in 2010.

Three rainfall events with an estimated return period of two to five years were recorded at City rain gauges in 2018. No reports of property damage was reported from these rainfalls.

- On May 24, 18 mm of rainfall in 135 minutes was recorded at the Saskatoon Light & Power rain gauge in Stonebridge, and 25 mm of rainfall was recorded in one hour at the Shaw Centre rain gauge in Blairmore.
- On June 22, 10 mm of rainfall in 20 minutes was recorded at the City Hall rain gauge in Downtown.
- On July 11, a maximum of 21 mm of rainfall in 80 minutes was recorded at the Wastewater Treatment Plant rain gauge in Silverwood Heights.



7<sup>th</sup> Street and Cairns Avenue

#### **Flood Control Strategy**

In 2018, Saskatoon Water developed a nine-year \$54 million Flood Control Strategy which outlines preliminary solutions and high level cost estimates for 29 of the City's flood areas that are prone to more frequent flooding. Ten areas were prioritized based on flood risk and the cost of infrastructure relative to the number of properties to be protected from flooding during a modelled "1-in-10 year" rain event. An application was made to the Government of Canada's Disaster Mitigation and Adaptation Fund for \$21.6 million. In December 2018, City Council approved proceeding with the Strategy, starting with a dry pond to reduce flood risk for the 1<sup>st</sup> Street & Dufferin Avenue area in 2019. Saskatoon Water began the design in 2018 which includes storm sewer upgrades and a dry pond in W.W. Ashley Park.

*There will always be a chance of  
basement flooding, no matter what  
municipalities or private  
homeowners do to reduce the risk.*

Institute for Catastrophic Loss Reduction

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### **Home Flood Protection Program**

In 2018, the Storm Water Utility partnered with the Intact Centre for Climate Adaptation (ICCA) at the University of Waterloo to pilot the Home Flood Protection Program (HFPP) in Saskatoon from March through October. SGI CANADA also provided funding for the program.



The HFPP offered free online resources with best practices to make homes more flood resilient. The second component of the program was Home Flood Protection Assessments. Trained inspectors provided Saskatoon homeowners with a confidential 45 point visual inspection of features inside and outside the home, a 35 point maintenance review, and a customized written report covering their top opportunities to reduce flood risk. Fully subsidized inspections valued at \$450 each were

offered to approximately 1,000 homeowners in known flood prone areas and to 900 homeowners in the Montgomery Place neighbourhood which has a unique ditch and culvert drainage system. Subsidized inspections were offered for a \$125 fee to all other Saskatoon homeowners.

The communications (see [Community Awareness and Engagement](#)) resulted in 633 unique website visits by Saskatoon residents. A total of 113 inspections were completed, including 58 fully subsidized (14 in Montgomery Place and 44 in other flood prone areas) and 55 partially subsidized inspections.

## **4.2 Maintenance and Operations**

### **Customer Care Centre**

In 2018, the Customer Care Centre responded to approximately 1,600 inquiries from citizens in regards to culvert, drainage, storm sewer, and storm water flooding issues. The Storm Water Utility partially funded *Water & Waste Operations* and *Roadways, Fleet, & Support's* expenses in resolving these issues, when necessary.

### **Roadways, Fleet, & Support Fall Sweep**

Similar to 2017, the 2018 fall Street Sweep program utilized a tree density and flood risk approach rather than the neighbourhood boundaries approach. A total of 103 km of streets were swept, with 1,462 tonnes of debris collected. Sweeping efficiency remained at 14 tonnes per linear kilometer swept which is up two tonnes per kilometer from the neighborhood boundaries approach used prior to 2017. By designing the program based on higher tree density, higher debris pickup during the sweep provides better flood risk reduction per kilometer swept.



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### **Water & Waste Operations Maintenance**

Water & Waste Operations operates and maintains below-ground storm water infrastructure including sewer mains, manholes, and connections. The table below summarizes WWO's storm water related maintenance activities including flushing and televising storm water sewers, and cleaning and inspecting infrastructure.

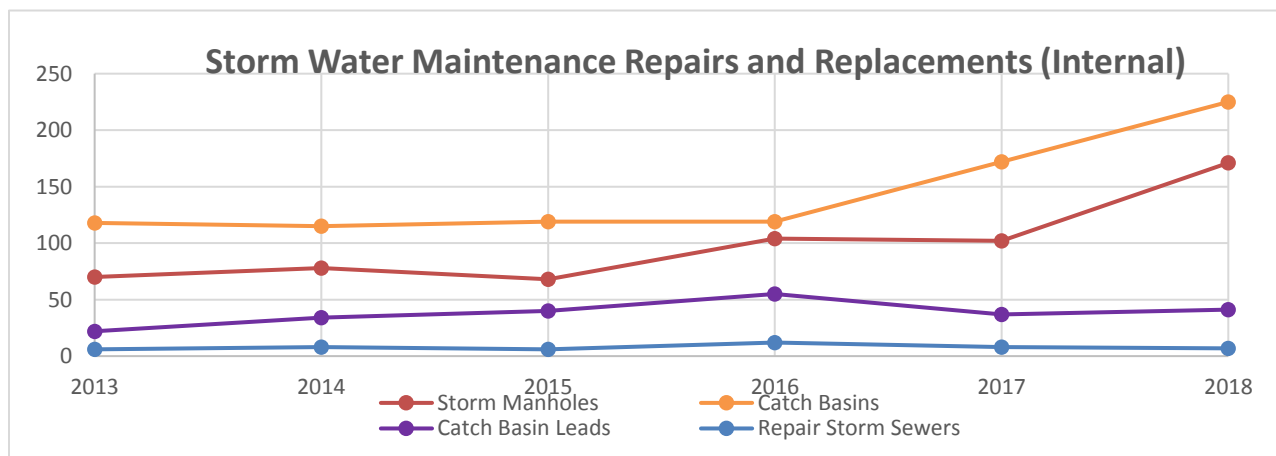
"Storm Sewer Meters" refers to the storm segment meters flushed, while "Flushing Storm Sewers" includes multiple passes by the flusher hose in the same segment. "Catch Basin Leads" is the number of leads flushed or cleaned. "Outfalls" is the number of outfalls inspected and/or cleaned. "Storm Ponds" is the number of trips made to maintain storm ponds.

