REPORT FOR ACTION

2023 Wet Weather Flow Master Plan Implementation Update

Date: May 23, 2023
To: Infrastructure and Environment Committee
From: General Manager, Toronto Water
Wards: All

SUMMARY

Adopted in 2003, the Wet Weather Flow Master Plan (WWFMP) provides planning for many initiatives that reduces the adverse impacts of stormwater (rain and melted snow) on the City's environment within a multi-year implementation horizon. This purpose of this report is to provide Council with an update of the progress of key WWFMP initiatives since the last WWFMP update in 2017.

Key objectives of the WWFMP include improving water quality along the waterfront, beaches and watercourses, protection of vulnerable City sewer and water infrastructure from erosion and reducing the risk of flooding to private and City properties during extreme wet weather. The WWFMP also provides guidance on municipal operations, environmental monitoring and public education initiatives related to stormwater management.

Significant progress has been made on critical WWFMP initiatives, most notably, construction of the Don River and Central Waterfront Project which is the largest and most significant stormwater management program in the city's history, the Basement Flooding Protection Program (BFPP), the rehabilitation of City stormwater management facilities, and in implementation of works within the watercourse and shoreline management programs. Policy updates to guide stormwater management for development and redevelopment have also been initiated.

Challenges due to construction cost escalation, constrained engineering and technical resources and competing commitments have impacted the implementation of the WWFMP, however key initiatives such as the construction of the Don River and Central Waterfront Project (and related projects - the Integrated Pumping Station and the High Rate Treatment Facility at the Ashbridges Bay Treatment Plant), critical end-of pipe projects and BFPP projects remain top priorities.

Implementation of the WWFMP is funded by investments set out in Toronto Water's annual capital budget and is primarily funded by the water rate with supplementary

contributions from Development Charges, and federal funding through the Disaster Mitigation Adaptation Fund.

RECOMMENDATIONS

The General Manager, Toronto Water recommends that:

1. Infrastructure and Environment Committee receive this report for information.

FINANCIAL IMPACT

This report provides an implementation status update on the WWFMP. The 2023-2032 Capital Budget and Plan for the WWFMP, as approved by Council, is $4.3 billion, including, state of good repair and service improvements that address future growth needs.

The implementation of WWFMP projects have been significantly impacted by cost escalation caused by high rates of inflation, global supply chain issues, market volatility, and staffing constraints for specialized labour. Year-over-year increases in tender costs across Toronto Water projects have impacted capital affordability and required reprioritization of the planned capital work necessary to address infrastructure needs. The implementation of some projects outlined in this staff report may extend beyond the ten-year capital plan, and/or are not fully funded.

Funding for Basement Flooding Protection Program projects include federal funding through the Disaster Mitigation Adaptation Fund.

Some sewer infrastructure identified in this staff report both manage wet weather flow and accommodate future growth. Funding for these projects is impacted by Bill 23, *More Homes Built Faster Act, 2022*. Specifically, Bill 23 has removed the City's ability to collect development charges for housing services, including sewers, resulting in an approximate $2.3 billion in lost revenues over 10 years.

Should the City not be fully reimbursed by the Province for the lost revenues resulting from Bill 23, and without new financial and policy tools, the City will not be able to construct the sewer infrastructure required to support growth. In addition, substantial escalation to cost estimates of capital works projects influence the number of projects that can be constructed with the available budget, and may require additional cost-benefit analysis, reprioritization of projects, or deferred project timelines.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

City Council on July 19, 20, 21 and 22, 2022, authorized the General Manager, Toronto Water to implement a recurring no-fault grant program for basement flooding damages, available to eligible properties within the Rockcliffe Special Policy Area and hydraulically connected sewer catchment area. The Council decision can be viewed at: Supplementary Report - No Fault Grant For Basement Flooding Damages

City Council on July 19, 20, 21 and 22, 2022 supported, in principle, undertaking a further phase of waterfront revitalization that could be enabled through tri-government funding commitments. Details on the council decision can be viewed here: Update on the Next Phase of Waterfront Revitalization

City Council on June 15 and 16, 2022, adopted the preferred solution and design for flood protecting the Rockcliffe-Smythe area and requested the TRCA, Transportation Services and Toronto Water to issue the Notice of Completion for the Rockcliffe Riverine Flood Mitigation Project. The council decision can be viewed here: Rockcliffe Riverine Flood Mitigation Project Municipal Class Environmental Assessment

City Council on July 14, 2021 authorized the General Manager of Toronto Water and the Chief Financial Officer and Treasurer to consult with water customers and stakeholders on the potential implementation of a stormwater charge and credits. The council decision can be viewed here: Water Users Consultation on Water Fees, Charges and Programs

City Council on November 25th and 26th, 2020 directed that projects identified through Basement Flooding Studies proceed to detailed design and construction if the cost per benefitting property is less than $68,000, and that projects that exceed the cost per benefitting property threshold be prioritized according to a greatest impact criteria. The council decision can be viewed here: Basement Flooding Protection Program Update

City Council on July 16th, 17th and 18th, 2019 authorized the City Manager to apply for intergovernmental funding to accelerate the Don River and Central Waterfront project. Don River and Central Waterfront Accelerated Plan

City Council on April 16, 2019 authorized the construction of the Ashbridges Bay Landform. The council decision can be viewed at: Ashbridges Bay Treatment Plant Landform Project

City Council on December 9 and 10, 2015 authorized the General Manager, Toronto Water, to develop and formulate a stormwater management funding model premised on the establishment of a dedicated stormwater charge, and directed a report back to Executive Committee in the spring of 2017 on stormwater charge implementation. The Council decision can be viewed at: Funding Options for Paying for Toronto Water's Stormwater Management Capital Program

City Council on March 10 and 11, 2015 requested the General Manager, Toronto Water, initiate and expedite the completion of new Basement Flooding Protection Environmental Assessment studies for the remainder of the City, specifically identified as Study Areas 42 through 67 on a prioritized basis. The Council decision can be viewed at:
2015 Rate Supported Budgets – Toronto Water 2015 Water and Wastewater Rates and Service Fees

City Council on June 10 -13, 2014 adopted principles and a framework for watercourse management in Toronto. The Council decision can be viewed at: Coordinated Watercourse Management Plan

City Council on June 10 -13, 2014 authorized the General Manager, Toronto Water, to finalize the Environmental Study Report for the Ashbridges Bay Erosion and Sediment Control Class EA, and to proceed with the detailed design of the Ashbridges Bay Landform Project as a joint initiative with the TRCA. The Council decision can be viewed at:
Ashbridges Bay Landform Project - Erosion and Sediment Control Class EA

City Council on October 8 to 12, 2013 requested that Toronto Water, Transportation Services, Engineering and Construction Services, and City Planning work together to develop green infrastructure standards for the public right-of-way for implementation in Transportation Services and Toronto Water capital projects. The Council decision can be viewed at:
Impact of July 8, 2013 Storm on the City's Sewer and Stormwater Systems

City Council on September 21 and 22, 2011 adopted the recommendations in a staff report titled "Wet Weather Flow Master Plan and Basement Flooding Protection Program Update" that identified WWFMP implementation and funding priorities for the next five to ten years. The Council decision can be viewed at: Wet Weather Flow Master Plan and Basement Flooding Protection Program Update

City Council on September 22 – 25, 2003 adopted the "Wet Weather Flow Management Master Plan and Wet Weather Flow Management Policy". The Council decision can be viewed at: Wet Weather Flow Management Master Plan and Wet Weather Flow Management Policy

COMMENTS

Background

In 1987, the International Joint Commission identified the Toronto region as one of 43 Areas of Concern in the Great Lakes Basin due to impaired beneficial uses (e.g., swimming, fish habitat, etc.) and degraded water quality, particularly in the Don River and Toronto's Inner Harbour. A major source of water pollution is stormwater runoff and combined sewer overflows (CSOs), which contain a mixture of stormwater and

untreated sewage, and are discharged from outfalls into Toronto's waterways during heavy rains or snowmelts.

In 2003, Council adopted the Wet Weather Flow Master Plan (WWFMP, a long-term plan with the goal of reducing and ultimately eliminating the adverse impacts of wet weather flow on Toronto's environment and improving the ecosystem health of its watersheds. The WWFMP sets out 13 objectives under four categories:

Water Quality in Local Waterways:

- Meet guidelines for water and sediment quality
- Virtually eliminate toxins through pollution prevention
- Improve water quality in rivers and the Lake so that they are healthy for swimming
- Improve aesthetics

Water Quantity:

- Preserve and re-establish a natural hydrologic cycle
- Reduce erosion impacts on habitats and property
- Eliminate or minimize threats to life and property from flooding

Natural Areas and Wildlife:

- Protect, enhance, and restore natural features (e.g., wetlands) and functions
- Achieve healthy aquatic communities
- Reduce fish contamination

Sewer System:

- Prevent sewer overloading to eliminate / reduce combined sewer overflows
- Reduce infiltration and inflow to sanitary sewers
- Reduce basement flooding

In alignment with the Toronto and Region Remedial Action Plan (RAP) under the Canada-Ontario Agreement and the Great Lakes Water Quality Agreement (GLWQA), the WWFMP identified improvement of water quality along Toronto's waterfront and City beaches as the highest priority objective. Implementation of the WWFMP improves water quality with the intent to delist the waterfront as an Area of Concern (AOC).

The WWFMP presents a variety of strategies for improving water quality and applies approaches tailored to the unique requirements, constraints, and opportunities in each of Toronto’s six watersheds. First “line of defence” practices (source controls and conveyance controls) provide treatment on private property and on roads prior to “last line of defence” practices (end-of-pipe controls) that are located at the most downstream end of sewer systems (outfalls).

Implementation of the WWFMP is a collaborative endeavour involving Toronto Water, other City divisions (including Transportation Services, Parks, Forestry and Recreation, City Planning, and Engineering and Construction Services), the Toronto and Region Conservation Authority (TRCA), and the public.

Toronto Water Capital Expenditures for WWFMP Implementation

Toronto Water capital expenditures supporting the WWFMP's implementation have totalled approximately $1.88 billion by end of 2022, including the Basement Flooding Protection Program and the Wet Weather Flow component of the Integrated Pumping Station at ABTP. The WWFMP is primarily funded by the water rate with supplemental contributions from Development Charges, and federal funding through the Disaster Mitigation Adaptation Fund directed towards Basement Flooding Protection Program work.

Toronto Water's 2023-2032 Capital Budget and Plan allocates a further $4.3 billion to support implementation of the WWFMP and its key implementation priorities. Toronto Water's historical and planned expenditures associated with the WWFMP are presented in Table 1.

