



STORM WATER UTILITY

2021 Annual Report



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MESSAGE FROM THE DIRECTORS

The Storm Water Utility funds the complex system of a storm water infrastructure network which starts from the collection ditches, storm ponds and sewer infrastructure and ends at the South Saskatchewan River by discharge through the City's 100 active outfalls. The storm utility is responsible for the planning and design, management, storage, operation and maintenance, and asset preservation programming, and construction engineering which is managed by the following departments:

- Saskatoon Water
- Water and Sewer Operations
- Technical Services

The storm utility also funds the drainage inspector and management of the Bylaw and Compliance Section (Community Standards) and the oversight of the riverbank stability by the Geotechnical Specialist (Saskatoon Water).

Management and staff from the responsible departments are committed to providing exceptional storm water management and flood protection services including operations and maintenance of assets in the most reliable and cost-efficient way for the citizens of Saskatoon. We are pleased to present our results in the Storm Water Utility 2021 Annual Report on behalf of our departments.

The report describes our contributions to achieving the City of Saskatoon's Strategic Plan. We take great pride in efficient storm water management and reducing the flood risk for the citizens of Saskatoon. Several initiatives have been completed and more are underway to further enhance service to the citizens, increase efficiencies, reduce costs, and strengthen our environmental leadership.

Our financials show responsible stewardship of the resources that Saskatoon citizens have entrusted to us. We continue to provide excellent value to our citizens as we undertake capital and continuous improvement projects that ensure asset and financial sustainability. Our utility rates are designed to fund the needed capital, asset preservation, operation and maintenance costs for current and future storm water management and flood protection considering climate change. The departments have been focusing on customer service, storm water management for current and new neighbourhoods, flood protection for the most at-risk areas, and addressing aging infrastructure for storm water related services.

We are proud to work with a dedicated group of professionals who demonstrate an ongoing commitment to storm water management and flood protection, as well as ensuring the storm water infrastructure is sustainable. The work of the Storm Water Utility departments is greatly appreciated.

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

EXECUTIVE SUMMARY

The 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 Storm Utility also monitors and stabilizes the East Riverbank to protect strategic public infrastructure. In 2021, the Storm Water Utility had revenues of \$13.0 million, with \$12.7 million for operating expenses which includes \$8.9 million transferred to Capital and Infrastructures Reserves. Approximately \$0.3 million was transferred to the Storm Water Stabilization Reserve which is available for future operating expenses.

In 2021, progress was made implementing the *Storm Water Utility Business Plan*, with the following highlights:

- Continued to progress the nine-project Flood Control Strategy which will reduce the flood risk for at least ten top flood prone locations within the City between now and 2027. Substantial completion was reached for the first project (W.W. Ashley District Park Dry Storm Pond), with excavation and storm sewer infrastructure constructed in 2021. Detailed design and tendering for excavation and storm sewer infrastructure upgrades were also completed for the second project (Churchill Neighbourhood Park Dry Storm Pond). Additionally, the feasibility assessment and preliminary design was completed for the third project (Weaver District Park Dry Storm Pond).
- Began detailed design of Phase 2 and concept plans of Phase 3 and Phase 4 of the Montgomery Place Drainage Improvement Project. Detailed design has been already completed for Phase 1 of the project, with construction expecting to be complete in 2022.
- Applied for \$3.9 million in funding through the Natural Infrastructure Fund (NIF) Program from the Government of Canada. A decision on the application, which proposes to restore the overland green network drainage system in the CN Industrial Neighbourhood, is expected in 2022.
- Responded to 801 storm water and drainage inquiries through our Customer Care Team. Bylaw and Compliance also responded to 115 drainage related complaints and the Storm Water team responded to 195 inquiries including 52 billings inquires and 12 site visits.
- Roadways, Fleet and Support completed the fall sweep which included 112 km of streets and 1,320 tonnes of debris collected. Water and Waste Operations completed 1,021 catch basins inspections and completed 236 repair or replacements based on the inspection findings. Operations also completed 441 manhole inspections and executed 133 manhole repairs.
- Funded the cleaning and inspection of approximately 13 km of existing storm sewers.
- Continued asset management planning of infrastructure, including the Storm Water Infrastructure Corporate Asset Management Update to City Council, participation in the Corporate Asset Management Maturity Assessment, and development of the Storm Water Asset Management Plan.

- Completed visual assessment of all 40 storm ponds in the City's inventory, identifying 267 action items to be completed in coordination with Saskatoon Water, Parks, Water and Waste Operations, and external projects.
- Installed ten new welcome signs near storm ponds which provide improved messaging regarding safety and permitted recreational use of storm ponds.
- Monitored sediment levels of storm ponds, including the dredging of Brand Road Pond and bathymetric surveying of four additional ponds.
- Implemented new initiatives involving additional drainage review and inspection for new infill, commercial, and multi-family developments. Additional work was also completed regarding guidelines and public information for residential lot drainage.
- Completed the annual Spring Reconnaissance comprising of a visual inspection of the slopes and monitoring of instrumentation of the East Riverbank to assess and rate specific sections. Frequent monitoring programs were completed near 16th Street and 11th Street.
- Collaborated with the Sustainability Department and presented a decision report to City Council with options to address gaps in the regulation of groundwater wells within City limits that contribute to the risk of aquifer contamination, drinking water cross-contamination, public health issues, and associated liabilities.
- Continued collaboration with the University of Saskatchewan, Meewasin, and others to monitor and research storm water quality and related concepts of the storm water system and South Saskatchewan River.
- Partnered with the University of Saskatchewan in a successful Natural Sciences and Engineering Research Council of Canada (NSERC) Alliance grant application, which will see the installation of two catchment bags at river outfalls in 2022 along with storm water quality monitoring.
- Completed billing reassessments of 228 industrial, commercial, institutional and multi-residential sites in the annual storm water utility billing process.

Overall, Saskatoon had a significantly below average rainfall year with 146 mm of rainfall recorded. This accumulation is significantly below the historical average of 264 mm, with it being the fourth lowest seasonal rainfall total out of 122 years (since 1900).

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 Storm Water Utility also monitors and mitigates damage to strategic public infrastructure along the riverbank.

Storm water services are provided to residential and industrial, commercial, and institutional (ICI) properties. In 2021, storm water charges were applied to approximately 66,088 single-family residential properties, 1,112 multi-family residential and 3,589 ICI properties including City-owned properties.

Saskatoon's storm water infrastructure includes over 23,000 manholes and catch basins, 957 km of linear infrastructure such as storm sewer pipes and culverts, 40 storm ponds, and other drainage infrastructure with a replacement value of approximately \$2.6 billion.

A list of key definitions and abbreviations for the report is provided in Appendix 1.

1.2 Strategic Linkages

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

Our Vision

The City of Saskatoon (COS) is a 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 Purpose

Our Purpose

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

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



Our Guiding Values



Our Values

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

PEOPLE MATTER

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

RESPECT ONE ANOTHER

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

ACT AND COMMUNICATE WITH INTEGRITY

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

SAFETY IN ALL WE DO

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

TRUST MAKES US STRONGER

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

COURAGE TO MOVE FORWARD

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



Our Strategic Goals

Quality of Life: Provide citizens with cost effective, reliable, and high-quality storm water management services.

A Culture of 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 storm water-related infrastructure for current and future citizens and businesses.

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

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

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

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

2.0 OUR STORM WATER UTILITY TEAM

The Storm Water Utility is part of Saskatoon Water (SW) in the Utilities and Environment Division. The Utility had three full-time employees and two engineering interns in 2021.

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

- Flood Control Strategy (FCS) design and project management
- Montgomery Place Drainage Improvement Project (MPDIP) design and project management
- Montgomery Place driveway ditch crossing permitting
- Rainfall monitoring and storm water quality monitoring
- Assessing runoff factors of multi-residential and ICI properties for billing purposes
- Analyzing and administering storm water billing credit applications
- Engineering support for drainage projects
- Community liaison for storm water issues
- Modelling storm system capacity relative to rainfall volume and intensity
- Planning and design of storm water infrastructure for new land development
- Asset management of the City's storm ponds and outfalls

- Monitoring the stability and condition of the riverbank, and coordinating remediation of slope failures and/or erosion in the area

The Utility also funds services provided by the following departments:

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

Communications and Public Engagement : assists in initiatives to enhance citizen awareness and engagement to improve flood resiliency.

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

Corporate Revenue: provides storm water billing and collection services.

Finance: provides accounting and administrative support.

Parks: provides Landscape design services for the FCS projects and provides ongoing day-to-day operations and maintenance of areas surrounding some storm ponds.

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

Sustainability: provides leadership in activities that contribute to storm water practices that protect our watershed and natural resources.

Technical Services (TS): tracks the inventory, completes condition assessment, and oversees asset preservation for storm sewer infrastructure.

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

3.0 OUR INFRASTRUCTURE

Table 1 summarizes the City’s storm water infrastructure with a replacement value of \$2.6 billion.

The Storm Water Utility’s **minor system** consists of sewer pipes, manholes, catch basins, and outfall structures that convey runoff from more frequent, lower intensity storm events (up to a “1-in-2-year” storm). The system includes 957 km of linear infrastructure such as storm sewer pipes and culverts, 9,350 manholes, 13,696 catch basins, 2,880 service connections, 100 functioning river outfalls, and minor ditches.

The **major system** consists of overland street drainage, nine dry ponds, 31 wet ponds (including ten naturalized ponds) major 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.