Activity	2018	Units
Flushing Storm Sewers	21,661	Meters
Storm Sewer Meters	6,611	Meters
# of Passes	133	Each
Flushing Catch Basins	100	Each
Televis Storm Sewers	21,661	Meters
Catch Basins Leads	281	Each
Inspect Storm Manholes	1,273	Each
Inspect CBs	749	Each
Outfalls	66	Each
Storm Ponds	62	Each
Clean CBs	13,357	Each
Repair Storm Manholes	156	Each
Repair CBs	181	Each
Grout MHs/CBs	10	Each
Culverts	39	Hours



**E.D. Feehan High School  
Rusholme Road**

A total of 444 storm sewers, manholes, and catch basins were repaired or replaced in 2018, a 29% increase relative to 2017, and the highest number completed in a year. A significant increase in the number of repaired catch basins and storm manholes contributed to the increase. The graph below shows the 2018 WWO repairs and replacements of storm water infrastructure compared to the previous five years.



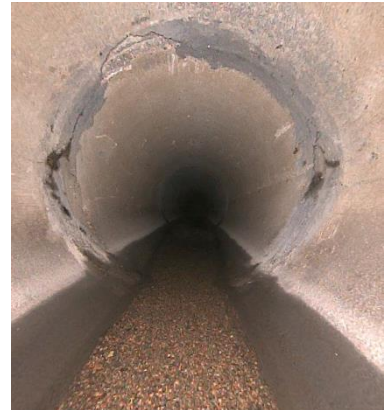
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### 4.3 Storm Water Asset Management

#### ***External Storm Sewer Inspection, Cleaning and Lining***

In 2018, the Storm Water Utility funded the cleaning and inspection of approximately 29 km of storm sewers. Over 133 km of storm pipes in total have been inspected to date (18% of total system), and 97 km of these have been rated (13% of total system).

In 2018, Major Projects and Preservation identified the priority inspection and lining asset management projects to be funded by the Storm Water Utility in 2019.



**Storm Sewer Inspection**

#### ***Agriplace Dry Pond Dredging***

In 2018, C&D coordinated a contract for the dredging of the Agriplace Dry Pond. The contract included the dredging of major flow paths in the pond and the cleaning of the three pond inlets and one outlet. This project helped to maintain proper function of the dry pond which sees high sedimentation due to its industrial location with the city.

#### ***Outfalls***

Saskatoon Water identified 32 outfall maintenance items in the *2016 Outfall Assessment report* that were to be completed. In 2018, Saskatoon Water followed up on 28 of these maintenance items. In general, the outfalls identified as having sediment and overgrowth issues have been resolved by WWO. All high priority maintenance items were completed.

Saskatoon Water plans to update its *2016 Outfall Assessment Report* in 2019.



**Storm Water Outfall**

#### ***Drainage***

The Utility assessed design options for improving drainage near Melville Street/ Portage Avenue and at Caen Street/ Dundonald Avenue. Construction for improved drainage will be completed in coordination with roadway reconstruction projects.

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### ***Montgomery Place Culverts and Ditch Drainage***

Frozen culverts and other drainage issues resulted in extensive ponding during the spring snow melt and after heavy rainfalls. In 2018, 52 work requests were made to the Customer Care Centre in regards to culverts and drainage in Montgomery Place.

The Storm Water Utility completed the Montgomery Place Culvert Inventory and Assessment in 2018 with \$50,000 in funding from the Federation of Canadian Municipalities' (FCM) Municipal Asset Management Program. Saskatoon Water collaborated with the other City divisions that influence ditch drainage to clarify policies, processes, and responsibilities; and to identify action items to support an asset management plan. The project included inventorying, assessing the condition, and mapping Montgomery Place culverts and elevations. An inventory of culverts is in the City's GIS system and is available for viewing by any City official.



**Montgomery Place Spring Melt**

Saskatoon Water plans to begin drafting a design in 2019 for ditch and culvert improvements to reduce the impacts of localized flooding throughout the neighborhood.

### ***4.4 Bylaws and Enforcement***

The Storm Water Utility funds a dedicated drainage inspector position and partially funds three other positions in the Community Standards Bylaw Compliance Section. The drainage inspector helps citizens and developers ensure compliance to Saskatoon's [Drainage Bylaw](#) through a model of education and enforcement. In 2018, Community Standard's Bylaw Enforcement Network software tracked 143 property drainage-related complaints:

- Drainage advice and education: 60
- Infill development: 15
- Lot grading concerns: 15
- Sump pump discharge: 14
- Eaves trough and downspouts: 10
- Commercial property development: 8
- Lot grading plan requests and questions: 6
- Garage suite or ROW closure approvals: 5
- Condo developments: 5
- Retaining wall concerns: 3
- Detached garage flooding: 2



**Non-Compliant Driveway Crossing**

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The Storm Water Utility led the Montgomery Place Culvert Drainage Study cross collaboration, which resulted in several changes including the following highlights:

1. Updated driveway crossing specifications for culverts and ditches.
2. Updated the "[Curb, Sidewalk, and Ditch Crossing Information Package](#)" to more clearly incorporate ditch crossing requirements.
3. Initiated a new pilot project to ensure all new crossings in the future have proper permits and meet compliance through linking Building Permits with information on Crossing Permits.
4. Implemented a new process for identifying non-compliance for new driveway crossings at the earliest possible stage.
5. Implemented a new clear process for complaints about non-compliant ditch crossings, and a process for addressing continuing non-compliance.
6. Identified and communicated a consistent message for citizens and staff about responsibilities for culverts.