Table 1 - Toronto Water WWFMP Related Capital Expenditures

Wet Weather Flow Master Plan Component	Toronto Water Capital Funds ($M)			
	Total Exp to date	2017-2022	2023-2027	2028-2032
Source Controls and Conveyance Controls ○ Policy / Guidelines development ○ Mandatory Downspout Disconnection ○ Green Infrastructure Right-of-Way Projects and Operations & Maintenance ○ Road Drainage Improvements	$61.1	$8.1	$15.3	$10.7
End-of-Pipe Controls ○ Don River and Central Waterfront Project (DRCW) including WWF pumping (part of IPS) and the HRT Facility, SWM Pond Projects, Ponds Rehabilitation, etc.[1] ○ Western Beaches Tunnel Retrofit, North Toronto CSO Tank project, etc.	$586.2	$480.3	$448.9	$1,333.1
Basement Flooding Protection ○ EA studies, Subsidy Program, Design & Construction	$920.5	$583.4	$1,306.1	$800.5

Wet Weather Flow Master Plan Component	Toronto Water Capital Funds ($M)			
	Total Exp to date	2017-2022	2023-2027	2028-2032
Waterfront and Shoreline Management and Watercourse and Valley Erosion Control o Geomorphic and Flood Management (EA) Studies, o Stream / Utility / Erosion Control Projects o EA and feasibility studies with TRCA for waterfront and landform projects o Ashbridges Bay Landform	$242.4	$151.4	$198.9	$136.4
Other WWFMP Initiatives o Stewardship and education, community engagement, regional watershed monitoring o Wet Weather Flow Monitoring Program	$71.1	$30.0	$29.0	$31.4
Total Toronto Water Capital Expenditures	$1,881.3	$1,253.2	$1,998.2	$2,312.1

Note 1: *For more information about these end-of-pipe facilities please refer to Attachment 1. The DRCW solution includes a Wet Weather Flow pumping station that is part of the Integrated Pumping Station (IPS) under the Ashbridges Bay Treatment Plant program funding.*
Note: *Table 1 does not include all Toronto Water operating expenditures for WWFMP related initiatives that are discussed in this report (e.g., municipal operations, tree planting, etc.). Future year budget allocations are premised on the future water rate increases (as detailed in Toronto Water's 2023 to 2032 Capital Budget and Plan.)*

Water Quality Improvement – Source Controls, Conveyance Controls and End-of-Pipe Projects

The City and its partners have taken a holistic approach to improving water quality that involves the implementation of source control programs (e.g., mandatory downspout disconnection), conveyance controls (e.g., Green Infrastructure demonstration projects), and end-of-pipe projects. Continued development and implementation of policies, guidelines and enforcement of the Toronto Municipal Code - Chapter 681 further supports the City's efforts in achieving water quality objectives.

The following sections (i, ii, iii and iv) describe initiatives implemented by Toronto Water and other City divisions to help achieve wet weather objectives. The Toronto Water

2023-2032 Capital Budget and Plan allocates approximately $1.81 billion to these initiatives.

(i) Source Controls

Source controls are practices that manage the flow of stormwater where it originates and reduce the quantity of stormwater runoff entering City sewers. Key source control initiatives implemented by Toronto Water include the Mandatory Downspout Disconnection Program, policies, guidelines and other programs, described below.

Mandatory Downspout Disconnection Program

The Mandatory Downspout Disconnection Program (MDDP) came into effect in 2008, following an amendment to the Sewers By-law, that requires city-wide disconnection of downspouts from private properties directly or indirectly connected to the City's sewer system. Downspout disconnection helps to reduce the amount of stormwater runoff entering the City's sewers thereby reducing the risk of basement flooding and CSOs.

To evaluate disconnection compliance rates, three field studies were undertaken during the summers of 2013, 2016 and 2021. The 2021 field study found a disconnection rate of approximately 76% and estimated the maximum potential disconnection rate at around 87%. Downspout disconnection rates by ward are provided in Attachment 1. Public education campaigns that promote the benefits to homeowners have been undertaken to increase participation in the MDDP program.

Policies, Guidelines and Other Programs

The City develops and updates policies and guidelines to help ensure source controls are implemented. Often targeted toward private property, the policies apply during the development review process. In April 2022, the Province introduced Bill 109, the More Homes for Everyone Act, that proposes extensive changes to the development application process and will result in fewer opportunities for stormwater management measures to be put into effect.

- Foundation Drainage Policy and Guidelines (2022): Requirements for new developments to manage foundation drainage on-site, with the goal of eliminating long-term foundation drainage discharge to the City's sewer systems, specifically to the sanitary sewer system.

- Sewer Capacity Assessment Guidelines (2021): A consistent approach for the assessment of capacity in the City's local sanitary and combined sewer systems and ensure adequate mitigation of basement flooding risk and CSOs.

- The Toronto Green Standard (2022) : Requirements for developments, based on the WWFM Guidelines, that are applied through the planning approval process.

- Design Criteria for Manufactured Treatment Devices (2023): A consistent process for design and evaluation of these devices.

Highlights of continued policy implementation are:

- The Wet Weather Flow Management Guidelines (2006) provide technical guidance on stormwater management requirements (e.g., flood management, water quality and water balance) for new and re-development opportunities. In 2023, the City plans to update the Guidelines to align with best industry practices, and Provincial and agency guidelines, policies and regulations.

- The Green Roof By-law (2010), led by City Planning, requires green roofs to be installed on new residential, commercial, and institutional buildings that have roof surface area greater than 2,000 m^2. To date, 506 Green Roofs have been built or permitted. The City's Eco-Roof Incentive program provides grants to construct green roofs in situations where the Green Roofs Bylaw are not applicable. As of year-end 2022, 100 green roofs have been completed through the Eco-Roof Incentive program.

- Tree Planting - In 2006, Parks Forestry and Recreation, with funding from Toronto Water, commenced a tree planting and tree naturalization project. To the end of 2022, Urban Forestry has planted over 682,271 trees and shrubs.

(ii) Conveyance Controls

Like source controls, conveyance control practices reduce the quantity of stormwater runoff generated by the urban environment. While source controls are typically implemented at the site level (rooftop, parking lot etc.), conveyance controls are typically located within the municipal right-of-way.

Inflow and Infiltration Reduction Strategy

Stormwater and groundwater that enters sanitary and combined (stormwater and sanitary) sewer systems is called inflow and infiltration (I&I). I&I enters the sanitary sewer system through sump pumps, roof gutter downspouts, foundation drains, or cracks in pipes and maintenance holes. I&I can have significant impacts on the capacity of the City's sanitary and combined sewer systems. I&I contributes to CSOs, basement flooding, increased wastewater treatment plants costs and can hinder urban growth due to reduced system capacity. Toronto Water has completed several I&I studies since 2017 including:

- Basement Flooding Study Area 9 I&I Reduction Strategy (2017)
- I&I Reduction Pilot: Wirral Court Sewage Pumping Station Sewershed (2017)
- Wet Weather Flow Reduction in the Scott Street Sewage Pumping Station Service Area: Field Investigations and I&I Sources & Suspects study (2021)

- Black Creek Sanitary Trunk Sewer System Class Environmental Assessment Study (i.e., the preferred solution included I&I reduction measures) (2021)

In 2023 and 2024, Toronto Water will develop a City-wide I&I reduction strategy that will provide a roadmap for effective I&I reduction.

Toronto's Green Streets Program

"Green Streets" is the City's program to implement green infrastructure in the public right of way and is administered by Transportation Services. Toronto Water provides funding toward green infrastructure and participates in the Green Streets Working Group that coordinates the implementation of green infrastructure on municipal roads. Green Streets pilot projects have been implemented within the municipal right-of-way, as illustrated in Attachment 1.

In 2021, the Green Streets Working Group initiated "Growing Green Streets", a master planning approach to implementing green infrastructure. Growing Green Streets will develop a decision-making framework to determine priority locations for implementation, a toolkit to apply green infrastructure designs within specific street typologies and will include cost estimation and a model for cost-sharing between City divisions. The following provide details of associated Green Streets initiatives.

Figure 1: Left image of completed bioretention work as part of the Green Streets program on Byng Avenue. Right image of construction of green street work on Winnett Avenue (work was completed in August 2022)

The Making Space for Trees Pilot will investigate the technical and financial implications of reconfiguring infrastructure, such as relocating watermains and other Toronto Water assets, to increase the potential area for planting trees. It is expected that this project will be completed in 2026.

Stormwater Opportunities Through Green Infrastructure Study (2023) will assess and determine the best opportunities for green infrastructure to achieve the City's wet weather flow objectives (in addition to providing other benefits).

Hogg's Hollow Stormwater Management and Road Improvement Study

This ongoing multi-phase project involves the reconstruction of local streets in the Hogg's Hollow neighbourhood. Some perforated storm sewers were included where soil conditions allowed. Additionally, source control measures on private property were encouraged through a public education campaign. Initiated in 2011, the first six phases of construction are now complete and the seventh and final phase of construction is anticipated to be complete in September 2023.

Sewer Separation Projects

The WWFMP advocated for the separation of the City's combined sewers on an opportunistic basis in conjunction with other road and/or sewer works. Toronto Water examines sewer separation feasibility during the preparation of Basement Flooding EA studies. While many combined sewers have already been partially separated, some large separation projects are underway.

One of the City's largest Basement Flooding Protection Projects, the Fairbank-Silverthorn Storm Trunk Sewer Project, involves construction of about 17 km of new storm sewers, a new storm trunk sewer/tunnel, and a new outfall. These works will reduce pressure on the existing combined sewer system and will reduce basement flooding risk in the project area.

Figure 2: Left image of City officials and contractor in front of the 270-tonne Tunnel Boring Machine (named "Nabia") for the Fairbank Silverthorn Storm Trunk Sewer System project, which will work to construct a new storm sewer that will collect, store and move stormwater from the Fairbank-Silverthorn area to Black Creek to help reduce the risk of basement flooding. Right image Lowering of the tunnel boring machine into a

40-metre-deep shaft inside Fairbank Memorial Park, located on Dufferin Street south of Eglinton Avenue West.

Policy and Guidelines

Since 2017, the City has updated several policy and guideline documents relating to conveyance controls including the following:

- Green Streets Technical Guidelines, 2017 (City Planning and TW)
- The Toronto Green Standard version 3, 2018 and V4, 2021 (City Planning)
- Design Criteria for Green Infrastructure in the Right-of-Way, 2021 (Engineering and Construction Services)
- Development of Construction Specifications and Drawings for Green Infrastructure, 2021 (Engineering and Construction Services)
- Design Criteria for Manufactured Treatment Devices, 2023 (Toronto Water)

(iii) End-of Pipe Projects

Located at the end of sewer systems, end-of-pipe controls store and treat stormwater prior to release from the City's sewer system into Lake Ontario or other surface waters. The WWFMP recommended the construction of stormwater ponds, constructed wetlands, and underground combined sewer overflow treatment facilities. A map showing the location and status of the facilities that have advanced is provided in Attachment 1.

Four WWFMP end-of-pipe facility projects were constructed or advanced since 2017, including:

- The Emery Creek Stormwater Pond
- The Earl Bales Stormwater Pond
- The Western Beaches Tunnel Retrofit, and
- The Don River and Central Waterfront Project

Additional information on these facilities and other end-of-pipe projects is provided in Attachment 1.

Figure 3: Top left image of Emery Creek Pond looking west. Top right image Emery Creek looking east. Bottom image of Emery Creek diversion weir.

Don River and Central Waterfront Project

The Don River and Central Waterfront Project (DR&CW Project) is the City's most significant water quality improvement initiative and one of the largest infrastructure projects of its kind in Canada. The entire DR&CW project including the WWF portion of the IPS project has an estimated cost over $3.7 billion and is scheduled for implementation in phases over a 25-year timeframe. Approximately $1.7 billion is allocated for this project in Toronto Water's 2023-2032 Capital Budget and Plan. When fully implemented, this project will virtually eliminate the release of CSO discharges (and polluted stormwater discharges) into the Lower Don River, Taylor Massey Creek, and Toronto's Inner Harbour, significantly improving water quality in these areas.

The Project involves construction of a 22 km tunnel system (three integrated tunnels) running along the Lower Don River, Taylor-Massey Creek and Toronto's Inner Harbour, 12 wet weather flow storage shafts, 27 connection points, and a real-time control system. Additionally, three CSO offline storage tanks will be constructed to reduce sewer overflows from remote outfall locations that are far away from the tunnel system alignment. Four offline storage tanks will be constructed to relieve the overloaded Don River Sanitary Trunk Sewer system during heavy rainfall storms.

Also included is a multi-purpose Integrated Pumping Station ("IPS") at the Ashbridges Bay Treatment Plant that will convey flows from the tunnel system to a new High Rate Treatment ("HRT") Facility. The IPS wet weather flow pumping is a significant component of the DR&CW project. The IPS project is intended to also address several additional needs. In particular, the Pumping station will serve to replace the two existing wastewater pump stations ('M' and 'T' Buildings) north of Lakeshore Boulevard, capture

flows from four CSOs that currently discharge into the Coatsworth Cut, and provide standby power to allow both the CSO flows and the wastewater flows to continue to be conveyed during any power outages. The HRT Facility is to be constructed on the Landform being constructed on the water lot adjacent to the Ashbridges Bay Treatment Plant and will discharge to the new Ashbridges Bay Treatment plant outfall that is anticipated to be substantially complete by the end 2024.