Table 1: Storm Water Inventory

Asset	Type	2021 Inventory
Sewer Mains	Collectors	671 km
	Trunks	71 km
Manholes	Collectors	8,845 ea.
	Trunks	505 ea.
Force mains	-	4 km
Service Connections	-	2,880 ea.
Catch Basins	Collectors	13,204 ea.
	Trunks	492 ea.
Leads	Collectors	151 km
	Trunks	7 km
Storm Ponds	Dry	9 ea.
	Wet	31 ea.
Culverts	-	9 km
Outfalls	-	100 ea.
Sub-drainage	Roadways	24 km
	Riverbank	20 km
Oil & Grit Separators	-	1 ea.
Lift Stations	-	3 ea.
Replacement value		\$2.6 billion



Figure 1: Recirculation Channel at Erindale (John Avant) Pond

4.0 OUR RESULTS

4.1 Climate and Precipitation

Annual Rainfall

Eight rainfall gauges were regularly monitored between April 1, 2021 and September 30, 2021 with a summary of Saskatoon's 2021 rainfall season provided in the [2021 Annual Rainfall Report](#). Overall, Saskatoon had a significantly below average rainfall year with 146 mm of rainfall accumulating. This was well below the historical average of 264 mm, with it being the fourth lowest seasonal rainfall total in the last 122 years (since 1900). Rainfall also decreased from 2020, when the City received 257 mm of rainfall.

Despite the low seasonal rainfall, three rainfall events occurred throughout the year. Two events had a return period of two to five years, while one event had a return period of five-25 years. The greatest rain event was on May 24, 2021, where a total average of 36 mm of rainfall occurred (which represented approximately 25% of the total 2021 rainfall). Table 2 provides the rain event details for all three rain events recorded by eight rain gauges.

Table 2: Rain Events in 2021

Date	Rain Event Statistics	Acadia	Aden Bowman	Attridge Fire Hall	City Hall	Light and Power	Shaw Centre	Wastewater Treatment Plant	Woodlawn
May 24, 2021	Average Intensity (mm/hr)	2.25	-	N/A	1.56	1.65	-	1.60	-
	Total Rainfall (mm)	54.0	-	N/A	37.6	39.6	-	39.0	-
	Return Period (yr.)	5 - 25	< 2	N/A	2 - 5	2 - 5	< 2	2 - 5	< 2
June 10, 2021	Average Intensity (mm/hr)	-	N/A	-	-	-	17.4	-	-
	Total Rainfall (mm)	-	N/A	-	-	-	17.4	-	-
	Return Period (yr.)	< 2	N/A	< 2	< 2	< 2	2 - 5	< 2	< 2
August 23, 2021	Average Intensity (mm/hr)	-	-	-	-	27.6	27.2	-	-
	Total Rainfall (mm)	-	-	-	-	13.8	13.6	-	-
	Return Period (yr.)	< 2	< 2	< 2	< 2	2 - 5	2 - 5	< 2	< 2

4.2 Capital Programs

Flood Control Strategy

The \$54 million FCS includes nine projects to reduce the flood risk for at least ten flood zones before 2028. The FCS construction is funded by the Storm Water Utility (60%) and the Government of Canada (GoC) Disaster Mitigation and Adaptation Fund (DMAF) (40%).

In 2021, substantial completion was reached for the first project of the FCS, the dry pond at W.W. Ashley District Park. Minor construction tasks and landscape maintenance are planned for 2022, with the park re-opening the public sometime in the fall of 2022. This dry pond will reduce flood risk for the following intersections and surrounding area:

- Lansdowne Avenue/1st Street;
- Dufferin Avenue/1st Street; and
- Broadway Avenue/Taylor Street.

“Thank you all again for the hard work and dedication it took to get this project underway. We are so very grateful. It is incredible to watch it all progress!”

Resident near the W.W. Ashley Park project



Figure 2: W.W. Ashley Park Substantial Completion Drone Image

Saskatoon Water and other Civic Departments finished the design of the second FCS project, a dry storm pond proposed within the north half of Churchill Neighbourhood Park to reduce the flood risk at the following intersections and surrounding area:

- Ruth Street/Cairns Avenue;
- Bute Street/Munroe Avenue;
- Ruth Street/York Avenue; and
- Bute Street/Albert Avenue.

This project was approved by City Council in March 2021. Construction is expected to occur in 2022.

“We are in support of this project as we have been extremely affected by the underperforming storm water infrastructure in the area.”

Resident near the Churchill Park project



Figure 3: Churchill Park Dry Pond Detailed Design Rendering

SW also worked on the feasibility assessment and preliminary design of the third FCS project, a dry storm pond proposed within the north half of Weaver District Park to reduce the flood risk at the following intersections and surrounding area:

- Cascade Street/Dufferin Avenue; and
- Bute Street/Dufferin Avenue.

City Council approval, detailed design and public engagement is expected to occur in 2022 with construction to follow in 2023 for the Weaver Park project.

Montgomery Place Drainage Improvement Project

In 2021, SW was awarded funding to improve the overland drainage network of ditches in Montgomery Place through the Investing in Canada Infrastructure Program (ICIP), which is supported by the Government of Saskatchewan (GoS) and GoC. Approximately \$5.8 million from the GoS and GoC will contribute to improving the drainage for approximately eight km of ditch through four capital projects before 2027.

Due to the delay receiving the ICIP funding approval, the infrastructure improvement project planned for the northeast area of Montgomery Place (Caen Street, Dundonald Avenue, Lancaster Blvd, and Ortona Street) was delayed so it could be included in the funding agreement. This project, which is known as Phase 1 of the MPDIP is planned to be constructed in 2022.

Saskatoon Water began the design of Phase 2 of the MPDIP, which is planned to be constructed in 2023. Public engagement is planned in 2022 to inform the neighbourhood and provide additional details regarding Phase 2 of the project. The drainage improvement projects will be completed in collaboration with roadway preservation work for an efficient, cost-effective, and one-City approach for the neighbourhood.



Figure 4: Montgomery Place Existing Drainage Network

CN Industrial Neighbourhood Drainage Improvements

In collaboration with the Sustainability Department, SW applied for \$3.9 million in GoC funding through the Natural Infrastructure Fund (NIF) in 2021. This funding application proposes to restore the overland green network drainage system that exists in the CN Industrial Neighbourhood. Specifically, this funding would help restore the overland ditch and culvert drainage network for this area (Melville Street, Portage Avenue, and Jasper Avenue S.). A decision on the funding application is expected in 2022. The planned drainage improvements for this neighbourhood are being coordinated with other capital projects that will include sanitary upgrades, road preservation, and storm system expansion.



Figure 5: Existing Ditch along Portage Ave

4.3 Maintenance and Operations

Citizen Inquiries

In 2021, the Customer Care Centre responded to 801 inquiries from citizens regarding culvert, drainage, storm sewer, and storm water flooding issues, which was down from 897 inquiries in 2020. The type of inquiries received are shown below in Table 3.

The Storm Water Utility group responded to 195 citizen inquiries, down from 228 in 2020. Of these inquiries, 52 inquiries were related to storm water billing, 27 were internal inquiries requested by other COS staff, while 12 required a site visit. Table 4 below presents a break down of the handled inquiries.

Note that complaints received by the Bylaw and Compliance group are not included in Table 3 and Table 4. This information is provided later in the report in Section 4.6.

Table 3: Customer Care Summary of Inquiries

Description	2020	2021
CB plugged/clogged	99	113
Street Drainage	9	57
Lane and/or lot drainage	53	78
Frozen Catch Basin	127	35
Spring Drainage	579	489
Other	18	10
Storm Ponds	12	19
Total	897	801

Table 4: 2021 Storm Water Group Customer Inquiries

Description	2020	2021
Alley Drainage	8	1
Surface Drainage	15	12
Sewer Drainage	10	11
Montgomery General	14	1
Montgomery Drainage Strategy	13	26
Montgomery Ditch Crossings	13	6
Flooding	15	9
Storm Water Utility Billing	87	52
General	28	38
Bylaw	6	1
Catch Basin Drainage	14	15
Councillor Requests	5	16
Storm Water Credit	-	7
Total	228	195

Roadways, Fleet, and Support Fall Sweep

Similar to 2020, the 2021 fall Street Sweep program utilized a tree density and flood risk approach. A total of 112 km of streets were swept, with 1,320 tonnes of debris collected. By designing the program based on higher tree density, increased debris captured during the sweep provides better flood risk reduction per kilometer swept. The RFS team completes many of the overland drainage inquiries received by Customer Care.

Water and Waste Operations Maintenance

WWO operates and maintains below-ground storm water infrastructure including sewer mains, manholes, and connections. Table 5 below summarizes WWO's 2021 storm water related maintenance activities including flushing and televising storm water sewers, and cleaning and inspecting infrastructure.

Table 5: WWO's Storm Water Infrastructure Maintenance

Activity	2020	2021	Units
Flushing Storm Sewers	3,154	N/A ³	Metres
Storm Sewer Metres	1,549	N/A ³	Metres
# of passes	43	N/A ³	Each
Televise Storm Sewers	2,104	6,937 ²	Metres
Catch Basin Leads	42	227 ²	Each
Inspect Catch Basins	N/A ¹	1,021 ²	Each
Clean Catch Basins	5,726	N/A ³	Each
Repair Catch Basins	19	208 repaired, 28 replaced	Each
Inspect Storm Manholes	80	441 ²	Each
Repair Storm Manholes	41	133	Each
Grout MHs/CBs	0	14	Each
Outfalls	46	N/A ³	Each
Storm Ponds	23	N/A ³	Each

¹Not recorded in 2020

²Only includes data from April 2021 to December 2021

³Not reported in 2021

Table Definitions

- “Storm Sewer Meters” refers to the storm segment meters flushed.
- “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 total times outfalls inspected and/or cleaned.
- “Storm Ponds” is the number of trips made to maintain storm ponds.

A total of 208 catch basins and 133 manholes were repaired, while 28 catch basins were replaced in 2021. Data regarding flushing of storm sewers, cleaning of catch basins, and maintenance visits to outfalls and storm ponds were not available at the time of report. Figure 6 displays the 2021 WWO repairs and replacements of storm water infrastructure compared to the previous five years.