Ditch drainage was restored in front of a residential property as a result of the new process for addressing complaints about new non-compliant drainage.

In 2018, the Storm Water Utility contributed \$62,000 in funding towards a cost-shared capital project led by Community Standards to determine the best practice model for more effective drainage regulations and enforcement. The project started in 2017 with research of best practices in other jurisdictions, and in 2018 internal stakeholder consultations were conducted and a report to Council outlined three proposed phases:

- Phase 1: Developing Public Education Resources and Standards Review
- Phase 2: Process Review and Development
- Phase 3: Drainage Bylaw Amendments

### **4.5 Riverbank Slope Stability**

The Storm Water Utility funds riverbank slope stability monitoring because of the impact of snow melt and rainfall on groundwater levels and erosion. In 2018, an in-house Geotechnical Engineering Specialist (GES) was hired by Saskatoon Water and funded by the Storm Water Utility to oversee riverbank monitoring and slope stabilization. The City's goal is to manage the east riverbank slope stability more proactively for increased efficiency and lower long-term financial investment. The GES role also provides an internal resource to all City departments for geotechnical matters.

#### **Monitoring:**

Saskatoon Water staff visually monitored east riverbank sites near 16<sup>th</sup> Street and 11<sup>th</sup> Street, with monitoring being more frequent when risk of slope movement was higher. Staff also completed piezometer readings of groundwater levels.



**Nutana Slope Area**



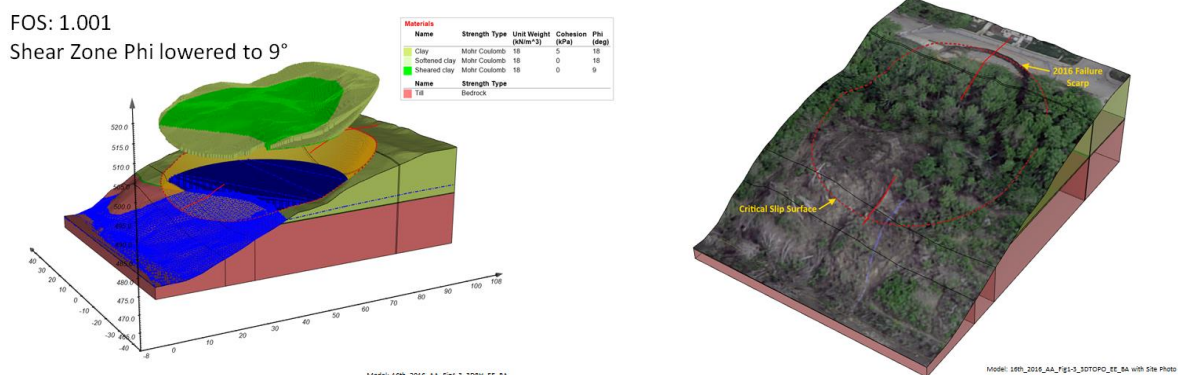
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Contracts awarded in 2017 for the following work were continued in 2018:

- East Riverbank Spring Reconnaissance: Year two of a three-year contract was completed with Golder and Associates for slope inclinometer (SI) readings, a visual review, risk rating, and recommended actions for 22 east riverbank sites. Saskatoon Water summarized results and met with WWO and RFS to plan next steps for the recommended actions.
- Nutana Slope Instrumentation Monitoring: Year two of a two-year contract was completed with Golder and Associates to survey and report on various instrumentation readings between 11<sup>th</sup> Street and Saskatchewan Crescent. Two monitoring reports were completed, and results were provided to area residents. No significant slope movement was observed.

### ***Saskatoon Riverbank Stability Modeling:***

In 2018, the Storm Water Utility contracted with Soilvision Systems for the provision of 3D slope stability modelling software and creation of a slope stability model. The model covers seven kilometres of the east riverbank between the CPR Bridge and Gordie Howe Bridge. This model consists of a 3D conceptual model and a 3D slope stability predictive model, calibrated to previous modeling studies.



The 3D model will be operated by the GES and updated with ongoing monitoring and additional ground investigation data to determine areas of higher risk and to contribute to remedial solutions prior to full slope failure.

### ***Geotechnical Investigation for Slope Instability near Eastlake Avenue***

In 2018, the Storm Water Utility contracted with Thurber Engineering Ltd. for a geotechnical ground investigation along the riverbank close to Eastlake Avenue. The investigation included six boreholes at varying depths, in-situ tests, and instrumentation to monitor groundwater and slope movement. Data collected will be incorporated in a 3D slope stability model to analyse the area and assess potential remedial options as necessary. A partnership with the U of S was established to research the effectiveness of increasing the strength of weak soils in-situ by injection of a salt solution.

### ***West Riverbank***

A desktop review was completed of the west riverbank geology, topography, historical ground investigations and records of previous slope instability. The results were summarized in a report and two sites, determined to be of potential risk, were visually inspected with a recommendation to complete visual monitoring every two years.

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### 4.6 Community Awareness and Engagement

#### **Home Flood Protection Program**

The HFPP was promoted throughout the spring and summer through the following:

- Press releases in March during National Water Week, April for program launch, and end of June
- Media interviews
- Radio and newspaper ads
- Public Service Announcements (PSAs) during National Emergency Week
- Inserts in 70,000 utility bills and electronically for e-bill customers
- Posters at 30 City-owned public facilities
- Pop-up banners displayed at City Hall and several public events
- Videos for social media
- Other social media posts by the City, ICCA, SGI CANADA, and Canadian Red Cross
- Promotion in the City of Saskatoon employee newsletter
- E-mails to 70 residents in flood prone areas who had subscribed
- Door hangers to all homeowners eligible for a free assessment
- Billboards in neighbourhoods with flood prone areas
- Promotion at two Montgomery Place community meetings
- Lawn signage for residents who had completed the assessments
- Information for City Councillors to share in newsletters
- Saskatoon Region Association of Realtors website and e-mails
- Door-to-door outreach by a HFPP assessor to 258 homes in flood prone areas



**Montgomery Place Drainage:** Flyers were delivered to Montgomery Place residents in the spring to increase awareness on what to expect from the City for drainage maintenance, actions for citizens to maintain drainage, and drainage requirements for driveway crossings.