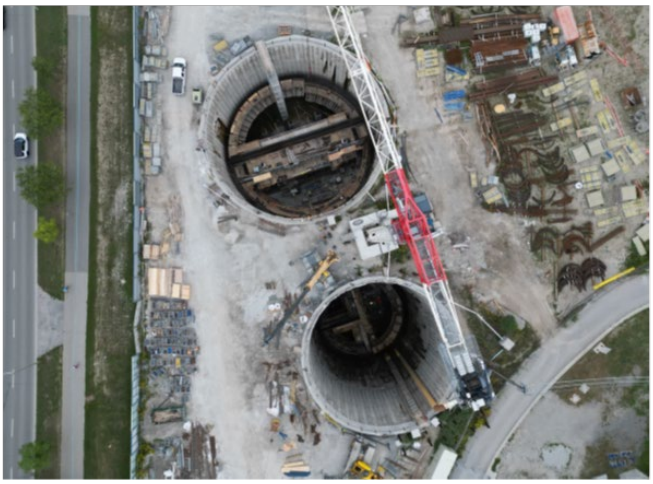

Figure 4: Top image of West-looking view of the integrated pumping station construction work site. Bottom image of overhead view of the wet weather flow and sanitary screen shafts at the integrated pumping station work site.

As part of the DR&CW project, real time control technology (i.e., active control of pumps, gates, and weirs within the interceptor) is being implemented in the Mid-Toronto Interceptor to improve sewer system operations. These improvements will regulate flows in constrained sections of the system and optimize capacity to reduce combined sewer overflows. The real time system is currently being designed and is anticipated to come on-line toward in 2025. A schematic showing all the DRCW project components is provided in Attachment 1.

Milestone dates for the DR&CW Project are provided below:

- Class EA study completed in 2012
- Preliminary design completed in 2015 (excluding HRT)

- Detailed design for Phase 1 (the Coxwell Bypass Tunnel) completed in 2017
- Construction of the main tunnel of the Coxwell Bypass completed in 2022
- Construction for other components in the Coxwell Bypass Tunnel including five storage shafts and sewer connections are currently underway
- The Inner Harbour West Tunnel & Connections design commenced in 2020 and is anticipated to be complete in 2024
- Landform construction commenced in 2021 and will be completed in 2025
- The first two construction contracts related to the IPS will be complete in 2024. Design of the larger third contract is 95% complete and construction tenders are expected in 2024. Construction completion is anticipated by 2034.
- The HRT Facility design is anticipated to begin in 2024 and construction and commissioning will be coordinated with the IPS project.

Figure 5: Top image of overhead views of the Coxwell By-pass tunnel. Bottom image of breakthrough of Tunnel Boring Machine for Stage 1 of Coxwell By-Pass in Summer 2022

Construction of an East Don Sanitary Trunk Sewer relief tank (4,500 m^3) at Sheppard / Leslie is planned for 2023-2026 to align with another sanitary sewer construction project, thereby minimizing river crossing and disturbance to the ravine and park areas. Following the work at Shepard / Leslie, the Inner Harbour West Tunnel, the Taylor-Massey-Creek Tunnel, and six offline storage tanks are all planned to be constructed over the next 10 to 15 years. The DR&CW Project's scope and implementation is subject to change based on the completion of detailed design, receiving regulatory approvals, capital program funding, and other considerations.

Public education and outreach are important aspects for the successful implementation of the DRCW project. This project is featured in the City's ongoing WWFMP public and

education outreach strategy, highlighting CSO issues and describing how this project helps to achieve water quality objectives.

Acceleration of the Don River and Central Waterfront Project

In 2019, Council directed the City Manager to pursue intergovernmental funding to support the acceleration of the DR&CW Project. The accelerated plan proposed engineering design and construction for future project phases and components on the following prioritized basis: 1) Inner Harbour West Tunnel and outfall connections; 2) offline storage tanks; and 3) Taylor-Massey Creek Tunnel, to complete construction of all project components by 2030 at the earliest. Additional provincial and federal funding has not been granted at the time of this staff report.

The Western Beaches Retrofit Project

The Western Beaches Tunnel (WBT) system collects and treats CSO and stormwater from ten existing CSO and storm outfalls. Constructed in the late 1990's, the system consists of a 3-metre diameter storage tunnel parallel to Lake Ontario, stretching 3.6 kilometers from approximately Parkside Drive to Strachan Avenue. The tunnel consists of three main storage shafts (approximately 25 metres diameter by 35 to 40 metres deep) located at the Battery Park, Cowan and Glendale sites, six drop shafts, ten sewer interception chambers, nine lake isolation chambers, and a pumping station with ultra-violet (UV) treatment. The system has an 85,000 cubic metre storage volume and was designed to improve water quality conditions at the City's nearby swimming beaches and along Toronto's waterfront.

The Western Beaches Retrofit project involves updates to an existing tunnel and storage facility. Proposed upgrades include modifications to 19 sewer chambers, replacement of a pumping station, replacement of UV systems in addition to other existing equipment. Design for the retrofit works is currently underway.

Figure 6: Left: Image of part of the Western Beaches Tunnel. Top right image of backfilling around the valve chamber for the Battery Park Interception Chamber. Bottom right image of final restoration work being completed for the Battery Park Interception Chamber

Black Creek Sanitary Trunk Sewer Environmental Assessment

The Black Creek Sanitary Drainage Area Servicing Improvements Class Environmental Assessment (EA) Study was advanced outside of the WWFMP but complements its objectives through recommendations to provide relief for the overloaded Black Creek Sanitary Trunk Sewer (STS) and reduce CSOs from the combined trunk sewers to the Black Creek watercourse. The preferred solution includes the Keele sanitary trunk relief sewer, the Jane-Wilson sanitary relief sewer, 40,000 m^3 CSO storage facility, and wet weather flow and inflow and infiltration reduction measures along the existing Black Creek STS.

Preliminary design is currently underway and is anticipated to be complete in 2023. Implementation including detailed design and construction is anticipated to be delivered in two phases (2023-2031 and 2026-2035).

Bonar Creek Stormwater Management Facility

Following the Bonar Creek Stormwater Management Facility and Legion Road Extension Class EA Study, this project moved forward to preliminary design in 2019. During preliminary design, cost estimates increased significantly, leading Toronto Water to undertake a study to evaluate the benefit of the proposed Bonar Creek stormwater

management facility in relation to alternatives. The study is scheduled to be completed by the end of 2023.

Spring Creek Ponds

Investigations at the Spring Creek Ponds in High Park revealed colour and odour issues typical of anaerobic conditions. In 2018, a study was commissioned to investigate and recommend solutions. A full-scale engineering assessment pertaining to the size and type of equipment needed to oxygenate the pond waters has been initiated. More information on the Spring Creek Ponds is available in Attachment 1.

Stormwater Pond Assessment, Cleaning and Rehabilitation Program

This program focuses on rehabilitation, maintenance, and repair work for the City's existing stormwater management facilities (SWMF). Milestone dates associated with this program include:

- 2018: The City developed rehabilitation, maintenance and cleanout plans for ten high priority ponds
- 2019/2020: Implemented the recommended rehabilitation, maintenance, and clean-out activities for several locations: Tapscott Industrial SWM Pond and Willowlea Park SWM Pond. Substantially completed maintenance works for: Pinemeadow SWM Pond, Bridlewood SWM Pond, Intracorp SWM Pond, Greenwood SWM Pond, Wincott Drive SWM Pond, Claireville SWM Pond, Ellis Ave Wetland

The SWMF Rehabilitation Program remains a WWFMP priority over the next decade. Staff are currently identifying the next round of priority facilities using previous condition assessment reporting. It is anticipated that 8 to 10 facilities can be cleaned on a five-year cycle. This work is planned to start in 2025. There is approximately $13 million allocated to the SWMF Rehabilitation Program in Toronto Water's 2023-2032 Capital Budget and Plan.

(iv) Municipal Operations

The WWFMP identified the important role of routine municipal operations in removing suspended solids and associated contaminants from stormwater runoff. Ongoing municipal operations carried out by Toronto Water and Transportation Services in support of WWFMP water quality objectives include outfall monitoring, street sweeping, and catch basin cleaning as described below.

Outfall Monitoring Program

The Sewers By-law (Chapter 681 of the City of Toronto Municipal Code) was adopted by Council in 2000 and is actively enforced. This Bylaw sets strict limits on waste discharges and requires certain business sectors to develop and submit Pollution Prevention Plans. Each year, Toronto Water staff monitor industrial wastewater discharges into the sanitary sewer system via the industrial inspection and sampling

program. Contaminated dry weather flows are traced to locate the source of contamination for immediate correction.

Initiated in 2005, the City's Outfall Monitoring Program involves monitoring flows from sewer outfalls during dry weather to identify potential sanitary cross-connections (i.e., sanitary wastewater being misdirected to a storm sewer). Toronto Water staff sample from outfalls located within all six of the City's watersheds, and at Lake Ontario.

Water samples are assessed for compliance with requirements set in the Sewers By-law. Between 2005 and 2021, the City's Environmental Monitoring and Protection unit discovered 855 cross connections and participated in the repair of 814 cross connections.

Catch Basin Cleaning Program

Toronto Water's Distribution & Collection (D&C) section is the owner and program administrator for the catch basin cleaning program. Catch basins are cleaned by vacuum to remove accumulated sediment from the catch basin sumps. On average, arterial roads are serviced on an annual basis and local roads every two years. Catch basins located in low lying areas are cleaned more frequently.

Street Sweeping Program

The City's street sweeping and fall leaf removal programs are administered by Transportation Services and Solid Waste Management Services. In addition to capturing water quality pollutants, street sweeping also prevents build-up of sand and debris that could block storm sewers and catch basins. Please refer to Attachment 1 for further information about the Street Sweeping program.

Basement Flooding Protection Program

The City's Basement Flooding Protection Program (BFPP) is a Council-approved program aimed at reducing the risk of flooding to private and public property caused by extreme storm events. Since the release of the WWFMP in 2003, basement flooding protection has become a greater priority due to several severe storm events that resulted in significant basement and surface flooding in various parts of the City. Public drainage system improvements, policies, by-laws, and incentives all contribute to the success of this program.

Through the BFPP, the City has implemented many infrastructure improvements to the City's sewer system and overland drainage routes. One of the City's major climate change adaptation initiatives, the BFPP increases the City's resilience to extreme weather.

The BFPP remains a WWFMP implementation priority over the next five to ten years. Toronto Water's 10-year Capital Budget and Plan (2023-2032) identifies approximately $2.1 billion for the completion of Basement Flooding studies, the implementation of

recommended infrastructure improvements to reduce future flooding, and the Basement Flooding Protection Subsidy Program.

(i) Basement Flooding Protection Program - Studies

Through the BFPP, numerous studies have been undertaken to assess capacity in the City's existing overland, storm, sanitary, and combined sewer drainage systems and to recommend infrastructure improvements to reduce flooding risks. Improvements are typically implemented in City parks and within the public road right-of-way and may include such measures as sanitary or storm sewer upgrades, underground storage, stormwater tunnels, high-capacity inlets, inlet control devices, stormwater management ponds, and green infrastructure.

A severe storm on July 8, 2013 resulted in 4,700 flooding complaints, and triggered the City-wide expansion of the BFPP to 67 study areas. On August 7, 2018, the Black Creek Watershed was significantly impacted by a severe storm with a rainfall intensity exceeding that of a 100-year return period. Many homes were flooded, and this event triggered the acceleration of study work.

As of April 2023, 53 studies have been completed. The remaining 14 studies are underway and are expected to be complete by 2024. The status of the studies completion is illustrated in Attachment 1.