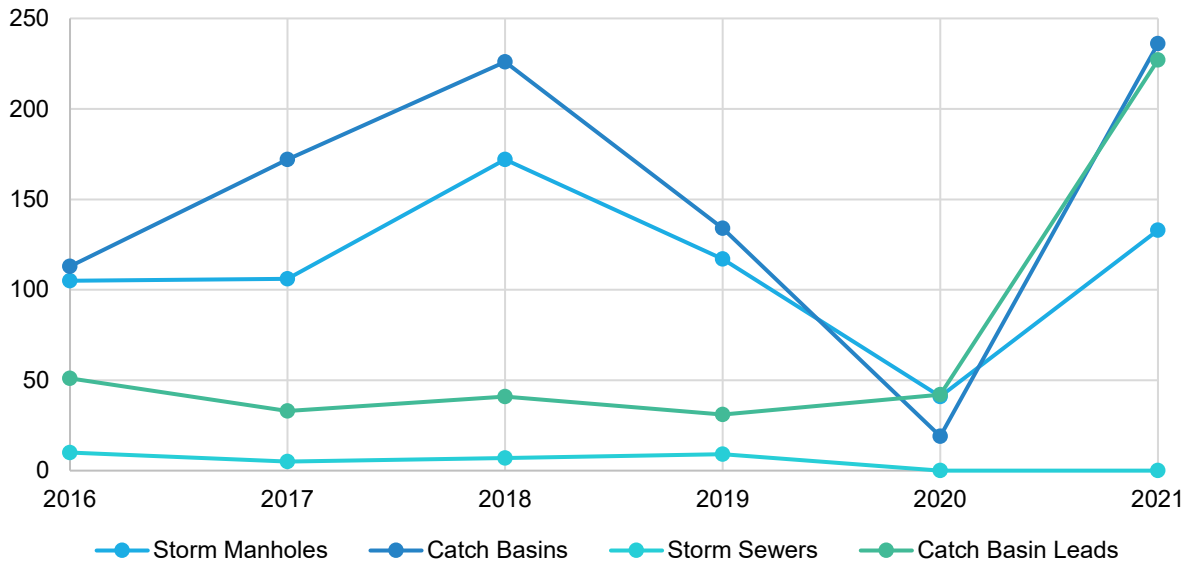


Figure 6: WWO Storm Water Maintenance Repairs and Replacements: 2016 to 2021

4.4 Storm Water Asset Management

Storm Sewer Inspection, Cleaning and Lining

In 2021, the Storm Water Utility funded the cleaning and inspection of approximately 13 km of storm sewers. Over 171 km of storm pipes in total have been inspected to date (23% of total sewer system), and 128 km of these have been rated (17% of total storm sewer system). The inspected storm sewers were rated using a three-point scale:

- A: No structural problem evident
- C: Sewer main showing deterioration
- F: Physical condition has failed

The rating for 128 km of inspected sewer mains is provided in Figure 8.



Figure 7: Image of Sediment within Storm Sewer Pipe

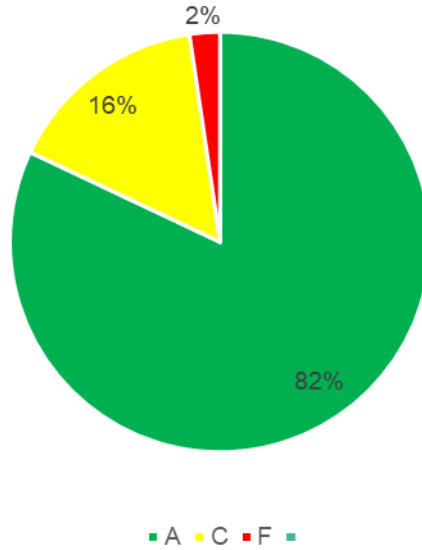


Figure 8: Storm Sewer Mains Rating

Storm Water Infrastructure Corporate Asset Management Update

An update of the storm water infrastructure asset management plan was presented to City Council in September 2021. The current inventory of storm water infrastructure has a replacement valuation of \$2.6 billion. Approximately 31% of the storm infrastructure network (storm sewer, outfalls, manholes, catch basins, culverts, ponds, etc.) has been inspected to date. The focus of the future will be to further inspect the storm water infrastructure network, so conditions are known for the entire system. Other priorities include documenting service expectations and accounting for climate change in future infrastructure projects.

Maturity Assessment

The Storm Water Utility participated in the Corporate Asset Management Maturity Assessment that was conducted by an external consultant. The external consultant rated the Asset Management Maturity for storm water infrastructure as a one (Aware) out of four (Excellence). The focus will be to progress this rating over the next several years between the Civic Departments that manage storm water for the City.

Storm Water Asset Management Plan

A comprehensive storm water Asset Management Plan (AMP) was developed in 2021. This will be a working document to be improved and progressed over the next several years in collaboration with other Civic Departments. Next steps for the Maturity Assessment will be incorporated to improve the Storm Water AMP.

4.5 Storm Water Ponds

Storm Water Ponds Inventory

The City currently has 31 wet ponds and nine dry ponds within the storm water management network. The Storm Water Utility formally inspects the storm water management ponds every three years, with new ponds inspected the year they are in-service, as part of the storm water AMP.

2021 Storm Pond Visual Assessment

In 2021, SW completed visual inspections of all 40 ponds in the City’s inventory. Overall, 267 action items were identified following the visual inspections, which will be completed in coordination with SW, Parks, WWO, and external projects.

Based on the number and severity of action items recommended for each pond, conditions were assigned to each pond. A summary of the assigned pond conditions is presented in Figure 9.

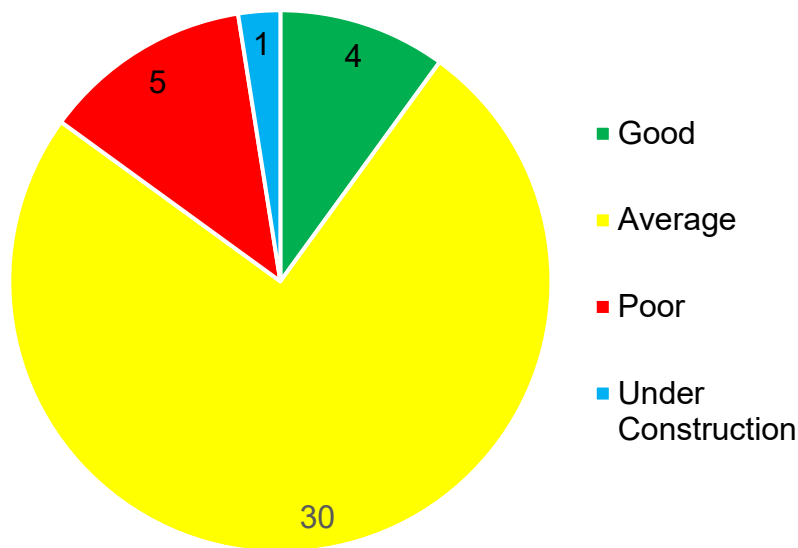


Figure 9: Pond Condition Summary

Storm Water Ponds and Recreational Use

The City permits use of storm water ponds for recreational use through *Policy C10-024*. A storm pond recreational use committee that meets quarterly includes members from Saskatoon Fire (SF), Recreational and Community Development (RCD), Communications, WWO, TS, and SW to discuss safety of the storm pond system. SF completes ice thickness testing in the winter to permit recreational use of the storm ponds for the season. Additional seasonal testing is completed by SF as required based on weather conditions. Only select storm ponds are permitted for recreational use based on infrastructure and previous site inspections.

New Welcome Signage

In 2021, Saskatoon Water replaced ten existing “old” welcome signs with new welcome signage at various storm ponds. The new welcome signage is consistent with updated COS visual identity guidelines and provides clearer messaging regarding safety and permitted recreational use of the storm pond.

The remaining “old” welcome signage will be replaced in 2022, with eleven signs planned to be installed.



Figure 10: New Welcome Sign at Briarwood Pond

Brand Road Storm Pond Dredging

Construction of the dredging project at the Brand Road Pond was completed in 2021. The project included the removal of sediment along the main drainage flow path through the pond, improving function of the pond and reducing the risk of upstream flooding.



Figure 11: Dredging at Brand Road Storm Pond

Storm Pond Bathymetric Survey Program

In 2021, SW continued its bathymetric survey program, identifying sediment infill volumes and determining if sediment is affecting the operation of the City’s wet storm ponds. Four wet ponds were surveyed in 2021, with two ponds found to have sedimentation build-up equivalent to over 50% of the ponds’ dead storage. To monitor sediment levels, SW plans to continue surveying four to five ponds per year in the future, with the program to be incorporated into its formal storm water AMP.

4.6 Bylaws and Compliance

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 2021, Community Standard's Bylaw Enforcement Network software tracked 115 property drainage-related complaints, down from 158 in 2020. Table 6 below displays the number of drainage related complaints in 2021 compared to 2020.

Table 6: Drainage Complaint Numbers

Complaint Type	2020	2021
Lot Grading Concern	25	33
Sump Pump Discharge	6	9
Sump Pump Winter Bypass	11	9
Drainage Advice & Education*	64	N/A
Lot Grading Plan Requests & Questions	8	6
Rear Property Line Drainage	15	8
Eaves Trough & Downspouts	11	22
ROW Closure Approvals	-	1
Side Yard Drainage Concerns	1	13
Garden/Garage Suite Plan Approvals	1	-
Commercial Property Development	1	3
Retaining Wall Concerns	1	-
Groundwater Issues	1	-
Infill Development	8	7
Condo Development	1	-
Detached Garage Flooding*	1	N/A
Garage Pad Elevations	3	3
Water Retention Structure**	N/A	1
Total	158	115
*Complaint categories were removed in 2021 with the new drainage bylaw coming into effect		
**Category added in 2021		

The Storm Water Utility has provided funding for a capital project led by Community Standards to improve Drainage Bylaw compliance. Completed and in-progress initiatives under this project are described below.