**Nutana Slope:** Two flyers were distributed to residents near the Nutana Slope to inform them of instrumentation monitoring results. A “Notice to Residents” was also delivered to provide information on what to expect from the City and what citizens can do to reduce risk from slumping.

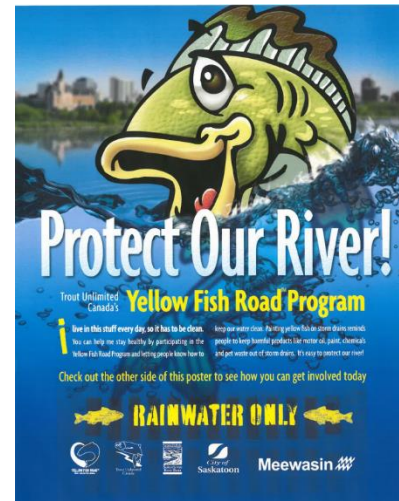


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**Yellow Fish Road™ Program:** The Storm Water Utility, in collaboration with Sustainability and WWO, supported the Partners for the Saskatchewan River Basin (PFSRB) and Meewasin Valley Authority in delivering the “Yellow Fish Road™ Program” to make students and citizens aware that water goes through the storm water system untreated to the Saskatchewan River. In 2018, 15 schools/groups and 426 students and teachers participated in Yellow Fish Road™. Yellow fish were painted on 335 storm drains in 13 neighbourhoods, and 1,364 door hangers were distributed.

**Storm Water Charges:** Bill inserts were prepared to provide information to ICI property owners about the storm water management charges including information about changes to rates from 2019 to 2022.

**Saskatoon.ca Website Updates:** Changes were made to Saskatoon.ca to update citizens about the Home Flood Protection Program and measures that citizens can take to reduce the impact of floods.



Students from St. Anne School's Grade 6 class painted storm drains around River Heights on May 29, 2018

### 4.7 Storm Water Ponds

#### **Storm Water Pond Safety Review**

The Utility participated in the Storm Water Pond Safety Review which was initiated in response to the unfortunate drowning incident in the Dundonald Storm Water Pond in September 2017. Research was conducted on storm water pond safety risks, results of safety reviews conducted by other municipalities, and identification of best practice options for Saskatoon. The review made recommendations in several areas including:

- Enhanced collaboration with school divisions on storm pond safety
- Revised signage with increased clarity
- Review of maintenance options
- Minimum required slope standards for new storm water ponds
- Separation of storm ponds from schools/playgrounds in new neighbourhoods
- Continued best practice design practices for edging, drainage and sediment control
- A partial fence at Dundonald Park and evaluation of fences at other storm water ponds on a case-by case basis



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After City Council adopted the report recommendations, the Storm Water Utility funded and oversaw the design and implementation of the partial fence in collaboration with the nearby schools, Parks, C&D, WWO, and the Crime Prevention through Environmental Design (CPTED) Committee.

In response to concerns identified by Montgomery Place residents at a Local Area Plan (LAP) meeting, a fence was relocated around the Montgomery Storm Water Pond.



Newly Constructed Fence around Dundonald Storm Water Pond

### ***Storm Water Ponds and Recreational Use***

The Utility collaborated with Community Development and other divisions to review policies for recreational use of storm water ponds. Ground Penetrating Radar (GPR) was used to test ice thickness for Lakeview, Briarwood, and Dundonald Storm Water Ponds. The GPR did not identify significant variability in the ice thickness.



GPR Ice Mapping Courtesy of G3TECH SK LTD.

## ***4.8 Storm Water and the Environment***

### ***Storm Water Quality Monitoring***

Saskatoon Water monitors nine major outfalls for storm water quality. Five major outfalls surrounding the water and wastewater treatment plants are monitored weekly to test for coliforms and E.coli.

In 2018, the University of Saskatchewan (U of S) completed additional storm water quality testing and analysis for 14 outfalls through a partnership funded through a \$25,000 Natural Sciences and Engineering Research Council of Canada (NSERC) grant. The analysis found a high degree of data variability and no trend between upstream and downstream river sites sampled. Discussions in 2019 will determine potential opportunities for follow-up research partnerships with the U of S.

A monitoring program also tracks immediate and long-term changes in water quality and quantity for the Northeast Swale. A monitor measures basic water quality parameters, and monthly water samples provide for more detailed analysis. Annual reporting includes trend analysis of samples, and comparisons to guidelines and historical data.



Northeast Swale Monitoring

## **SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT**

### ***Green Infrastructure Strategy***

The Storm Water Utility participated in the Green Infrastructure Strategy with Sustainability, Planning and Development, other divisions, and Meewasin Valley Authority. Green storm water infrastructure, such as swales and storm water ponds, are an important part of the green network. Green storm water infrastructure will be incorporated in future neighbourhood planning to contribute to the green network and to improve storm water quality entering the South Saskatchewan River. The strategy will also help to reposition storm water as an important resource.



**Swale in Aspen Ridge**

### ***Climate Change***

In 2018, agreements with the University of Saskatchewan and Concordia University were signed to undertake research to update Saskatoon's rainfall Intensity, Duration, Frequency (IDF) curves to take into account more recent rainfall and the risks associated with climate change for use in developing future storm water infrastructure standards for new neighbourhoods. An application to the federal National Disaster Mitigation Program (NDMP) was approved for \$100,000 to help fund a \$212,000 project that will be completed between 2018 and 2020. In 2018, the project funded new LiDAR data for use in storm water modelling and the start of research being conducted by the universities.