When all studies have been finalized, a review of the proposed solutions will be undertaken, and the cost and schedule to design and construct all identified solutions will be summarized.

(ii) Basement Flooding Protection Program - Implementation

Implementation involves design and construction of infrastructure improvement projects recommended in Basement Flooding studies. As of 2022, approximately 65 kilometres of storm sewer upgrades and 21 kilometers of sanitary sewer upgrades have been constructed.
Recommended infrastructure improvements are prioritized and scheduled, according to Council approved criteria, to protect the greatest number of properties as soon as possible within approved budgets (and are coordinated with other capital projects). On November 25, 2020, Council directed that the cost per benefitting property threshold be increased from $32,000 to $68,000. All BFPP projects are therefore reviewed at the completion of preliminary design, with projects advancing where the cost per benefitting property is under $68,000.

Council also directed that, following the completion of all 67 basement flooding studies, and once all qualifying projects under $68,000 per benefitting property have been scheduled for implementation, basement flooding projects will be sequenced in accordance with the principle of implementing projects that achieve the greatest impact.

Figure 7: Left image of construction workers standing on new sewers being installed in a residential area as part of a basement flooding protection project. Right image of construction equipment backfilling a new sewer installation as part of the basement flooding protection program

Approximately $849 million has been spent on construction and activities supporting construction in 2022. Two major BFPP projects have been awarded funding from the federal Disaster Mitigation and Adaptation Funding program: The Mid-Town Toronto Storm Sewer Relief project (currently in detailed design), and the Fairbank-Silverthorn Storm Sewer project (currently being constructed). Many BFPP projects are scheduled to advance through design and construction over the next five to ten years.

(iii) Basement Flooding Protection Subsidy Program

The Basement Flooding Protection Subsidy Program (BFPSP) offers financial assistance to homeowners across the city to take actions on their properties to reduce flooding risks. Property owners of single-family, duplex, and triplex residential homes can apply for financial assistance of up to $3,400 per property to install flood protection devices, including a backwater valve, sump pump, and pipe severance and capping of the home's storm sewer or external weeping tiles (or foundation drain).

Since the subsidy program was expanded City-wide in 2006, more than 40,000 homes have installed flood protection devices. As of March 31, 2023, $73.5 million in total subsidy payments have been issued to property owners by Toronto Water. See Attachment 1 for more information.

(iv) No Fault Grant for Basement Flooding Damages in the Rockcliffe Special Policy Area

On October 1 and 4, 2021, Council received a report on the eligibility criteria and financial implications of providing a one-time, no-fault grant for residential property owners and/or tenants in the Rockcliffe neighbourhood, York South-Weston and other similarly impacted areas that experienced basement flooding. The report recommended that Council not proceed with a no-fault grant program, noting practical and equity

challenges. A no-fault grant program does not reduce future flood risk and does not incentivize residents to implement measures to reduce flood risk.

Following a supplementary report to council that included guidance on funding, funding sources and implementation, in July 2022 Council authorized a recurring no-fault grant program to provide $7,500 to eligible properties within the Rockcliffe Special Policy Area.

Watercourse Management

The City's Watercourse Management Program is delivered by Toronto Water in coordination with TRCA. This state-of-good-repair program aims to mitigate erosion in City watercourses to protect adjacently sewer and water infrastructure while also providing aquatic habitat and ecosystem benefits. Many projects run through this program employ an engineering approach to river systems abiding by the principles of natural channel design. The Watercourse Management Program remains an implementation priority over the next five to ten years and beyond. Toronto Water's 2023-2032 Capital Budget and Plan includes funding of $186 million on the delivery of this program.

Aside from watercourse erosion projects, other program priorities include the reduction of valley land erosion impacting private property (TRCA-delivered), management of riverine flooding to protect life and property, and improvement of Toronto's ravine system (e.g., enhancement, and restoration of natural features, healthy aquatic/riparian communities, trail systems, etc.).

(i) Protection of City Sewer and Water Infrastructure from Watercourse Erosion

Toronto Water conducts Geomorphic Systems Master Planning (GSMP) studies to examine needs and propose solutions to erosion within watercourses. GSMP studies typically recommend stream restoration projects (natural channel engineering) and other approaches to protect City infrastructure from the impacts of watercourse erosion. Other types of recommendations may include improvements to channel hydraulics, water quality, aquatic and riparian habitat, and amenities (e.g., trails, pedestrian bridges, benches, etc.) for local communities.

Since 2017, GSMP studies have been completed for Humber Creek, West Don River, and Burke Brook Creek, and are ongoing at Yellow Creek, Newtonbrook Creek, Taylor-Massey Creek, German Mills Creek, Mimico Creek, and West Humber River.

Recommendations from GSMP studies and field inspections of Toronto Water assets are two sources of information used to prioritize projects. Since 2017, Toronto Water has completed 17 watercourse-related projects. Examples include stream restoration works on Mimico Creek at the Van Dusen sanitary trunk sewer crossing, outfall repair on Yellow Creek at St Clair, implementation of Duncan Creek Phase 2 and Phase 3 works, and the Saxony syphon protection.

Over the next five years, approximately 40 capital projects are scheduled to be built to protect Toronto Water assets from watercourse erosion. Priorities in the Watercourse Management Program are subject to change due to storm related impacts on watercourses, City infrastructure, and private property.

Using an adaptive management approach, Toronto Water monitors the performance of implemented stream restoration projects to inform future designs.

Figure 8: Images of Mimico Creek at Van Dusen Blvd Sanitary Sewer Protection – Top images look upstream before (left) and after (right) construction. Bottom images look downstream before (left) and after (right) construction.

(ii) Protection of Private Property from Valley Land Erosion

TRCA and Toronto Water jointly assess erosion risks and prioritize projects to protect private property, and public health and safety. A severe storm on July 8, 2013, resulted in more than 450 erosion sites that impacted private property in Toronto. The 51 highest risk sites have been stabilized and another 100 sites are being monitored. The remaining sites are not participating in TRCA's erosion risk management program. Approximately 400 locations not related to the July 2013 storm are being assessed and prioritized for improvements.

(iii) Riverine Flooding in Floodplains

Riverine flooding occurs in Toronto's valley lands and ravines when the City's creeks and rivers overtop their banks and spill onto the adjacent floodplain. TRCA manages riverine flooding within Toronto's boundaries.

TRCA's updated “Flood Plan” (2013) was summarized in the 2014 City staff report titled Coordinated Watercourse Management Plan. Building on this work, in 2019 TRCA completed a Flood Risk Assessment and Ranking Study. Fourteen flood vulnerable areas in Toronto were ranked in terms of overall risk and detailed flood mapping was created for each area. The Rockcliffe-Smythe area, located in Ward 5 (York South – Weston), is the most flood vulnerable urban area in the City with respect to riverine flooding.

The Rockcliffe Riverine Flood Mitigation Project Municipal Class EA, led by the City and the TRCA, is scheduled for completion in 2023. The recommended solution, as presented to Council in 2022, involves significant infrastructure investment to modify the Black Creek and Lavender Creek channels, construct a new flood protection wall, implement a new road realignment, and replace several bridges and culverts. The entire project is proposed to be constructed in phases over a 10-year timeframe and will flood-protect 195 homes located in approximately 80 hectares (198 acres) of flood prone land. This initiative will also remove 222 buildings from the regulatory floodplain during a regional storm event at an estimated cost of approximately $371 million. The proposed project includes components led by Transportation Services and the TRCA, with funding still to be determined for components of the recommended solution. This cost estimate includes a BFPP project (Project 45-48), funded by Toronto Water, that will benefit 2,364 addresses.

Between 2017 and 2022, the TRCA has also advanced several other initiatives to better understand flooding in valley lands including updates to Watershed Plans, hydrology updates, and floodplain mapping updates.

(iv) Toronto’s Ravine Strategy

Since adoption of the draft strategy by Council in 2017, the Ravine Strategy, led by City Planning, has provided a framework, vision, and approach to manage Toronto’s ravine system.

The Ravine Strategy provides a structured forum for coordination of capital works within ravines and valley lands, contributes to improved asset management of infrastructure and ecological services of the natural heritage system, and supports the rehabilitation and restoration of subsurface Toronto Water infrastructure.

In January 2020, Council adopted the next steps to implement the Ravine Strategy over the next ten years and directed staff and the TRCA to report every three years on the advancement of the Ravine Strategy’s actions.

Waterfront and Shoreline Management

The WWFMP recommended waterfront and shoreline management works to address water quality, sediment quality, loss of fish habitat, and other issues that contribute to Toronto's waterfront being designated as an Area of Concern. These projects and

studies also address waterfront erosion, improve recreational swimming opportunities, and improve access along the waterfront.

(i) Ashbridges Bay Landform

The Ashbridges Bay Landform Project is a joint initiative between the City and TRCA. The Ashbridges Bay Erosion and Sediment Control Class Environmental Assessment was completed in 2014. The EA recommended a new landform project immediately south of the Ashbridges Bay Treatment Plant (ABTP). As the City's most significant shoreline management project currently under construction, the project will:

- provide erosion and sediment control to improve passage for boats, eliminating the need for regular dredging in the Coatsworth Cut area of Ashbridges Bay

- be the site of the high-rate treatment facility and a stormwater treatment wetland

The high-rate treatment facility will provide treatment of CSOs intercepted by the integrated system of tunnels being constructed through the Don River and Central Waterfront Project. Construction of the high-rate treatment facility is scheduled to start in 2029 pending the results of engineering studies that will establish design criteria.

In addition to the landform, the EA also recommended erosion and sediment control breakwaters (to reduce dredging needs at the mouth of Ashbridges Bay) and a SWM wetland facility. A subsequent planning assessment of lake elevations determined that implementation of SWM wetland facility is not feasible. Instead of connecting to the proposed wetland, the 4 outfalls at the head of Ashbridges Bay will be connected to the Don River and Central Waterfront tunnel system.

Recent and upcoming project construction milestones are provided below:

- Construction of the landform commenced in 2019
- The landform perimeter and east breakwater construction was substantially complete in December 2022, and
- Work on the central breakwater structure is ongoing (70% complete), targeted for completion in 2024.
- Continued landform grading and soil addition, planting, creation of cobble stone beaches and closing of headland will continue into 2024.

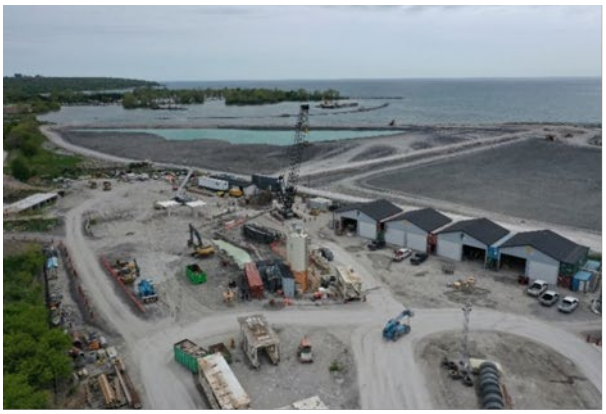


Figure 9: Left image of overhead view of construction site for the landform at Ashbridges Bay

(ii) Scarborough Waterfront (East) Project - Individual Environmental Assessment

In 2016, TRCA initiated an individual EA study for the Scarborough Waterfront (East) between Bluffer's Park and East Point Park. The EA was completed in 2019 and the preferred alternatives include recommendations to address shoreline erosion, improve public access, provide recreational opportunities, and enhance natural habitat. The Brimley Road South Multi-Use Trail and 'west segment' project components achieved the 60% detailed design milestone in 2022. Phased design and implementation of the recommended work is planned to advance over the next five to ten years as funds become available.

(iii) The Scarborough Waterfront CSO and Stormwater Outfalls Control and Flood protection Class Environmental Assessment Study

The Scarborough Waterfront CSO and Stormwater Outfalls Control and Flood Protection Class EA Study was completed in 2010. An addendum to this study was prepared in 2021. The EA addendum identified a preferred strategy including a combination of source controls, conveyance upgrades and an underground CSO storage tank. Upon further advancement of the DRCW project, or as funds become available these measures will progress.