Drainage Regulation Completed Initiatives

- In 2021, work progressed on the Drainage Regulation Project and the new [Drainage Bylaw \(No. 9772\)](#) was approved in July of 2021. The Infill Lot Grading Plan review and approval process that was developed in anticipation of these changes was also implemented. The process, which includes a required submission of an Infill Lot Grading Plan at the Building Permit Application stage to

be reviewed, approved, and inspected by Community Standards, is underway with 25 plan reviews having been completed in 2021.

- Residential Property Lot Grading Guidelines – This document was completed in August of 2020 and is available on the [City's Lot Drainage webpage](#). A comprehensive set of guidelines to assist property owners in ensuring proper storm water management on their lot. A Communications Plan has been developed for this information which includes social media posts, public service announcements (PSAs), targeted emails to stakeholders, and printed hard copies that will be available at City Hall.
- Lot Drainage Webpage – The City's Lot Drainage webpage was revised to provide property owners more detailed information on lot grading. Four new webpages were added that contain information on residential lot grading styles and lot grading requirements. The webpages also provide access to the Residential Property Lot Grading Guidelines and City's Lot Grading Plans database.
- Commercial & Multi-Family Site Grading Regulation – A Site Grading Plan review and inspection process has been developed. The process includes the current requirement of submitting a Site Grading Plan to SW for approval prior to development and submitting an as-built drawing upon completion of the development. The process also involves an optional inspection at the 'rough grade' stage and a mandatory inspection at the 'final grade' stage. Site inspections will be performed by Community Standards. With the approval of the new Drainage Bylaw in 2021, the developed process is underway with grade inspections slated to start in the last quarter of 2022.
- Revisions to the Design and Development Standards Manual were approved to provide administration with additional regulatory tools respecting drainage and lot grading matters. These initiatives included:
 - Consideration for rear property line design elevations and slopes, providing greater consistency of lot drainage types within a given block;
 - Guidelines on garage pad design elevations, eliminating drainage issues caused by differing garage pad elevations on side-by-side lots; and
 - Additional requirements for catch basin amounts to better manage back of lot drainage.

Current Initiatives

- Back of Lot Grading – Stakeholder engagement will continue regarding potential specifications for new low-density suburban development including the possibility of concrete swales.
- Park Development Guidelines – Stakeholder engagement will continue regarding potential park infrastructure improvements to better accommodate drainage from lots adjacent to parks. This serves to address situations where parks are frequently damaged due to high amounts of storm water runoff.

4.7 Riverbank Slope Stability

The Storm Water Utility funds riverbank slope stability projects due to the impact of snow melt and rainfall on groundwater levels and erosion. The City's goal is to manage the East Riverbank slope stability more proactively for increased efficiency and lower long-term costs.

East Riverbank Spring Reconnaissance

Since 2009 an annual Spring Reconnaissance has been completed on the East Riverbank, for areas considered most susceptible to slope instability, between the North and South Railway Bridges. This reconnaissance comprises of visual inspections of the slopes and monitoring of slope inclinometers and standpipe and vibrating wire piezometers. The reconnaissance aims to provide a yearly review of the riverbank status from a geotechnical and risk of slope instability perspective.

The Spring Reconnaissance has previously been completed by an external geotechnical consultant, but in 2020 following the purchase of instrumentation equipment and the hiring of an internal Geotechnical Engineer in 2018, the Reconnaissance was successfully completed by SW staff. Completion of this report internally will enable the City to have a more detailed understanding of the East Riverbank and to provide a higher level of maintenance where required. In 2020 the inspection extents were expanded to the south to the east Raw Water Intake and in 2021 to the north to Peturrson's Ravine.

In addition to the monitoring completed as part of the Spring Reconnaissance, SW staff visually monitored East Riverbank sites near 16th Street and 11th Street, with monitoring being more frequent when risk of slope movement was higher.

Nutana Slope Area

Geotechnical instrumentation in the Nutana Slope Area was monitored twice in 2021 by Golder Associates Ltd., with the results communicated to residents of the area. Visual inspections and instrumentation monitoring was completed monthly by City staff during the water main replacement construction that occurred on Saskatchewan Crescent, downslope of the previous instability within this area.

Saskatoon Riverbank Stability Modeling

The 3D model, created in 2018, continued to be updated with new and revised information in 2021 and was utilized to review ground and ground water conditions and their impacts on slope stability along the East Riverbank. The model has been successfully used to demonstrate how proposed construction by the City to maintain level of service for residents will impact the stability of adjacent riverbank slopes.

The modelling software has also been utilized to create slope stability models to provide input for other projects and departments including:

- Circle Drive South Ditch Cleanout
- Faithfull Avenue Area Grading, Trunks & Primary Water Main
- Melville Sanitary Sewer Replacement

Riverbank Development Regulations

In December 2019, City Council approved the bylaw amendment which included the Riverbank Slope Overlay District and applies appropriate development standards and regulations. The bylaw helps to avoid or minimize potential impacts of slope instability and subsidence on development, and to prevent injury and minimize property damage related to public and private properties adjacent to the South Saskatchewan River (SSR).

Following direction by City Council, a report from the Administration was presented in 2021 that identified three options for consideration of the development of inground swimming pools in the Overlay District. City Council resolved, to permit in-ground swimming pools with site specific geotechnical review and engineered design with no monitoring requirement from either the City or property owner.

In 2021, five applications were received and approved for development in Zone 1 and seven applications were approved in Zone 2.

Groundwater Protection Project

In 2021, a collaboration between members of the Sustainability Department and the City Geotechnical Engineering Specialist presented a report to City Council with options to address gaps in the regulation of groundwater wells within City limits that contribute to the risk of aquifer contamination, drinking water cross-contamination, public health issues, and associated liabilities. In December 2021, City Council approved the creation of a new bylaw to prohibit new domestic-purpose pumping wells and to create a new development standard for monitoring wells installed, maintained and decommissioned during the land development process. Administration also committed to creating internal guidelines and process for the maintenance and decommissioning of wells on City property and right-of-ways (ROWS).

Geotechnical Support

In addition to managing the riverbank, the City Geotechnical Engineering Specialist is a resource for all City Departments and in 2021 was involved in several projects, providing geotechnical support. Some of these projects included the following:

- Faithful Avenue Area Grading, Trunks & Primary Water Main
- Hampton Business Park Sanitary Trunk Crossing
- W.W. Ashley District Park Dry Storm Pond Construction
- Churchill Park Dry Storm Pond Design
- Melville Street Sanitary Sewer Replacement
- Blairmore Sector Planning
- East Water Treatment Plant Feasibility Study

4.8 Community Awareness and Engagement

Montgomery Place Drainage

The annual update for the Montgomery Place Neighbourhood was completed in the fall of 2021. Information included details of planned capital projects, driveway crossing permits, the new bylaw created to support driveway restoration during City-led drainage improvement projects, and general drainage information for the overland ditch and culvert network.

Flood Control Strategy

Communications and engagement for the FCS is a priority for the Storm Water Utility. The following communications were mailed to area residents and stakeholders regarding the Churchill Park dry pond project in 2021:

- Notification of Council meeting for project approval (March 2021)
- Approval of Churchill Park Project (April 2021)

- Engagement Webpage creation (May 2021)
- Video Presentation to Engage webpage (July 2021)
- Public Engagement Events (September and October 2021)
- Public Engagement Summary (December 2021 and January 2022)

Two virtual engagement events were held for the Churchill Dry Pond project in September and October 2021. An engagement summary of the events was mailed to residents in early 2022.

A news release was completed for the first FCS project at W.W. Ashley Park when substantial completion was reached in October 2021. Regular communication throughout construction was also provided to area residents.

Nutana Slope

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

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 SSR. In 2021, recorded presentations and virtual presentations were offered to schools in the province. Nine schools or groups and 357 students and teachers participated in the Yellow Fish Road™. Yellow fish were painted on 338 storm drains in 12 neighbourhoods, and 1,162 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 2021 to 2022 and the Storm Water Management Credit Program. Detailed information regarding the storm water utility charge credit program was also distributed to new builds (2017 to 2021) that would qualify for a credit due to installing peak flow reduction infrastructure to reduce the impact on the storm water system that is now mandated through the building permit process.

Saskatoon.ca Website Updates

The Storm Water website is reviewed as needed to ensure up-to-date information is provided to Saskatoon residents. In 2021, additional information regarding ditch crossings in Montgomery Place was added to the webpage, including a new application form and information package.

4.9 Storm Water and the Environment

Storm Water Quality Monitoring

Saskatoon Water monitors 12 major outfalls for storm water quality. These outfalls are sampled and tested for temperature, chlorine, E.coli, and total coliforms every alternate week.

The monitoring program also tracks changes in water quality and quantity for the Northeast Swale. The monitoring 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.

Green Infrastructure Strategy

The Storm Water Utility participated in and contributed funding for the Green Infrastructure Strategy (GIS) with Sustainability, Planning and Development, other Civic Departments, and Meewasin Valley Authority. The GIS includes actions that support managing rain where it falls and recognizes storm water as an important resource. An implementation plan update in alignment with the GIS's priorities is planned to be presented to City Council in Q2 of 2022. Green storm water infrastructure, such as swales and storm water ponds, are an important part of Saskatoon's 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 SSR.

Outfall Debris Catchment Bags

The COS has partnered with USask on an upcoming project to install outfall debris catchment bags on two of the City's storm water outfalls. The bags will hold trash and other pollutants that would have otherwise reached the SSR through the storm water system. The project, which was successful in receiving a Natural Sciences and Engineering Research Council of Canada (NSERC) Alliance grant in late 2021, will also involve the analysis of the contents of the catchment bags and storm water quality analysis. Installation of the bags and the beginning of analysis is expected to begin in Spring 2022.

4.10 Utility Billing

ERU Assessment Updates

In 2021, the Storm Water team reassessed a total of 228 ICI and multi-residential properties. Of these sites, 160 assessments were due to internal observations of recent construction or previously incorrect billing, 41 assessments were due to new sites being created, and 27 assessments were due to customer inquiries.