Understanding flood risks, flood damage and the cost of infrastructure for different risk levels will provide for more informed decisions about optimal resource allocation for new storm water management infrastructure.

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### 4.9 Utility Billing

#### **ERU Assessment Updates**

In 2018, the Storm Water Utility began the process of checking each ICI and multi-residential storm utility property assessment for accuracy and completeness. Approximately 3,500 of the 4,500 total ICI and multi-residential properties were checked with the remainder to be completed in 2019. The assessment checks resulted in an increase of 2,100 new ERU's which will result in an increase of \$140,000 in revenue for the Storm Water Utility in 2019.

#### **Storm Water Management Credit Program**

In 2018, the Storm Water Utility developed a [Storm Water Management Credit Program](#) which was approved by City Council to begin in January, 2019. The program provides a reduction in Storm Water Management Charges for ICI and multi-residential property owners who have implemented onsite storm water management measures. These properties will be eligible for a Credit in the following three categories up to a maximum total combined Credit of 50%.

Category	Evaluation Criteria	Total Credit (50% Maximum)
Water Quality Improvements	Based on the percentage of storm water directed through a quality control infrastructure that meets the minimum standard of 80% total suspended solids (TSS) removal for particles sizes 50 micron or larger.	Up to 20%
Peak Flow Reduction	Based on the proportion of storm water for a standard 1-in-2 year rain event held onsite and released slowly to the City's storm water system. The credit is equal to 0.4 multiplied by the peak flow reduction percentage up to 75%.	Up to 30%
Onsite Retention (Runoff Volume Reduction)	Based on 2% per millimeter of storm water up to 25 mm that is retained onsite and not released to the City's storm water system.	Up to 50%

### 4.10 Bylaws and Standards

Two existing Storm Water Utility Bylaws were consolidated into [The Storm Water Management Utility Bylaw, 2019](#). The new bylaw provided for rate changes and the new Storm Water Management Credit program, clarified properties that are exempt from Storm Water Management charges, and included other housekeeping amendments.

The Storm Water Utility participated in updating the [Design and Development Standards Manual 2018](#) to ensure future storm water infrastructure meets best practice standards.



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### ***4.11 Continuous Improvement Highlights***

The Storm Water Utility has undertaken Continuous Improvement to increase service levels, improve efficiencies, and reduce costs in 2018:

- The Utility completed the inventory and assessment of the condition and elevations of culverts in Montgomery Place. The data was input into the City of Saskatoon GIS system which is now available to any employee who needs it. The data also will form the basis for a master drainage plan for the neighbourhood.
- The pilot Home Flood Protection Program was offered to all Saskatoon residents with customized assessments and information on how to reduce the impact of flooding on their properties.
- Grants secured in 2018 included \$20,000 from SGI CANADA for the HFPP, \$50,000 from the FCM Municipal Asset Management Program for the Montgomery Place Culvert Drainage Study, \$100,000 from the National Disaster Mitigation Program for the IDF Curve Project. A funding application was made to the Disaster Mitigation and Adaptation Fund for \$21.6 million.
- Cost-effective research was leveraged through partnerships from the U of S, Concordia University, and the University of Waterloo.
- Updates to individual ERU assessments based on the new 2017 aerial photo will result in an increase of \$140,000 in revenue for the Storm Water Utility in 2019.

## **5.0 OUR FINANCES**

The Storm Water Utility is funded on a user-pay principal with charges reasonably proportional to the storm water generated according to property size and surface imperviousness (green space is charged less than buildings and pavement). A one-unit residential dwelling is deemed to produce one Equivalent Runoff Unit (ERU) of storm water which forms the unit for charging other property types. The Storm Water Management Charge that single residences paid in 2018 was \$4.40 per month (\$52.80 annually).

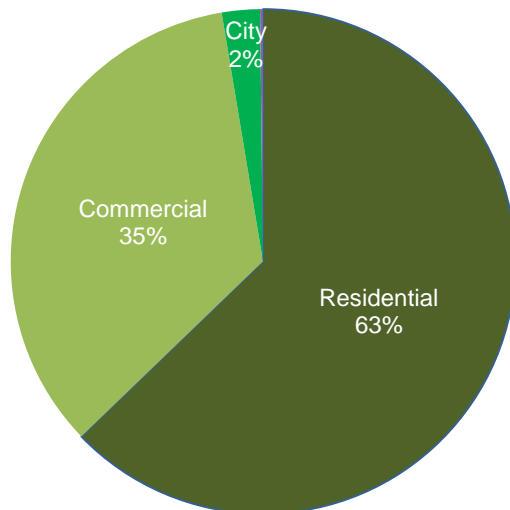
Commercial properties can generate significantly more storm water than residential properties; therefore they were charged multiple ERUs from a minimum of two annual ERUs (\$105.60) to a maximum of 100 ERUS (\$5,280) in 2018.

City Council approved an increase to the ERU rate of \$13.50 per year from 2019 to 2022. Revenue from the temporary Flood Protection Program which is a fixed charge of \$40.50 for each water meter will also be directed to the Storm Water Utility for flood capacity projects starting in 2019, and will be phased out by \$13.50 per year, ending December 31, 2021.

## SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

### 5.1 Revenues

#### Storm Water Utility 2018 Revenues \$6,545,586

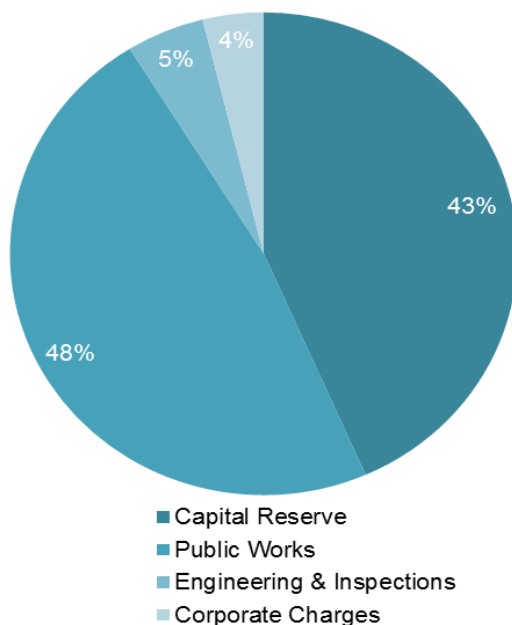


In 2018, Storm Water Utility revenues were \$6.5M, an increase of 5.2% from 2017. ICI customers accounted for \$2.3M or just over one third of revenues (about 5% of customers), while residential customers contributed \$4.2M or approximately two thirds of revenues (95% of customers). The residential revenues included about \$735K from multi-residential properties which are assessed similarly to ICI properties. Revenue from City-owned properties was \$125K.

*Variances:* Actual total Storm Water Utility revenues were \$174K (2.7%) higher than expected in 2018, partly because of reassessments completed and properties being annexed to the City of Saskatoon.

### 5.2 Operating Expenditures

#### Storm Water Utility 2018 Operating Expenses \$6,259,254



The Storm Water Utility's 2018 operating expenditures were \$6.3M, which was 5.6% more than 2017 expenses.

Approximately \$2.7M was allocated to the Capital Reserve.

WWO and RFS (Public Works) received \$3.0M to operate and maintain the storm water system including handling citizen drainage calls, keeping storm drains clear, and replacing and repairing the infrastructure.

Administration costs (corporate charges) of \$0.24M included billing services by the Revenue Branch, financial and administration services from Finance, and insurance.

Engineering and inspections, including overall utility management, accounted for \$0.31M.

*Variances:* Operating expenditures in 2018 were \$113K (3.1%) lower than budgeted because of staff vacancies and rain events were less widespread than average years.



## SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

The following table shows the actual 2018 Operating Revenues and Expenditures compared to the 2018 budgeted and 2017 actual amounts.

<b>Storm Water Utility Operating Revenues and Expenses (\$1000s)</b>			
	<b>2018 Actual</b>	<b>2018 Budget</b>	<b>2017 Actual</b>
<b>Revenues</b>			
Storm Water Charges	\$ 6,534	\$ 6,360	\$ 6,208
Late Charges	12	12	13
<b>Total Revenues</b>	<b>\$ 6,546</b>	<b>\$ 6,372</b>	<b>\$ 6,220</b>
<b>Expenses</b>			
Engineering & Inspections Operations	\$ 313	\$ 451	\$ 305
Maintenance (Public Works)	2,306	2,018	1,933
Drainage (Public Works)	693	950	760
Customer Billing	123	128	125
Corporate Services	52	52	52
Licenses & Insurance	68	68	80
Interest Expense/(Revenue)	(23)	(23)	(23)
Provision to Capital Reserve	2,728	2,728	2,696
<b>Total Operating Expenses</b>	<b>\$ 6,259</b>	<b>\$ 6,372</b>	<b>\$ 5,927</b>
<b>Revenues Less Expenses</b>	<b>\$ 286</b>	<b>\$ -</b>	<b>\$ 293</b>
<b>(To)/From Stabilization/Capital Reserves</b>	<b>\$ (286)</b>	<b>\$ -</b>	<b>\$ (293)</b>

### 5.3 Storm Water Stabilization Reserve

The Storm Water Stabilization Reserve has been established to provide for normal fluctuations in expenses for storm water expenses as a result of differences in weather conditions that impact requirements for storm water maintenance services. The balance ensures that funding is available in the event of a widespread severe rain event. The \$2.1M balance at the end of 2018 was \$303K more than in 2017, and included \$16K from a 2016 Urban First Nations wage program rebate and \$286K from the 2018 operating surplus.

<b>Change in Storm Water Stabilization Reserve (\$1000s)</b>			
	<b>2018</b>	<b>2017</b>	<b>2016</b>
Stabilization Reserve Beginning of Year	\$ 1,753	\$ 1,460	\$ 1,197
Balance From Year	\$ 303	\$ 293	\$ 263
<b>Storm Stabilization Reserve End of Year</b>	<b>\$ 2,056</b>	<b>\$ 1,753</b>	<b>\$ 1,460</b>

## SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

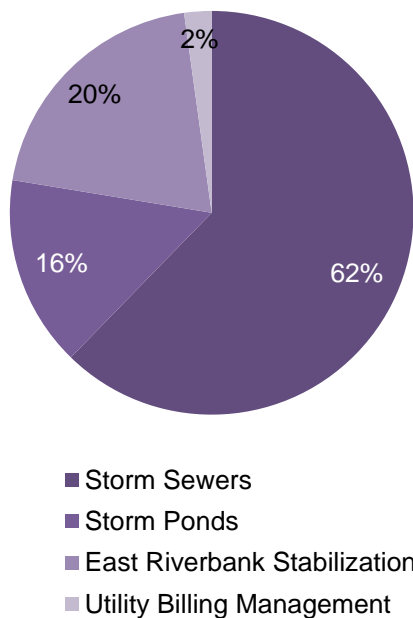
### 5.4 Capital Funding

In 2018, capital funding was \$3.1M, with most being contributed from the Storm Water Capital Reserve. In addition, the following contributions were received:

- \$20,000 sponsorship from SGI CANADA for the Home Flood Protection Program
- \$50,000 grant from Federation of Community Municipalities Asset Management program for the Montgomery Culvert Drainage Assessment
- \$35,000 of an approved grant of \$105,000 from the Government of Canada's National Disaster Mitigation Program to update the City's IDF curves and identify potential implications of climate change for the City's storm water infrastructure.