Public Education and Outreach

Public education and outreach is an integral component of the WWFMP's implementation. The City employs a multi-faceted approach to increase public awareness and understanding of the impacts of stormwater on the environment, property, and public health. Key objectives include: increasing public awareness on how the City manages stormwater, describing the impact of CSOs on water quality, communicating the City's infrastructure plans, and advising on actions that can be taken to protect people and property. Outreach and education efforts that support the WWFMP's implementation include:

- Multi-media advertising campaigns including Basement Flooding Campaigns and Stormwater Projects
- Dedicated pages on the City's website -Stormwater webpages can be found here: https://www.toronto.ca/services-payments/water-environment/managing-rain-melted-snow/
- How-To Video Series to help homeowners with basement flooding prevention and stormwater management
- Community Outreach via HTO to Go water trailers at community events.
- Brochures, pamphlets and other publications that are available at City and community events
- Public opinion research is conducted routinely to inform public education/consultation/outreach initiatives
- Toronto Public Health Beach Water Quality Website
- Signage at the City's Supervised Beaches
- Signage at unsupervised recreational water areas along the City's Lake Ontario shoreline

The TRCA also administers their own delivery of community engagement initiatives, including events such as Celebrate Humber, Paddle the Don, and Adventures of Salmon.

Figure 10: Left: 2023 Basement Flooding campaign graphic, showing a teddy bear floating in flood water. Right: Basement Flooding campaign graphic used in recent years to provide tips to help homeowners protect their basements from flooding.

Evaluation and Monitoring

The preferred alternative presented in the WWFMP included provision for an evaluation and monitoring program designed to assess the effectiveness of the recommended strategy at achieving its objectives. Current initiatives for evaluating and monitoring the effectiveness of the WWFMP are described below.

(i) Toronto and Region Remedial Action Plan

The Toronto and Region Remedial RAP produced three progress reports. These reports highlight key actions and progress made in delisting Toronto and Region as an Area of Concern in the Great Lakes Basin, and summarize improvements observed in the waterfront between reporting periods.

Between 2017 and 2022, RAP updates have been largely focused on beneficial use assessments and various restoration and waterfront research projects including:

- 2017: Beneficial Use Re-Designation report on Degradation of Aesthetics
- 2018: Preliminary Beneficial Use Assessment Report on Wildlife Habitat Loss
- 2020: Preliminary Beneficial Use Assessment Report on the Effectiveness of Aquatic Habitat Restoration Implemented using the Toronto Aquatic Habitat Restoration Strategy
- 2022: First assessment of the Fish Populations Beneficial Use Impairment in the Toronto and Region AOC
- The Toronto RAP also recently published a Toronto and Region *Area of Concern workplan for 2020-2025* that outlines the status of all current beneficial use impairments, progress, and planned work up to 2025

(iI) TRCA's Regional Monitoring Program

TRCA's regional watershed monitoring program has been in operation since 2001 and is funded by the Toronto and Region RAP, the City of Toronto, and the Regions of York, Peel and Durham. The program includes more than 500 monitoring stations used for the collection of long-term data related to water quality, hydrology, stream temperature, groundwater and aquatic communities and habitat.

(iii) Blue Flag Certification for City Beaches

One key indicator of the WWFMP's success in achieving stated objectives is the quality of swimming conditions in the City's 10 supervised swimming beaches. Toronto's Beaches Plan (2009) provided actions to improve swimming conditions and called for 24-hour sampling during the swimming season at its supervised swimming beaches. Toronto Public Health tests the water quality at supervised beaches from June to Labour Day, and posts warning signs against swimming when conditions are unfavorable.

The Blue Flag program is an internationally recognized standard for meeting exceptional recreational water quality. The Blue Flag Program certifies beaches as "Blue Flag" if they meet standards for water quality, safety, environmental education and information, the provision of services, and other environmental criteria. In 2005, the City had four Blue Flag Beaches. In 2008, the number of Blue Flag beaches increased to eight. In 2022, eight of the city's 11 supervised beaches remained Blue Flag-certified.

(iv) Toronto's Wet Weather Flow Monitoring Program

Toronto Water administers the Wet Weather Flow Tributary Monitoring Program, a City-wide monitoring program that assesses water quality changes in watercourses. The purpose of this program is to generate baseline water quality and quantity data that will be used to measure the efficacy of WWFMP stormwater quality and flood reduction initiatives. The program collects flow and water quality data for the duration of the WWFMP implementation.

The most recent cycle of water quality and flow monitoring program began in 2022 and will continue until 2025, with reporting expected in 2026. As of 2022, Toronto Water has installed:

- 24 permanent four-season capable monitoring stations,
- 3 portable three-season stations, to be rotated between 29 or more locations.

The 27 stations are strategically spread over the City's six watersheds. The locations of the City's monitoring stations are illustrated in Attachment 1.

WWFMP Implementation Issues

The 25-year WWFMP Implementation Plan was designed to be flexible in the face of changing environmental conditions, infrastructure needs, shifting priorities. Toronto Water will continue to manage the issues impacting the implementation of WWFMP by adjusting our methods and approach to advance the objectives of the WWFMP.

The following provides a summary of the issues which pose the greatest risk the implementation of the WWFMP.

Construction Cost Escalation

Cost escalations caused by high rates of inflation, global supply chain issues, market volatility and operational cost increases (e.g., commodities, materials) have significantly impacted year-over-year tender costs across Toronto Water projects. These substantial cost escalations have constrained the number of projects that can be constructed within the available budget.

To mitigate the risks associated with deferring capital work, Toronto Water has recast the 10-year capital plan to balance program priorities, opportunities for cost efficiencies

through coordinated capital delivery, updated project cost estimates, and existing contractual commitments.

Toronto Water continues to monitor cost escalations and tender values to accommodate projects within its funding model and will continue to explore efficiencies and other opportunities to mitigate risk and absorb operational pressures.

Engineering and Technical Resources

Engineering and technical/specialize resources, both internal to the City (Toronto Water and Engineering and Construction Services) and withing the private sector, are limited for key activities such as project management, EA studies, flow monitoring, modelling, and detailed engineering design and construction. Resourcing issues are impacting the implementation timing and costs of Basement Flooding Protection Program and WWFMP projects.

Competing Commitments

The need to respond to the increasing intensity and frequency of extreme weather events have influenced Council priorities and increased program commitments. For example, following significant storm events in 2006, 2013, 2015 and 2018 the BFPP was initiated, then expanded into a City-wide program, and later accelerated. This call to action required tremendous capital investment and resources for capital delivery that prioritized BFPP withing Toronto Water's capital plan, resulting in a need to rework the capital plan and moving funding within various WWFMP projects.

Funding for Wet Weather Flow Master Plan Implementation

Stormwater management initiatives are a growing component of Toronto Water's Capital Budget. Approximately $4.3 billion is allocated with the 2023-2032 Capital Budget and Plan to implement programs, projects and initiatives identified or associated with the WWFMP. This includes $165 million in funds transferred to TRCA.

Currently, funding for WWFMP related work is almost entirely sourced from the water rate with supplementary contributions obtained through Development Charges. Funding for certain basement flooding projects is provided by the Federal Government, through the Disaster Mitigation Adaptation Fund.

As authorized by Council in July 2021, Toronto Water and the Chief Financial Officer and Treasurer will be consulting with water customers and stakeholders in 2023 on the possible implementation of a Stormwater Charge to fund the City's Stormwater Management Program (including the WWFMP and Basement Flooding Protection Program). The Stormwater Charge would be based on a property's impervious (hard surface) area instead of its water consumption. Revenues from the Stormwater Charge would be removed from the City's water rate. Staff will report back to Executive Committee and Council on the outcomes of the consultation.

Next Steps

When it was introduced in 2003, the WWFMP was a progressive, forward-facing plan. Twenty-years later, policies and plans introduced in the WWFMP have endured and evolved. Many projects will continue as part of the next stage of implementation, including components of the Don River and Central Waterfront Project and the Basement Flooding Protection Program.

Leading up to 2028, Toronto Water will undertake a review of the WWFMP and its implementation to determine its future. In 2025, Toronto Water will begin mapping the next steps for future wet weather flow planning.

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SIGNATURE

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ATTACHMENT 1 – WET WEATHER FLOW MASTER PLAN SUPPLEMENTARY INFORMATION

Map of WWFMP End-of-Pipe Projects (2023)
Description and Status of WWFMP End-of-Pipe Projects (2023)
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Mandatory Downspout Disconnection - Disconnection Rates by Ward (2021)
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Summary of Toronto's Street Sweeping Program

ATTACHMENT 1

WET WEATHER FLOW MASTER PLAN – SUPPLEMENTARY INFORMATION

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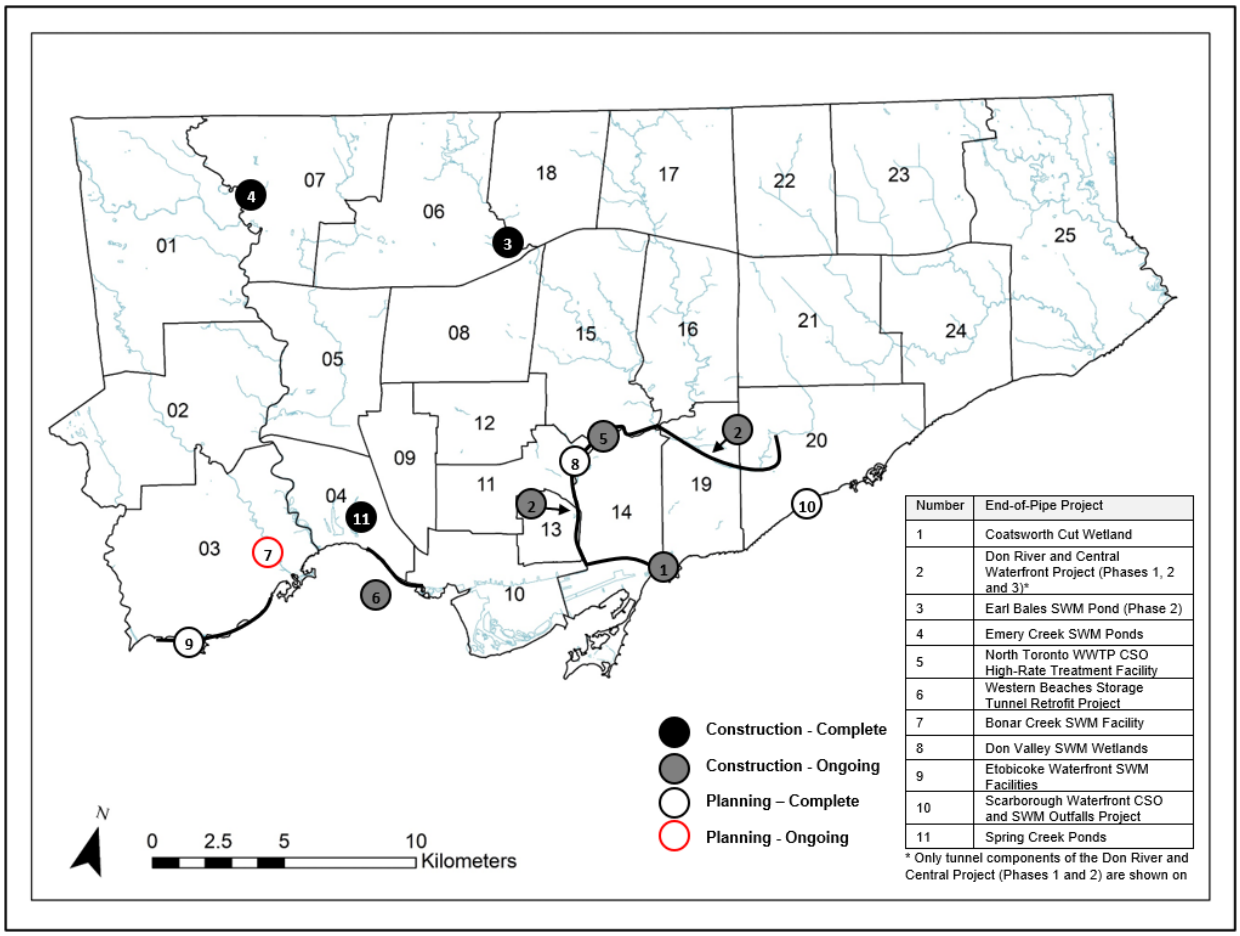