Storm Water Management Credit Program

The [Storm Water Management Credit Program](#) took effect January 1, 2019, providing the opportunity for a reduction in Storm Water Management Charges for ICI and multi-residential property owners who have implemented onsite storm water management measures. Properties are eligible for a credit in the three categories up to a maximum total combined credit of 50%. The details of the three categories are provided below in Table 7.

Table 7: Storm Water Management Credit Categories

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%

The Storm Water website includes Frequently Asked Questions, a fillable application form, a user-friendly credit calculation calculator, an inspection and maintenance template, and a comprehensive guidance manual regarding the credit program. Information about the credit program was sent with all 2021 ICI Storm Water Utility bills. The City received eight inquiries and follow-up questions regarding the storm water credit program, however only four property owners submitted a formal application. Of the received applications, only two sites received approval for the credit program (as the remaining sites did not provide sufficient documentation for review and have not resubmitted). A communication plan will continue to be implemented in 2022 to increase awareness of the credit program for ICI and multi-residential property owners.

4.11 Continuous Improvement Highlights

The Storm Water Utility has undertaken Continuous Improvement to increase service levels, improve efficiencies, and reduce costs in 2021:

- The FCS cost-shared with the GoC, to help the City adapt to the risk of more intense storms associated with climate change. Project 1 (W.W. Ashley Park Dry Pond) construction reached substantial completion and the detailed design of Project 2 (Churchill Neighbourhood Park Dry Pond) was completed in 2021.
- A funding application for approximately \$5.8 million in external funding through the GoC and GoS ICIP was approved in mid-2021. This funding will cost share the MPDIP, with construction to restore drainage expected to start in 2022 for Project 1. Three additional capital drainage improvement projects are planned for the neighbourhood before 2027.
- A funding application was completed for the NIF through the GoC in 2021. This funding application would cost-share overland ditch and culvert drainage improvements for the CN Industrial Neighbourhood.

- Cost-effective research was leveraged through a partnership with the USask to identify the water quality of storm water run-off in outfalls. The results were used to remediate a source of contamination. This project concluded in 2021.
- Asset management improvements were a focus for the Storm Water Utility in 2021. A general Storm Water AMP update was provided to City Council in 2021. Approximately 31% of the overall storm water infrastructure system has been inspected. The Storm Water Utility also participated in the corporate Asset Management Maturity Assessment. A comprehensive storm water AMP was created and will be improved in the next several years. Storm Pond Asset Management work including the formal visual assessment of the pond network and sediment infill analysis were completed in 2021.
- Improvements were made to the storm pond visual assessment reporting, including new observation categories and required information on the inspection forms, and a new report template that included additional background information and more detailed descriptions of the findings at each pond.
- Participation in the National Water and Wastewater Benchmarking Initiative (NWWBI) provided access to best practices and lessons learned from other Canadian municipalities regarding storm water management.
- As part of the Groundwater Protection Project, Administration committed to create an Administration policy and associated guidelines for the installation, maintenance and decommissioning of groundwater monitoring wells. This policy will improve how wells are managed on public property and reduce the risk of groundwater contamination through monitoring wells.
- The updated Drainage Bylaw will improve lot grading and overland drainage in the City's neighbourhoods. It also provides more tools for the Drainage Inspector to resolve drainage problems between property owners.
- The new welcome signs installed and planned to be installed at storm water wet ponds provide a more user friendly and education awareness of the function and safety implications regarding storm ponds and recreational use.

5.0 OUR FINANCES

The Storm Water Utility is funded through a user-pay principle with charges reasonably proportional to storm water runoff generated according to property size and surface imperviousness (green space is charged less than buildings and pavement). A single-family 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 for single residential properties in 2021 was \$7.775 per month (\$93.30 annually). In 2021, 66,088 single family dwellings were charged storm water management charges (1 ERU each).

Commercial properties can generate significantly more storm water than residential properties; therefore, they are charged multiple ERUs from a minimum of two annual ERUs (\$186.60) to a maximum of 100 ERUs (\$9,330) in 2021. In 2021, the Storm Water Utility billed 4,701 properties including 3,589 ICI properties and 1112 multi-residential properties.

After intense rain events caused sanitary sewer backups in 2005, a temporary Flood Protection Program (FPP) was established with a \$36.00 annual (\$3.00 monthly) charge on all water meters. The charge was increased to \$54.00 annually (\$4.50 monthly) in 2009. In 2018, City Council approved the phase out of the FPP charge by \$13.50 per year from 2019 to 2022, in conjunction with an increase to the ERU rate of \$13.50 per year. Figure 12 below displays the ERU and FPP rates for single family residential properties from 2018 to 2022, with the total charges not changing.

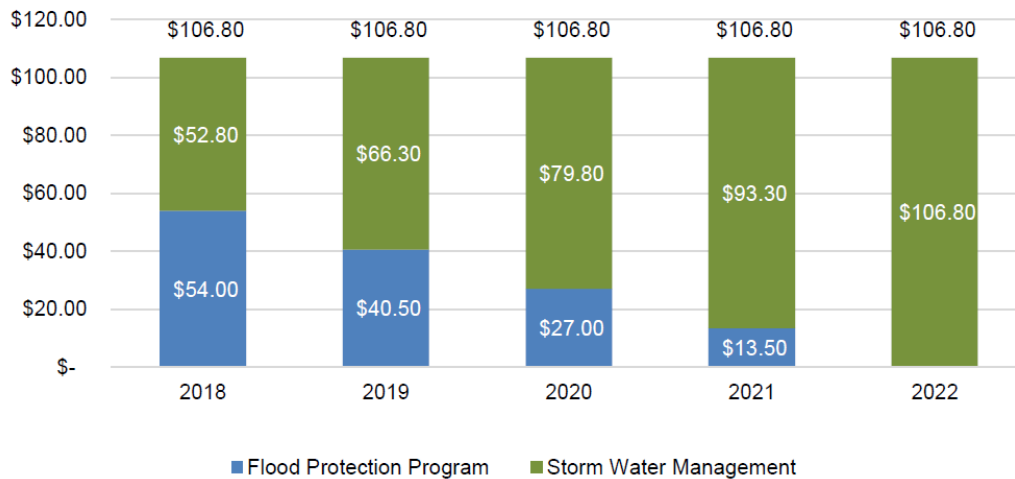


Figure 12: Annual Storm Water and Flood Protection Charges per Year

5.1 Revenues

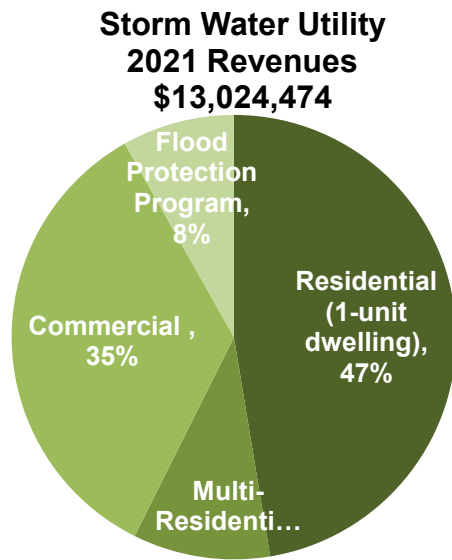


Figure 13: 2021 Revenues by Category

In 2021, total Storm Water Utility revenues including the temporary FPP were \$13.0 million, an increase of 7.1% from 2020. Storm Water Management revenues of \$11.9 million based on ERUs included \$4.5 million from ICI properties (35% of total revenues and 5% of customers of the storm water management charge), \$6.2 million from one-unit residential properties (47% of total revenues and 93% of customers of the storm water management charge), and \$1.3 million from multi-residential properties (10% of total revenues and 2% of customers of the storm water management charge). Revenue from City owned sites was \$0.3 million which is included in the Commercial category. Figure 13 displays the revenues in percentage by category.

The 2021 revenue from the temporary FPP of \$1.1 million was directed to the Infrastructure Reserve for future Flood Control Strategy projects.

Variations: Actual total Storm Water Utility revenues were \$255,000 (2.0%) higher than budgeted in 2021 because of ERU reassessments completed, new sites, and higher than budgeted FPP revenues.

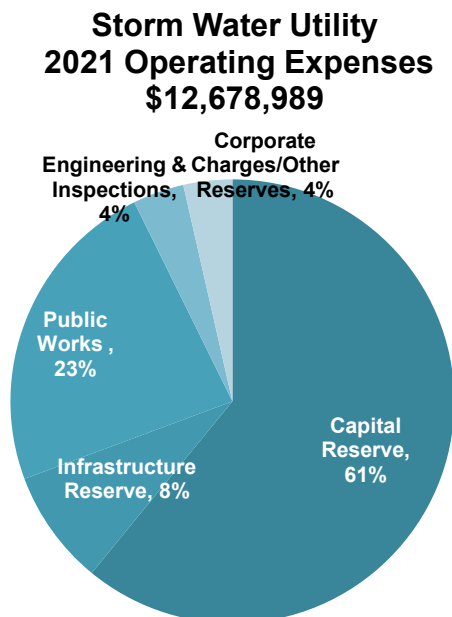


Figure 14: 2021 Operating Expenditures by Category

5.2 Operating Expenditures

The Storm Water Utility's 2021 operating expenditures were \$12.7 million, including \$8.8 million (69%) allocated to Capital and Infrastructure reserves.

WWO and RFS (Public Works) expended \$3.0 million (23% of total operating expenses) to operate and maintain the storm water system including handling citizen drainage calls, keeping storm drains clear, replacing and repairing the infrastructure, and sweeping streets in the fall. Of the \$3.0 million spent by Public Works, \$2.1 million was spent on sewer maintenance by WWO, which was a \$0.9 million (78%) increase from 2020. The drainage (RFS) component of Public Works spent \$0.9 million in 2021 which was up

from \$0.7 million (30%) spent in 2020.

Administration costs (corporate charges) of \$0.39 million included billing services by the Revenue Branch, financial and administration services from Finance, and insurance. Engineering and inspections, including overall utility management, accounted for \$0.47 million.