### 5.5 Capital Expenditures

**Storm Water Utility  
2018 Capital Expenses  
\$1,798,522**



In 2018, Storm Water Utility capital expenditures were approximately \$1.8M.

Approximately 62% of capital expenditures was for storm sewer network management, asset preservation, and capacity building (\$1.1M).

East Riverbank Stabilization expenditures of \$363.6K primarily included the in-house GES salary, the 3D slope stability modelling, geotechnical investigation at Eastlake, and other riverbank monitoring costs.

Storm pond preservation expenditures were \$275.2K, and primarily included installing the Dundonald Storm Pond fence and remediating the Montgomery Storm Pond fence.

Utility billing expenditures of \$39.4K

included the review and update of ICI properties' storm water management charges. This capital project will be closed in 2019, and in the future similar expenses will be part of the Operating Budget.

The Storm Water Utility contributed \$62K towards the budget for the Community Standard's drainage regulation project, which will be continued in 2019.

*Variances:* Actual 2018 capital expenditures were \$1.1M less than budgeted with the following significant contributing factors:

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- Actual expenditures for the East Riverbank Stabilization project were \$700K less than budget because no slope remediation projects were completed in 2018. A balance of up to \$3.0M will be maintained in the East Riverbank Stabilization Capital Project to ensure funding is available if there is an emergency slope failure which impacts strategic public infrastructure.
- Storm Water Sewer expenditures were less than the budget because approximately \$400K in asset preservation work will be completed in 2019 with storm sewer lining projects that will significantly extend their lifespan.

The following table shows the actual 2018 Storm Water Capital Expenditures compared to the 2018 budgeted and 2017 actual amounts.

<b>Storm Water Capital Expenditures (\$1000s)</b>			
	<b>2018 Actual</b>	<b>2018 Budget</b>	<b>2017 Actual</b>
Storm Trunk and Collection Sewers	\$ 1,120	\$ 1,437	\$ 1,013
Storm Sewer Pond Preservation	275	350	78
Utility Billing Management	39	80	62
East Riverbank Stabilization	364	1,060	1,216
Drainage Regulation	-	62	7
<b>Total Capital Expenditures</b>	<b>\$ 1,799</b>	<b>\$ 2,989</b>	<b>\$ 2,377</b>

At the end of 2018, ongoing capital projects extending over more than one year had unspent capital balances of \$3.5 million including \$1.3 million for potential emergency slope failures.

### **5.6 Storm Water Capital Reserve**

The Storm Water Capital Reserve provides funding for future large scale capital projects. The capital reserve at the end of 2018 was \$1.9M.

In 2018, several capital projects from previous years were closed, with unspent balances returned and overages deducted from the capital reserve, with a net addition of \$109K.

<b>Change in Storm Water Capital Reserve (\$1000s)</b>			
	<b>2018</b>	<b>2017</b>	<b>2016</b>
Capital Reserve Beginning of Year	\$ 2,008	\$ 1,721	\$ 3,538
Provision to Capital Reserve	2,728	2,696	2,691
Capital Budget	(2,989)	(2,424)	(5,414)
Closures Returned to Capital Reserve	109	15	906
<b>Capital Reserve End of Year</b>	<b>\$ 1,857</b>	<b>\$ 2,008</b>	<b>\$ 1,721</b>

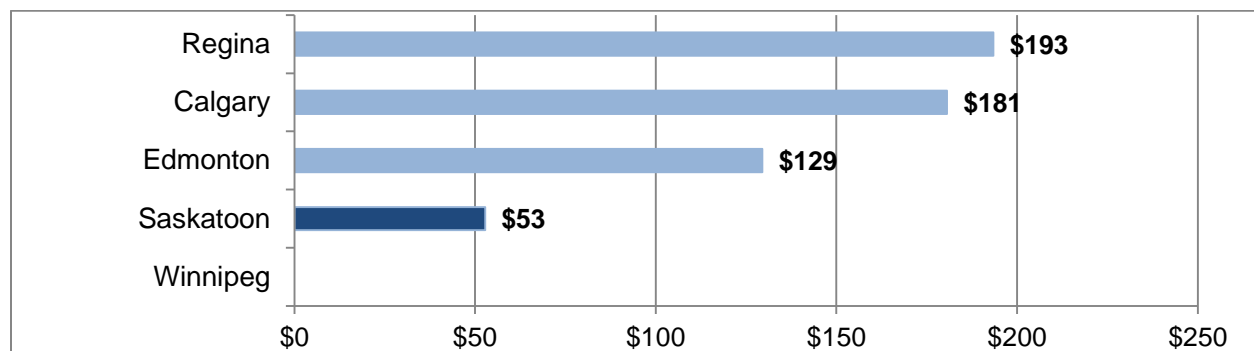
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### 5.7 Storm Water Utility Benchmarking