Table A1: Description and Status of WWFMP End-of-Pipe Projects (2023)

End-of-Pipe Project	Project Description	2023 Implementation Status
Coatsworth Cut CSO and Storm Outfalls Control Project	Conveyance control improvements including weir adjustments and adding storage in the Coatsworth Cut sewershed to reduce the volume of stormwater and combined sewer overflows discharged from outfalls to Coatsworth Cut. A wetland facility south of the Ashbridges Bay Treatment Plant was also recommended.	The EA study was completed in 2008. The conveyance controls and the CSO storage tank at Kingston Road and Dundas Street East were completed in 2012. An assessment of lake elevations and variations concluded that the implementation of the wetland at Coatsworth Cut was too complex to be hydraulically feasible. Instead, four outfalls discharging to the Coatsworth Cut will be connected to the Don River and Central Waterfront tunnel system. Modifications have been made the Don River and Central Waterfront tunnel system to accept the Coatsworth Cut flows. In addition, the design of the Integrated Pumping Station at the Ashbridges Bay Treatment Plant site has been modified to accommodate the changed approach.

End-of-Pipe Project	Project Description	2023 Implementation Status
Don River and Central Waterfront (DR&CW) Project	The system will be comprised of three integrated tunnels, underground storage shafts, off-line storage tanks, A pumping station (referred to as the Integrated Pumping Station – IPS), and a new wet weather flow high-rate treatment facility to be located on a Landform constructed on the Ashbridges Bay Treatment Plant water lot. The system will capture and treat stormwater discharges and combined sewer overflows. This combination of projects under the DR&CW program will greatly improve the water quality in the Lower Don River, Taylor-Massey Creek and Toronto's Inner Harbour. The project also includes upgrades to the Don Sanitary Trunk Sewer system to help service future growth and improve operations by providing redundancy for the Coxwell Sanitary Trunk Sewer.	The EA study was completed in 2012 and preliminary design of the entire tunnel system was completed in 2015. The first phase of tunnel construction, the Coxwell Bypass Tunnel (CBT), began in 2018. As of the end of 2022, the CBT tunnel was completed with the breakthrough at Coxwell Ravine Park. Other components of the CBT construction are underway, including the five storage shafts along the tunnel alignment, its connections between the main tunnel and the 11 drop shafts, and sewer connections at two of the storage shafts. The Sheppard / Leslie storage tank, originally planned for phase 3, has been constructed with the phase 1 work. The Inner Harbour West (IHW) Tunnel and sewer connections were scheduled for Stages 4 and 5 respectively in the EA. Due to rapid growth in this area, TW advanced the IHW tunnel implementation with detailed design anticipated to be completed in 2024. Further adjustments to the implementation stages (2, 3, 4 and 5) associated with budget prioritization are anticipated. Two large complex facilities are need to make the system operational. These include the Integrated Pumping Station at the north end of the Ashbridges Bay Treatment Plant (ABTP) that will pump stormwater and combined sewage overflows captured by the tunnel system. Two of three IPS contracts are near complete and the design of the third IPS contract is near complete. Tender of the third contract will be in mid 2024 and construction is expected to last some 10 to 12 years. The IPS will covey the captured combined sewer and stormwater flows to a dedicated treatment facility (referred to as a High Rate Treatment (HRT)) Facility to be constructed on new property created by lakefilling the water lot adjacent to the ABTP. Construction of the landform will be completed in 2025. Design of the HRT is expected to commence in 2024 and the facility is expected to be constructed by 2034.

End-of-Pipe Project	Project Description	2023 Implementation Status
Earl Bales Stormwater Management Pond	One of the largest facilities of its kind in Canada, this stormwater pond in Earl Bales Park provides stormwater treatment for a 400-hectare drainage area. Key innovations of the project include using the pond water for golf course irrigation in the summer and for snowmaking at the Earl Bales ski hill in the winter. The project's benefits include improving water quality and reducing fish habitat stress in the West Don River.	The EA study was completed in 2006 and construction of the pond was completed in 2011. In 2015, the second phase of the project began, which included the construction of two new sewer diversion pipes to capture stormwater from an additional 150 hectares. Phase 2 Civil works were substantially completed in 2018 with site restoration in 2019. With the facility now online, implementation of the monitoring plan has begun utilizing three real timed water quality sondes, three portable autosamplers, and three sets of flow through water quality instruments. The complexity of the sampling and data management system caused a three-year pause before it could be turned over to the City for operation in late 2022.
Emery Creek Stormwater Management Ponds	A series of three stormwater ponds in the valley lands southwest of Finch Avenue West and Weston Road. The ponds will intercept and treat stormwater flows from the Emery Creek catchment area, which historically has had some of the worst water quality contributions to the Humber River. This project will contribute significantly to improved water quality in the Humber River and contributes to a healthier environment and improved habitat for aquatic and terrestrial wildlife in the Humber River watershed.	The EA Addendum was completed in 2012. Construction of the project started in 2016 and was completed in 2017.
North Toronto Wastewater Treatment Plant CSO High-Rate Treatment Facility	Retrofits to CSO and stormwater storage tanks at the North Toronto Treatment Plant to provide enhanced chemical treatment of CSOs and increased treatment capacity. This project contributes to improved water quality in the Lower Don River by decreasing CSO volumes and enhancing CSO treatment.	Construction was substantially completed in 2016. The facility was initially commissioned in 2017 but was overwhelmed by stormwater flows experienced at this location. After examining the potential cause of the problem, additional design work was initiated resulting in certain modification that need to be implemented. The current additional design started in 2021 and expected to be completed by end of 2023; and construction is expected to commence in 2025.

End-of-Pipe Project	Project Description	2023 Implementation Status
Western Beaches Storage Tunnel Retrofit Project	The Western Beaches Storage Tunnel was constructed in 2002. The four-kilometre-long tunnel, with three storage tanks, intercepts wet weather flows from eight CSO outfalls and two stormwater outfalls to improve water quality in the City's western beaches. The Western Beaches Storage Tunnel Retrofit Project involves the replacement of the pumping station and other existing equipment for the facility to improve its operation.	In 2017-2018, the detailed design work was split into two phases. The first phase, which involved upgrading chambers at 10 outfalls to replace flap-gates with weirs to isolate the system was completed in 2021-2022. The second phase, including a redesign of the pump system, commenced in 2022 prior to tendering the associated system.
Bonar Creek Stormwater Management Facility	A future project that will include new stormwater management pond adjacent to Mimico Creek and sewer interceptor to collect stormwater discharges from a 365 ha drainage area that is currently untreated. The stormwater pond will treat stormwater discharges to improve water quality in Bonar Creek and Mimico Creek.	The EA study was completed in 2010. Due to cost escalation, Toronto Water is undertaking a study to evaluate the benefit of the proposed Bonar Creek stormwater management facility in relation to alternatives. The study is scheduled to be completed by the end of 2023. The City completed a Park Lawn Lake Shore Transportation Master Plan and Legion Road study in 2022, which included a recommendation to prepare an EA Addendum for the 2010 Legion Road Extension EA (to confirm the validity of the 2010 EA). The EA addendum will be initiated following the outcome of TW's study to determine the preferred SWM alternative for the subwatershed.
Don Valley Stormwater Management Wetlands	A project for future implementation. The EA recommended three stormwater management wetlands and other improvements (e.g., slope stabilization, tree planting, and erosion control) along the Don Valley Parkway (DVP) from the Gardiner Expressway to Taylor-Massey Creek to reduce the impact of stormwater runoff from the DVP and help improve water quality in the Don River.	The EA study was completed in 2009. Improvements on these corridors will be considered for future implementation as part of the City's Green Streets Program.

End-of-Pipe Project	Project Description	2023 Implementation Status
Etobicoke Waterfront Stormwater Management Facilities	A future project to improve quality of stormwater discharges to the Etobicoke waterfront. The EA study recommended the construction of a stormwater interceptor pipe that will direct flows from 27 of 30 outfalls along the Etobicoke waterfront to an underground treatment shaft to be in Samuel Smith Park. Oil/grit separators are recommended for three outfalls.	The EA study was completed in 2013. As the EA study is approaching ten years old, verification of the EA solution may be required. This project will be evaluated prior to advancement, scheduled accordingly, and sequenced with other major projects.
Scarborough Waterfront CSO and Stormwater Outfalls Control Project	A future project to improve water quality along the western Scarborough Waterfront. The EA study recommended source controls, conveyance controls and seven end-of-pipe underground storage facilities to store and treat stormwater and CSOs that are discharged from outfalls along the western Scarborough waterfront. The EA study also recommended flood protection projects to reduce basement flooding and surface flooding at five locations within the study area.	The EA study was completed in 2011. An EA addendum was completed in 2021. Implementation of the water quality improvement recommendations are currently beyond the capital plan, for future consideration upon further advancement of the DRCW project.

End-of-Pipe Project	Project Description	2023 Implementation Status
Cherry Street Stormwater Management Facility (CSWF)	The Cherry Street Stormwater Facility is designed to attenuate and treat stormwater from three different waterfront precincts east of Toronto's downtown core, namely: West Don Lands (32 ha), East Bayfront (22 ha) and North Keating (24 ha). It uses a three-step process to treat stormwater: (1) a hydrodynamic oil grit separator (2) ballasted flocculation (a binder is added so that the weighted material sinks to the bottom of the chamber where it is isolated from the clarified water) and (3) treatment with ultraviolet (UV) disinfection, prior to discharge to the Keating Channel (and Toronto Inner Harbour).	The Environmental Assessment (EA) was completed in 2013. All phases of the EA study and design and construction were led by Waterfront Toronto with input from TW from 2013 -2018. Construction started in August 2018 and was completed in March 2022. Commissioning has occurred from March 2022 to 2023. The facility has been operated by Waterfront Toronto from 2022 to 2023 Due to capacity issues, equipment issues and programming issues the facility has not passed the site acceptance testing yet. Until the facility operates properly, Waterfront Toronto will continue to operate the facility. All deficiencies are likely to be corrected sometime this fall (2023) at which time TW will undertake the operations and maintenance responsibilities.
Spring Creek Ponds	Two cells of Spring Creek Ponds were reconstructed and enlarged in 2003 to improve the water quality performance of each cell. Due to the development of a large subsurface cavity caused by artesian pressures, a groundwater well was installed to depressurize the aquifer and to seal up the cavity. Accumulated sediment from the pond cells were cleaned out in 2015 to 2016 and improvements to erosion control measures were constructed for when the outflow from the Upper Pond overtops its spillway into the Lower Pond cell. Since operation of the rebuilt cells commenced in 2003, gray to black colours and occasion smells have been observed in the two cells, which are typical of anaerobic conditions. Accordingly, a study was commissioned in 2018 to investigate the causes of the problems and to investigate solutions.	The Study was initiated in 2019 and completed as three separate field years. In 2019, the study focus was to sample influent water quality, to characterize potential odour sources, and to test out two Solar Bees (i.e., solar powered devices that vertically mix the pond water). In 2020, the study focused on refurbishment and installation of mixers, and further characterization of pond limnology. In 2021, the study focused on obtaining a better understanding of dissolved oxygen balance in the two pond cells. As there is no one cause that can be attributed to the loss of oxygen, a proposal has been developed in 2022 to develop a new phase of work which will involve an Engineering Assessment to scope the equipment needed to install a demonstration system to oxygenate the pond waters, given the large oxygen demand observed in the pond waters.