Variances: Operating expenditures in 2021 were \$0.09 million (1%) below budget. Public Works (RFS drainage and WWO maintenance) actuals for 2021 were \$0.24 million (8%) below budget, which was a significant improvement from 2020. Expenses also included a \$114,000 transfer to a capital reserve for the City's enterprise resource program (Fusion).

Table 8 displays the actual 2021 Operating Revenues and Expenditures compared to the 2021 budgeted and 2020 actual amounts.

Table 8: 2021 Storm Water Operating Revenues and Expenditures

Storm Water Utility Operating Revenues and Expenses (\$1000s)			
	2021 Actual	2021 Budget	2020 Actual
Revenues			
Storm Water Charges	\$ 11,947	\$ 11,744	\$ 10,092
Flood Protection Program	\$ 1,064	\$ 1,013	\$ 2,066
Late Charges	\$ 12	\$ 12	\$ 5
Ditch Crossing Permits	\$ 2	\$ -	\$ -
Total Revenues	\$ 13,024	\$ 12,769	\$ 12,163
Expenses			
Engineering & Inspections Operations	\$ 474	\$ 592	\$ 289
Maintenance (Public Works)	\$ 2,083	\$ 2,169	\$ 1,168
Drainage (Public Works)	\$ 883	\$ 1,038	\$ 677
Customer Billing	\$ 117	\$ 139	\$ 117
Corporate Services	\$ 59	\$ 60	\$ 52
Licenses & Insurance	\$ 88	\$ 88	\$ 82
Other Admin Expenses	\$ 126	\$ -	\$ -
Interest Expense/(Revenue)	\$ (54)	\$ (54)	\$ (54)
Provision to Capital Reserve	\$ 7,725	\$ 7,725	\$ 6,041
Provision to Other Reserves	\$ 114	\$ -	\$ 114
Provision to Infrastructure Reserve	\$ 1,064	\$ 1,013	\$ 2,066
Total Operating Expenses	\$ 12,679	\$ 12,769	\$ 10,552
Revenues Less Expenses	\$ 345	\$ -	\$ 1,611
(To)/From Stabilization/Capital Reserves	\$ (345)	\$ -	\$ (1,611)

5.3 Storm Water Stabilization Reserve

The Storm Water Stabilization Reserve has been established to provide for normal fluctuations in storm water expenses because of differences in weather conditions, such as widespread severe rain events, that impact requirements for storm water maintenance services. The Stabilization Reserve reached the maximum cap in 2020, which is the one-year operating budget for Public Works (WWO and RFS). In October 2021, the Storm Water Utility presented a report to City Council which was approved to reset the Stabilization Reserve cap to 50% of the one-year operation budget of WWO and RFS. The transfer of funds exceeding the new Stabilization Reserve cap were transferred to a Storm Water Utility Capital project.

Table 9: 2021 Change in Stabilization Reserves

Change in Storm Water Stabilization Reserve			
(\$1000s)			
Description/Year	2021	2020	2019
Stabilization Reserve Beginning of Year	\$ 3,144	\$ 2,803	\$ 2,056
Balance From Year	\$ 345	\$ 1,611	\$ 747
Transfer Out to Capital Project	\$ (2,134)	\$ (1,270)	\$ -
Storm Stabilization Reserve End of Year	\$ 1,356	\$ 3,144	\$ 2,803

5.4 Capital Funding

In 2021, \$7.7 million was allocated to the Storm Water Capital Reserve and \$1.1 million from FPP revenue was allocated to the Infrastructure Reserve. In addition to revenue allocated to capital from the Storm Water Operations, \$1.5 million from the GoC's Disaster Mitigation and Adaptation Fund (DMAF) was utilized for the Flood Control Strategy (W.W. Ashley Storm Pond eligible expenditures).

5.5 Capital Expenditures

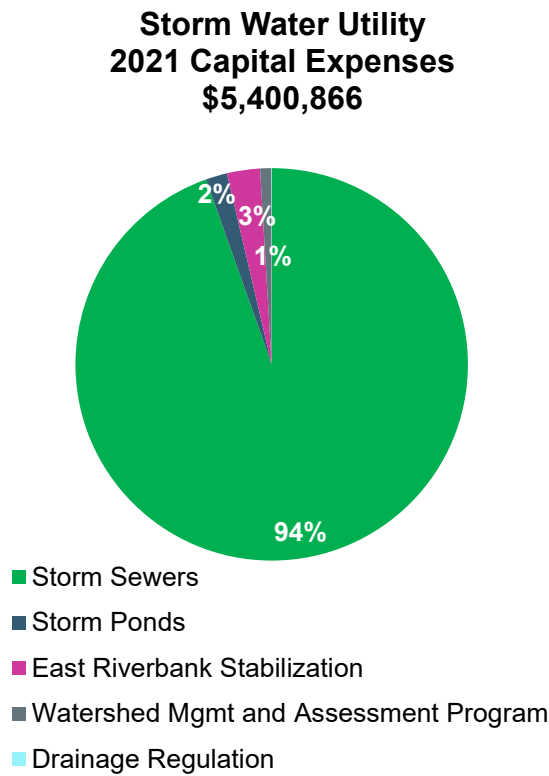


Figure 15: 2020 Capital Expenditures by Category

In 2021, Storm Water Utility capital expenditures were approximately \$5.4 million (Figure 15). Approximately 94% of capital expenditures were for storm sewer network management, asset preservation, and capacity building (\$5.1 million).

East Riverbank Stabilization expenditures of \$147,000 primarily included the in-house Geotechnical Engineer salary, the 3D slope stability modelling, and other riverbank monitoring costs.

Storm pond preservation expenditures were \$95,000, and included inspections, monitoring, asset management and reporting, and the final construction costs of the Brand Road Pond dredging.

The Watershed Management and Assessment project also contributed \$49,000 in actual costs.

Variances: Actual 2021 capital expenditures were \$8.0 million less than budgeted with the following significant contributing factors:

- Actual expenditures for the East Riverbank Stabilization project were \$978,000 less than budget because no slope remediation projects were completed in 2021. A balance of up to \$3.0 million 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. This emergency fund maximum has been reached and the East Riverbank Capital annual budgets will be reduced starting in 2022.
- Storm Water Sewer expenditures were \$6.5 million less than the budget due to previous (2019 and 2020) delays in the Flood Control Strategy projects. Construction years for the nine Flood Control Strategy projects have been reforecasted and remaining budget will be used in future years before 2028.
- Storm Water Pond preservation expenditures were \$523,000 less than budgeted. Significant capital expenditures are planned in the next several years for storm pond preservation, which will utilize the remaining budget.

Table 10 displays the actual 2021 Storm Water Capital Expenditures compared to the 2021 budgeted and 2020 actual amounts. The amounts shown in Table 10 does not factor in reimbursement from the DMAF funding agreement between the City and the GoC for the FCS. This reimbursement factors in the 'Storm Trunk and Collection Sewer' capital expenditures. Total net capital expenditures for the Storm Trunk and Collection Sewers

would be reduced from \$5.1 million to \$3.7 million considering the funding received by the GoC. Furthermore, the Total Capital Expenditures Actuals is reduced from \$5.4 million to \$3.9 million factoring the GoC funding.

Table 10: 2021 Storm Water Capital Expenditures from Capital Reserve Fund

Storm Water Capital Expenditures (\$1000s)			
	2021 Actual	2021 Budget	2020 Actual
Storm Trunk and Collection Sewers	\$ 5,108	\$ 11,587	\$ 1,765
Storm Sewer Pond Preservation	\$ 95	\$ 618	\$ 140
East Riverbank Stabilization	\$ 147	\$ 1,125	\$ 159
Drainage Regulation	\$ 2	\$ -	\$ 101
Watershed Mgmt and Assessment Program	\$ 49	\$ 76	\$ 22
Total Capital Expenditures	\$ 5,401	\$ 13,406	\$ 2,186

At the end of 2021, ongoing capital projects extending over more than one year had unspent capital balances of \$19.1 million. This does not include \$3.8 million in funding from the GoC for the FCS that was allocated in the 2020 and 2021 budget but was not utilized yet.

5.6 Storm Water Capital Reserves

The Storm Water Capital Reserve provides funding for future large-scale capital projects. The capital reserve at the end of 2021 was \$4.4 million. Capital account closures and adjustments yielding a net addition of \$0.8 million. Table 11 displays the comparison of 2021 Capital Reserves End of Year to those of 2019 and 2020.

Table 11: 2021 Change in Storm Water Capital Reserve

Description/Year	2021	2020	2019
Capital Reserve Beginning of Year	\$ 2,557	\$ 1,052	\$ 1,857
Provision to Capital Reserve	\$ 7,725	\$ 6,041	\$ 4,253
Capital Budget	\$ (9,033)	\$ (8,793)	\$ (5,065)
Redevelopment Levy Adjustment	\$ 2,384	\$ 2,402	\$ -
Transfer in from Stabilization	\$ -	\$ 1,270	\$ -
Closures and Adjustments Returned to Capital Reserve	\$ 785	\$ 585	\$ 8
Capital Reserve End of Year	\$ 4,418	\$ 2,557	\$ 1,052

Since inception, FPP funding has been paid into the “Infrastructure Reserve”. Table 12 shows changes in the component of the Infrastructure Reserve funding from FPP revenue for capital projects to reduce risks of sanitary sewer back-ups and overland flooding. At the end of 2021, \$2.0 million was available in the Infrastructure Reserve for future FCS projects.

Table 12: 2021 Year End Balance of Storm Water Reserves

All End of Year Storm Water Reserves			
(\$1000s)			
Description/Year	2021	2020	2019
Storm Stabilization Reserve	\$ 1,356	\$ 3,144	\$ 2,803
Capital Reserve	\$ 4,418	\$ 2,557	\$ 1,052
Infrastructure Reserve	\$ 2,020	\$ 1,969	\$ (90)
Total Storm Water Reserves End of Year	\$ 7,794	\$ 7,670	\$ 3,766

At the end of 2021, the total balance of all three-storm water related reserves (Storm Water Stabilization (Table 9), Capital (Table 11), and Infrastructure (Table 12) Reserves) was \$7.8 million.