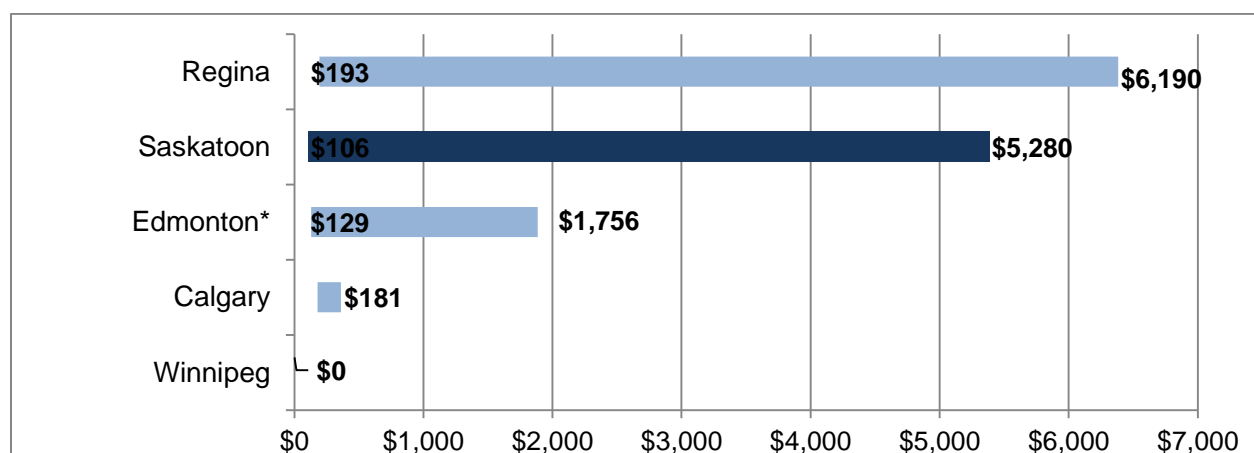
The 2018, Storm Water Utility compared its utility rates to 11 other cities with utilities across Canada. Saskatoon had the lowest storm water utility rates for residential properties at \$52.80 annually in 2018. Winnipeg has no storm water utility fees. If the 2018 \$54.00 temporary Flood Protection Program levy<sup>1</sup> is included, Saskatoon has the fifth lowest rates for storm water and flood protection.

Non-residential properties are more difficult to compare as storm water utility programs ranged from flat rates for all customers to charges for all customers based on area size and imperviousness. Saskatoon's maximum annual storm water charge was \$5,280 in 2018 for non-residential properties. Saskatoon had the fourth highest charge out of 11 cities for non-residential properties, based on a completely impervious surface with a property area of 4,515 m<sup>2</sup>. Annual storm water charges for a typical large shopping centre ranged from \$102 fixed rate charge in Sherwood Park to \$192,915 in Mississauga which has no cap.

#### Single Family Residential 2018 Annual Storm Water Utility Charges<sup>2</sup>



#### Commercial 2018 Annual Minimum and Maximum Storm Water Utility Charges<sup>3</sup>



<sup>1</sup> The "Flood Protection Program" levy of \$54.00 per water meter was charged to fund projects that mitigate damage from sanitary sewer backups during intense rain events.

<sup>2</sup> 265.4 m<sup>2</sup> area for residential properties (equivalent to CoS 1 ERU)

<sup>3</sup> \*Edmonton maximum assumes 4,500 m<sup>2</sup> property with 0.9 runoff co-efficient.

## SASKATOON STORM WATER UTILITY 2018 ANNUAL REPORT

### 6.0 OUR CHALLENGES

**Climate Change:** Climate change adds to the potential of more frequent, higher intensity rain events, and increased demands on the storm water infrastructure.

**Age and Condition of Existing Infrastructure:** Water infrastructure has a limited life expectancy and over time pipes, culverts and other infrastructure must be repaired or replaced. Some of Saskatoon's water infrastructure dates back to the early 1900s.

**Historical Design Standards:** Limited standards for storm water infrastructure were in place when Saskatoon neighbourhoods began to develop. In 1989, new storm water standards for new neighbourhoods were established to handle "1 in 100 year" storms. Surface flooding during high intensity storms continues to be an issue for many low lying areas in older areas of the City.

**Higher Groundwater Levels:** Higher groundwater levels have changed drainage patterns as water is unable to seep into the ground. The groundwater levels impact neighbourhood drainage and contribute to East Riverbank slumping and slope failure.

**Infill Development:** Cumulative impacts of infill development are placing higher demands on our water-related infrastructure. Infill reduces greenspace and increases surface runoff.

**Citizen Expectations:** Citizens have high expectations for storm water drainage that minimizes ponding on their streets and on properties. Flooding happens relatively rarely, but when it does happen, it can impact many properties at once. Citizens expect quick reactions by the City to their areas.

**Insufficient Drainage Bylaw Enforcement:** Neighbourhood storm water drainage is negatively impacted by properties developed contrary to approved design standards or drainage paths that are not maintained. Inspections when development occurs are necessary to minimize future problems.

**Regulatory Requirements:** Evolving federal and provincial regulations have the potential to impact discharges to the river, and may require future investments to improve the quality of storm water runoff.

**Inflow & Infiltration to the Sanitary Sewer:** Extraneous inflow and infiltration of snowmelt and rainfall to the sanitary system increases risk of sanitary sewer back-up during rain events and creates unnecessary costs for treatment and capacity upgrades for the Wastewater Treatment Plant.

**Costs for Businesses:** Storm water charges for some businesses will more than double over the next four years, which may generate negative feedback. Actions that businesses can take to reduce their storm water run-off generally have high capital costs relative to the annual reduction in storm water management charges.

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### **7.0 CONCLUSION**

Several initiatives that the Storm Water Utility undertook in 2018, will be further developed in 2019, including the following:

- Implementing the nine-year Flood Control Strategy to reduce flooding in areas that have a long history of frequent flooding, starting with the area near W.W. Ashley Park in 2019.
- Fully implementing the Storm Water Management Credit which comes into effect January 1, 2019 to recognize ICI properties that manage rainfall runoff onsite.
- Starting the storm water pipe lining program to extend the life of storm water infrastructure and improving drainage for two areas with ongoing drainage issues in collaboration with Major Projects and Preservation.
- Completing a Master Drainage Plan for the Montgomery Place neighbourhood.
- Completing a State of Storm Water Infrastructure Report based on assessments completed for culverts and storm water pipes, and with 2019 condition assessment updates for storm water ponds and outfalls.

The Storm Water Team is committed to working collaboratively with other divisions towards making Saskatoon a more flood resilient city.