Figure 2: Map of Don River and Central Waterfront Project (April 2023)

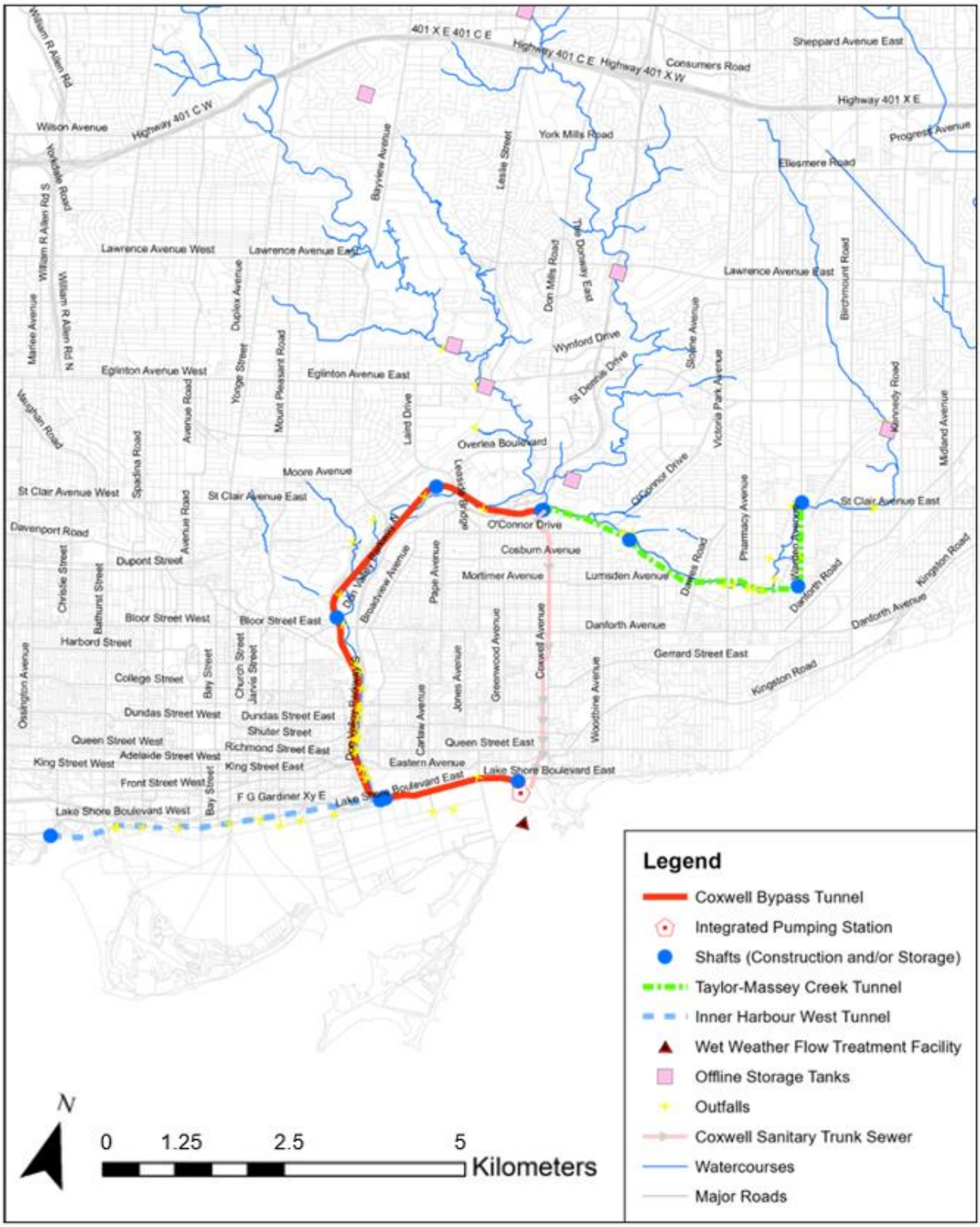


Figure 3: Status of Basement Flooding Protection Program Studies (April 2023)

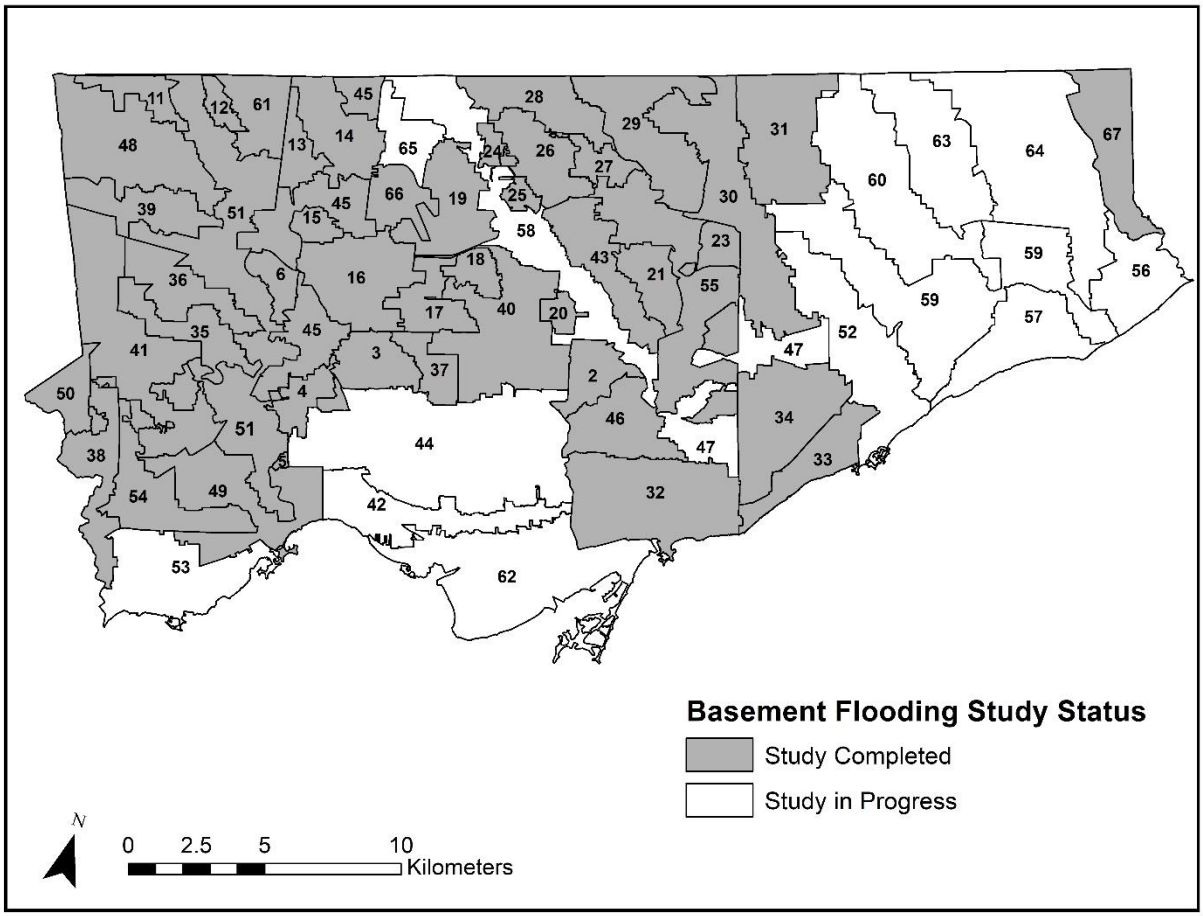


Figure 4: Mandatory Downspout Disconnection – Disconnection Rates by Ward (2021)

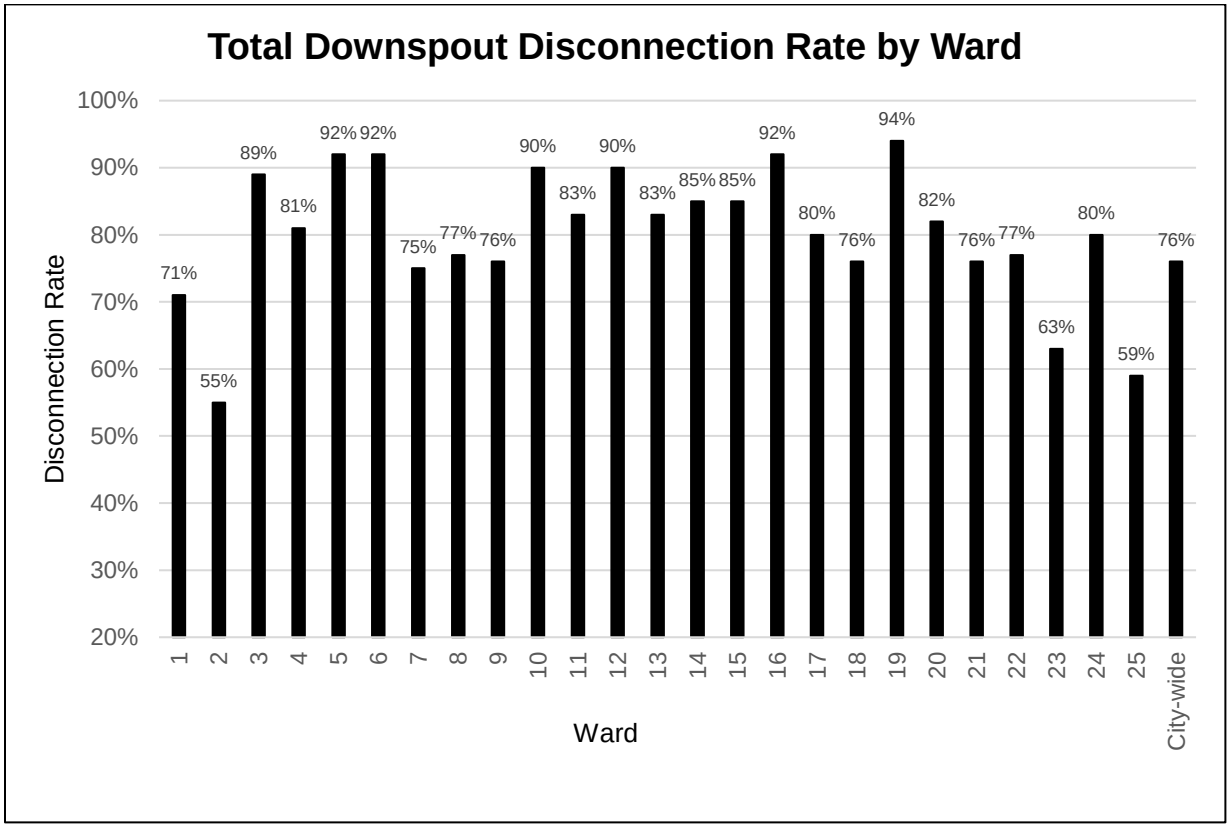


Figure 5: Number of Properties Receiving a Subsidy for Installation of Flood Protection Devices by Ward (up to end of March 2023)