5.7 Storm Water Utility Benchmarking

In 2020, the City of Saskatoon storm water utility rate was the third lowest of the eight Canadian cities that participated in the National Benchmarking Initiative. Results of the 2021 comparison is not yet known through the National Benchmarking program.

In 2021, the Storm Water Utility compared its utility rates to 12 other cities with utilities across Canada using publicly available information on the cities' websites. For single residential properties, Saskatoon's overall charges including Storm Water Management (\$93.30) and Flood Protection¹ (\$13.50) was \$106.80. This fee is the fourth lowest compared to the 12 other comparison cities, and the second lowest among the seven comparison cities located in the Prairies. An image of the comparison to prairie cities is shown in Figure 16.

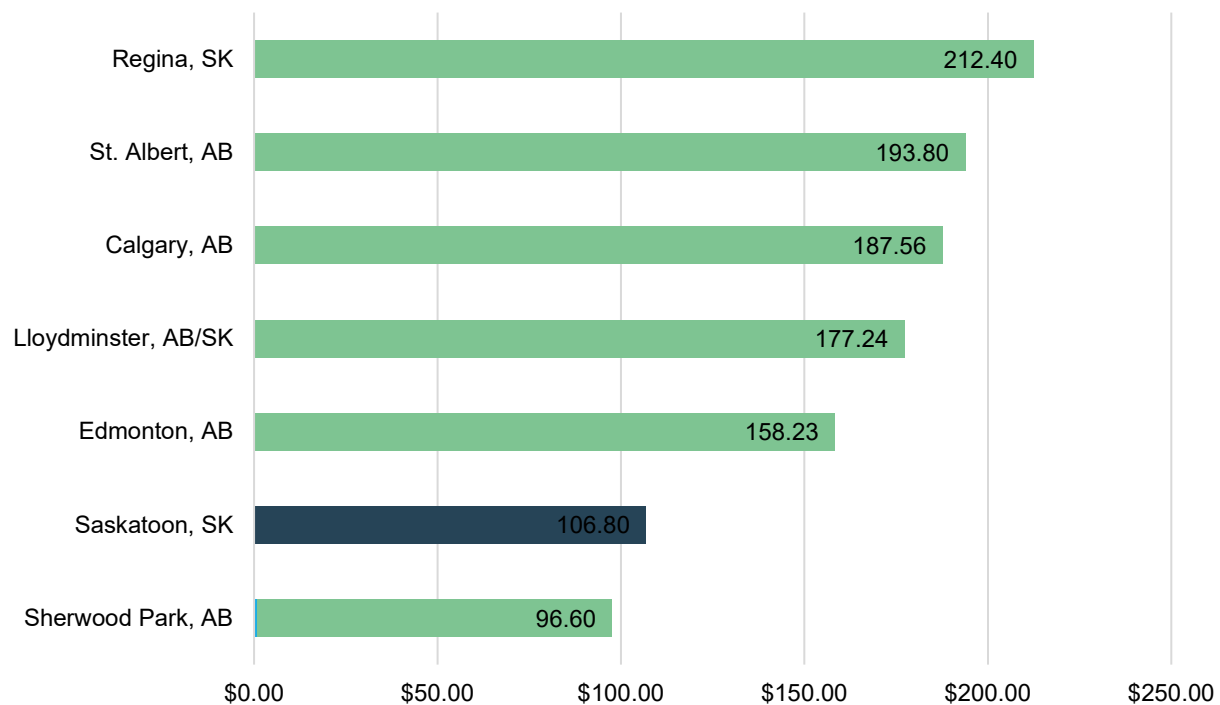


Figure 16: 2021 Residential Storm Water Management and Flood Protection Charges.²

Non-residential properties are more difficult to compare, as storm water utility programs ranged from flat rates for all customers to charges based on area size and imperviousness.

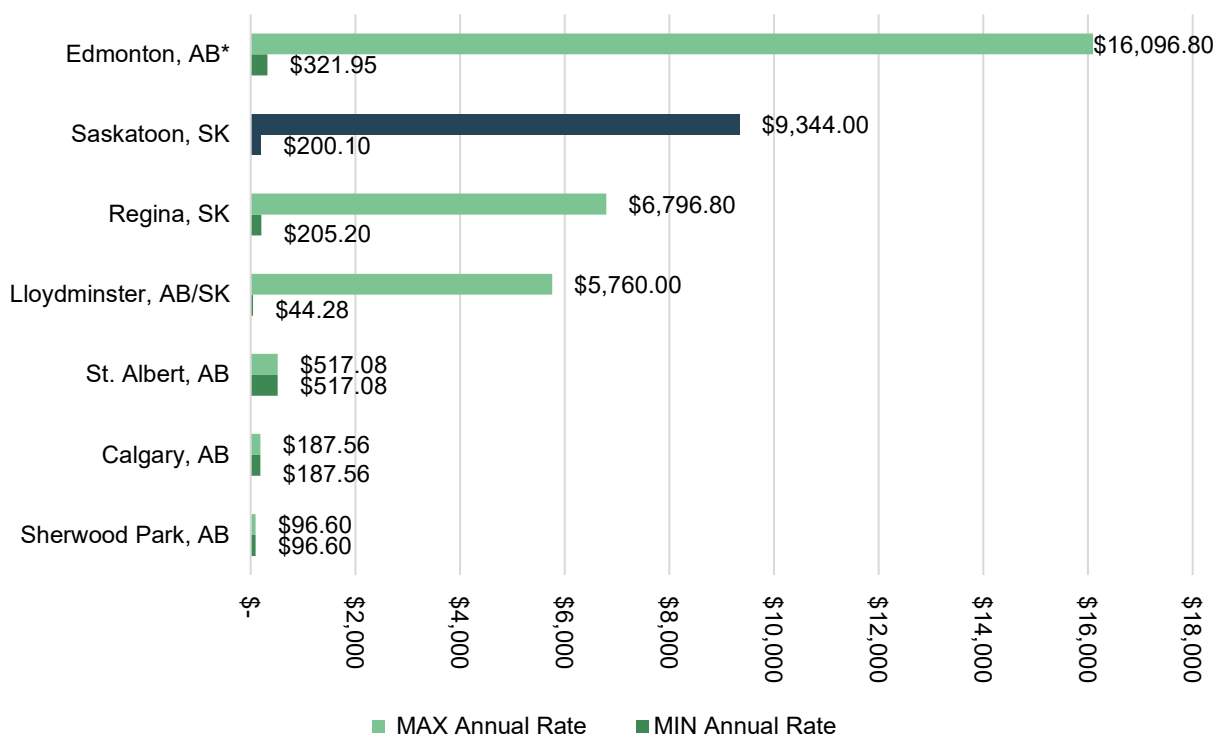
- For a typical restaurant (4,515 m²) that is all hard surface, municipality storm water charges range nationally from \$97 (Sherwood Park) to \$2,636 (Kitchener). Saskatoon has the fourth highest annual rate, charging \$1,414.

¹ Prior to 2019, the "Flood Protection Program" levy was charged to fund projects that mitigate damage from sanitary sewer backups during intense rain events.

² Sources: Rates from websites of Cities of Calgary, Lloydminster, Regina, Sherwood Park, St. Albert, and EPCOR.

- For a large shopping center (37,200 m²) that is all hard surface, municipality storm water charges range nationally from \$97 (Sherwood Park) to \$19,961 (Edmonton). Saskatoon has the third highest annual rate, charging \$9,344.

Saskatoon’s maximum annual storm water charge was \$9,344 in 2021 for non-residential properties, which was the second highest maximum charge out of the seven prairie cities surveyed. Note that the Saskatoon data utilized an assumption of one water meter for the purpose of FPP charges. A comparison between the maximum and minimum commercial fees of the seven prairie cities is shown in Figure 17.



* Assuming maximum charge is for 30,000 m² property (equivalent to 100 ERU in Saskatoon)

Figure 17: 2021 Commercial Annual Minimum and Maximum Storm Water Management and Flood Protection Charges³

³ Sources: Rates from websites of Cities of Calgary, Lloydminster, Regina, Sherwood Park, St. Albert, and EPCOR.

6.0 OUR CHALLENGES

Storm water management has continuing and expected future challenges which are summarized below:

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.

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

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

Costs for Businesses: Storm water charges for some businesses will more than double between 2018 and 2022, which may generate negative feedback. Actions that businesses can take to reduce their storm water run-off (storm water credits) generally have high capital costs relative to the annual reduction in storm water management charges.

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.

Fluctuating 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. As groundwater levels decrease during times of drought, the impact of high groundwater can be forgotten by nontechnical staff and residents alike resulting in lower implementation of groundwater management practices.

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.

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

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.

7.0 CONCLUSION

Several initiatives that the Storm Water Utility undertook in 2021 will be further developed in 2022 and future years including the following:

- Furthering the nine-year FCS to reduce flood risk in areas that have a long history of frequent flooding. Excavation and construction of storm infrastructure for the Churchill Storm Pond will be completed in 2022. The detailed design and public engagement for the Weaver Park Dry Storm Pond will also be completed in 2022, with construction scheduled for early 2023 (pending Council approval).
- Phase 1 of the MPDIP will be constructed in 2022 along Caen Street., Dundonald Avenue, Lancaster Boulevard, and Ortona Street. Detailed design of Phase 2 and concept plans of Phase 3 and Phase 4 of the MPDIP are also expected to be completed in 2022.
- Begin detailed design of drainage improvements in CN Industrial Neighbourhood (related to the NIF funding application).
- Continuing the storm water pipe lining program to extend the life of storm water infrastructure in collaboration with TS.
- Improving the storm water system AMP in collaboration with the City's Corporate Asset Manager, TS, and WWO.
- Finalizing and implementing recommendations from the 2021 Storm Pond System Visual Assessment Report.
- Continuing installation of new welcome signage located near storm ponds, including eleven signs planned to be installed in 2022.
- Completion of bathymetric surveys of existing storm ponds, including four locations planned for 2022.
- Further leveraging resources through partnerships with the USask for research about storm water quality, including installation of catchment bags on two existing river outfalls in 2022.
- Completing inspections and identifying conditions of existing SSR outfalls in the 2022 Outfall Visual Assessment Report.
- Reassessing ICI and multi-residential properties storm water utility ERU assessment through the 2021 aerial photo.
- Continuing promotion of the Storm Water Management Credit Program.
- Participating in the Canadian Infrastructure Benchmarking Initiative management by AECOM.

The Storm Water Utility is committed to working collaboratively with other departments towards making Saskatoon a more flood resilient City.

8.0 APPENDICES

Appendix 1: Definitions & Abbreviations

Definitions

Catch Basins: Used to convey storm water from the ground surface, usually on a street or parking lot, to the storm water collection system. Collector catch basins are located on collector mains and trunk catch basins are located on trunk mains.

Culverts: Used to channel water under roads, railways, or embankments. Culverts have open inlets and outlets, usually transporting water from one ditch to another.

Dredging: The process of removing sedimentation (mud), weeds, and rubbish from storm pond bottoms.

Equivalent Runoff Unit (ERU): A measurement unit for runoff that is used for storm water management fees. One ERU is based on an average single-family residential property's areas and types of surfaces (i.e. amount of grass, hard surface, etc.).

Force Mains: Pressurized mains from 100 mm to 900 mm in diameter which connect storm water pumping stations and lift stations to the gravity collection system.

Leads: Pipes connecting catch basins to the storm collection system which range in diameter from 100 mm to 900 mm. Collector leads are located on collector storm mains. Trunk leads are located on trunk storm mains.

Lift Stations: Move storm water from lower to higher elevations, particularly where the elevation of the source is not sufficient for gravity flow and/or when the use of gravity conveyance will result in excessive excavation depths and high sewer construction costs.

Lining: A layer of material installed in a sewer main to improve performance and extend the lifespan.

Manholes: Chambers used to access sewer mains for maintenance and inspection purposes.

Oil and Grit Separators (OGS): A variation of the traditional settling tanks designed to capture sediments and trapped hydrocarbons (oils) in storm water runoff. OGS replace conventional manholes.

Outfalls: Are the discharge point of the storm sewer system to the river, and include the following three categories:

- Local – Expel water from relatively smaller local areas than the collector or trunk outfalls
- Collector – Connect to the storm sewer system through collector mains
- Trunk – Connect to the storm sewer system through trunk mains

Piezometers: Devices used to measure pressure or depth of groundwater at a specific location.

Return Period: The estimated average time between equivalent rain events based on rainfall intensity and duration. A rain event with a 2-year return period has a 50% probability of occurring in any year. A rain event with a 100-year return period has a 1% probability of occurring in any year.

Runoff: Rain and snowmelt draining from land, buildings, or other surfaces.

Service Connections: Connect drainage systems from customer properties to storm mains in the street.

Sewer Mains: Principal pipes in a system that distribute water or collect storm water and waste water, and include the following two categories:

- Collector – Sewer mains that are less than 1350 mm in diameter
- Trunk – Sewer mains that are more than 1350 mm in diameter

Slope Inclinometer: Geotechnical instruments used to measure horizontal displacements along various points on a borehole to detect slope movement.

Standpipes: Plastic pipes with perforated holes at the base used to measure groundwater level.

Storm Water Ponds: Manmade basins that control excess storm water during and after heavy rainfall events and provide water quality improvement for runoff.

- Dry Ponds – normally do not store water. They detain runoff during intense rain events and then gradually release the water back into the storm sewer system.
- Wet ponds – permanently retain water throughout the year.

Sub-Drainage: Perforated pipes located in the slope along the riverbank used to collect ground water and remove it from the slope. This decreases the groundwater level in the slope and helps to stabilize the area.

Sump Pumps: Remove water that has accumulated in a water-collecting sump basin, commonly found in the basements of homes.

Vibrating Wire Piezometers: Used to provide accurate pore-water pressure readings in soils to measure groundwater levels.

Abbreviations

AMP	Asset Management Plan
COS	City of Saskatoon
C&D	Construction and Design
DMAF	Disaster Mitigation and Adaptation Fund
ERU	Equivalent Runoff Unit
FCS	Flood Control Strategy
FPP	Flood Protection Program
GIS	Green Infrastructure Strategy
GoC	Government of Canada
GoS	Government of Saskatchewan
ICI	Industrial, Commercial, Institutional
ICIP	Investing in Canada Program
MPDIP	Montgomery Place Drainage Improvement Project
NIF	Natural Infrastructure Fund
NSERC	Natural Sciences and Engineering Research Council of Canada
PFSRB	Partners for the Saskatchewan River Basin
PSA	Public Service Announcement
RCD	Recreation and Community Development
RFS	Roadways, Fleet, and Support
ROW	Right-of-way
SF	Saskatoon Fire
SSR	South Saskatchewan River
SW	Saskatoon Water
TS	Technical Services
TSS	Total Suspended Solids
USask	University of Saskatchewan
WWO	Water and Waste Operations

Appendix 2: Montgomery Place Drainage Strategy Communication

Drainage

When it rains or melts, help maintain ditch drainage to reduce flooding in Montgomery Place

How you can help:

- › Do not fill in ditches within City of Saskatoon right-of-way (ROW). A permit to alter the ROW is required.
- › Keep culverts clear.
- › Work with neighbours to resolve ditch drainage issues.

What you can expect from us:

- › The City will clear major drainage paths and culverts each spring.
- › The City will assist homeowners through the Ditch Crossing Driveway Permit application process.
- › The City will follow up on ditch drainage complaints regarding new driveway crossings.

Contact Us

Customer Care Centre

Email: customercare@saskatoon.ca
Phone: 306-975-2476

General Drainage and Flooding Questions

Email: stormwater@saskatoon.ca
Phone: 306-975-7611
Web: saskatoon.ca/stormwater

Sign Up for Project Updates

To receive biweekly Drainage Improvement Project updates when construction begins, please e-mail your name and e-mail address to constructionupdates@saskatoon.ca.



Fall 2021 Drainage Improvement Project Update Montgomery Place



2021-2022 Drainage Improvement Project

The project includes improvements in the following locations:

- > **Dundonald Ave from Dieppe Street to Caen Street:** storm sewer and ditch construction.
- > **Caen Street from Dundonald Avenue to Currie Avenue:** water main replacement and ditch construction.
- > **Lancaster Blvd from Caen Street to Dieppe Street:** ditch construction and a portion of water main replacement.
- > **Ortana Street:** ditch construction.

Project delays in 2021 were due to an industry shortage in materials necessary and the requirement to finalize funding agreements with the Government of Canada and Government of Saskatchewan.

Affected residents will be notified in advance of the project resuming in 2022.

For more information and background on the Drainage Improvement Project, visit saskatoon.ca/montgomeryplace.



Ditch Crossing Driveway Permits

NEW

Saskatoon Water manages private ditch crossing permits for Montgomery Place. Permits are necessary for the construction of any driveway or landscaping project that crosses over the public right of way (ROW).

Ditch crossing specifications for driveway width within the ROW have been updated and are based on lot frontage in Montgomery Place.

To apply for a permit and to view the Driveway Crossing Information Package, visit: saskatoon.ca/ditchcrossingpermit

Questions?

Call 306-975-7611 or email stormwater@saskatoon.ca

Private Crossings Over Ditches Bylaw

NEW

A new bylaw (Bylaw No. 9730) is specific to drainage improvement projects in Montgomery Place and improving driveway ditch crossing permitting and compliance.

To review the bylaw, please visit saskatoon.ca/bylaws and enter "9730" into the search field.

Appendix 3: Flood Control Strategy Communication

Churchill Park Dry Storm Pond Project Update

BACKGROUND

The City of Saskatoon is upgrading the storm water system to reduce the flood risk for residential properties near the intersections of Ruth Street at Cairns and York Avenues, and Bute Street at Munroe and Albert Avenues.

When intense rainfall occurs, storm water will drain into a newly constructed dry storm pond in the nearby Churchill Park rather than flood intersections. It will then slowly drain into the storm water system and to the river.

SCHEDULE

Construction of the dry storm pond at Churchill Park begins with excavation in early 2022. The remaining phases (storm sewer pipes, outlet-inlet structures and landscape construction) will be scheduled between May and November 2022.

PROJECT FUNDING

The Churchill Park dry storm pond is the second of nine projects that will address flooding at Saskatoon's most flood-prone areas through the nine-year \$54 million Flood Control Strategy. The Government of Canada is contributing 40% of the eligible construction costs up to a maximum of \$21.6 million.

ENGAGEMENT & COMMUNICATIONS

Learn more about the Churchill Park Dry Storm Pond at saskatoon.ca/engage. Properties adjacent to the park will receive a construction notice with important information prior to the excavation work planned for early 2022.

In the meantime, we ask that residents sign up to receive project updates. To sign up, please email us at constructionupdates@saskatoon.ca from your preferred email address with "Churchill Park" as the subject to provide your name and address.

DESIGN

Feedback Included

Your feedback during the virtual information sessions was incorporated in the design of the storm pond:

- A new pathway will be added on the east side of the dry storm pond that will connect with the existing pathway.
- The dry pond will have the capacity to store storm water volume for a 1-in-10-year rain event.
- The cross-country ski trail system within the park can include the dry pond area once the project is complete.
- Existing trees on the east perimeter of the dry storm pond will be maintained and additional trees will be planted in the park. However, trees will not be added along the north side of the pond, maintaining the park view for residents of the nearby condominium.
- The multi-purpose fields will be incorporated into the design.



Customer Care Centre | 306-975-2476 | stormwater@saskatoon.ca



saskatoon.ca/engage