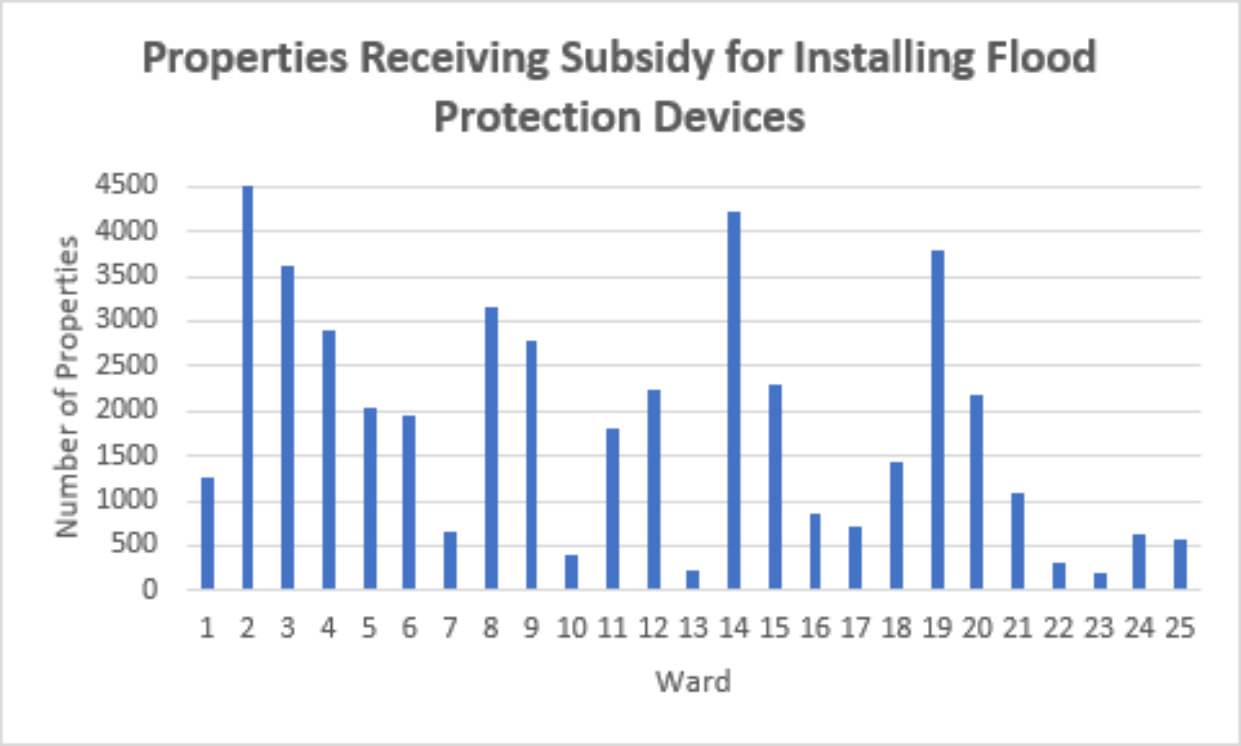


Figure 6: Wet Weather Flow Tributary Monitoring Program (2018-2022)

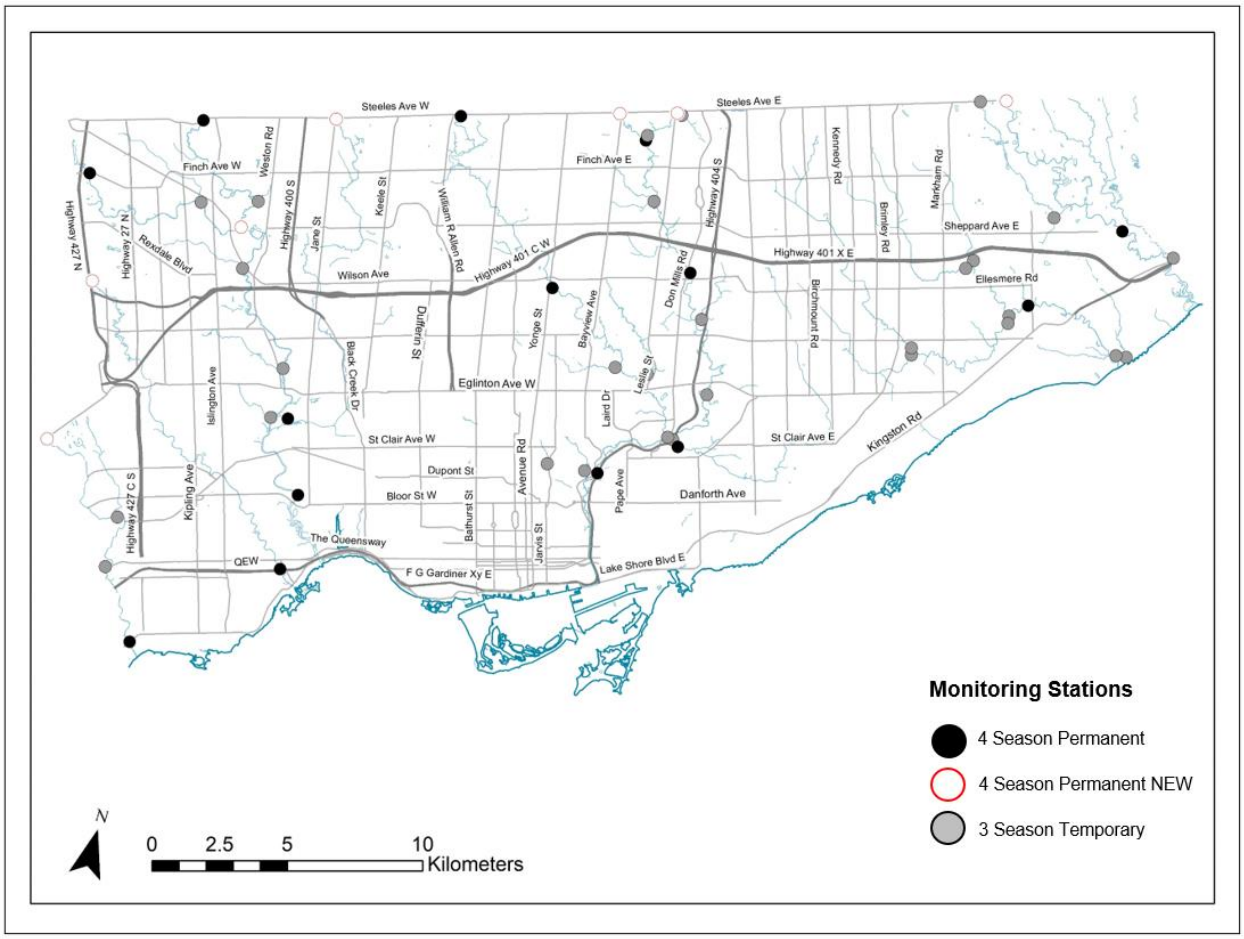
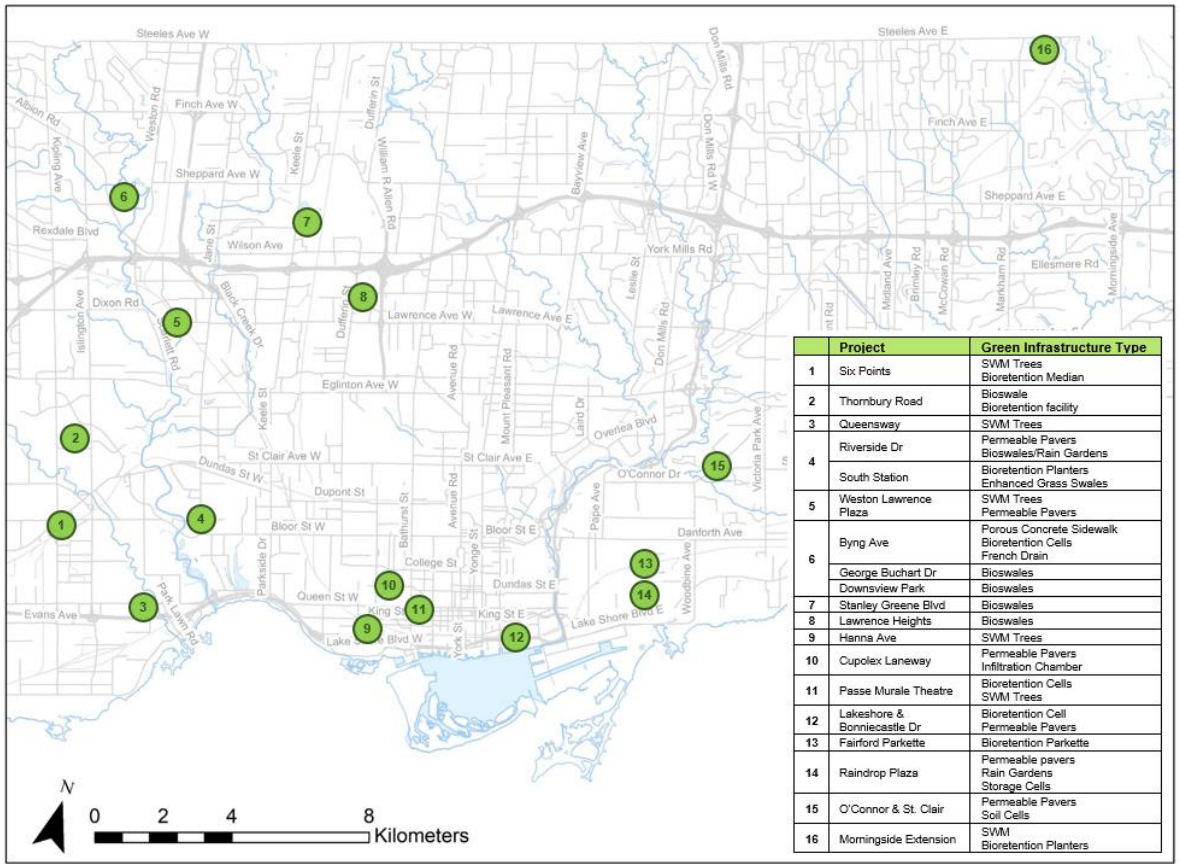


Figure 7: Green Infrastructure Works (January 2023)



	Project	Green Infrastructure Type
1	Six Points	SWM Trees Bioretention Median
2	Thornbury Road	Bioswale Bioretention facility
3	Queensway	SWM Trees
4	Riverside Dr	Permeable Pavers Bioswales/Rain Gardens
	South Station	Bioretention Planters Enhanced Grass Swales
5	Weston Lawrence Plaza	SWM Trees Permeable Pavers
6	Byng Ave	Porous Concrete Sidewalk Bioretention Cells French Drain
	George Buchart Dr	Bioswales
	Downsview Park	Bioswales
7	Stanley Greene Blvd	Bioswales
8	Lawrence Heights	Bioswales
9	Hanna Ave	SWM Trees
10	Cupolex Laneway	Permeable Pavers Infiltration Chamber
11	Passe Murale Theatre	Bioretention Cells SWM Trees
12	Lakeshore & Bonniecastle Dr	Bioretention Cell Permeable Pavers
13	Fairford Parkette	Bioretention Parkette
14	Raindrop Plaza	Permeable pavers Rain Gardens Storage Cells
15	O'Connor & St. Clair	Permeable Pavers Soil Cells
16	Morningside Extension	SWM Bioretention Planters

Summary of Toronto's Street Sweeping Program

In 2021, the Transportation Services Division (TSD) engaged Ernst & Young LPP ("EY") to undertake a review of the City's Street sweeping and separated bicycle lane operations. EY's report entitled "Review of Street Sweeping Operations - Final Report of all Workstreams" was finalized in December 2022 and documents how the landscape and responsibilities of the street sweeping operations performed by TSD have changed over the years, and how it continues to change. Changes have been observed in the composition of the maintenance vehicle 'fleet', in the amount of cycling infrastructure across the City, and in the population and density of Toronto all with implications for sweeping operations. EY's assessment of the current state and jurisdictional scan developed a concept for the desired (future) state of the sweeping program.

Currently, the TSD has 65 operators, 8 supervisors, 2 superintendents and 2 managers that are responsible for sweeping approximately 12,000 km of curb within the City and an additional ~250 km of expressway. This is completed using 34 regenerative air sweepers (Tymco 600). The operations are split between the four seasons, with an additional spring clean-up in the spring season, leaf program and additional leaf cleaning in the fall, and operations in the winter only when weather is permitting.

Solid Waste Management Services (SWMS) currently has about 10 individuals who operate 6 compact vacuum units to sweep approximately 180 curb kms (2-ways) of separated bicycle lanes. The fleet consists of 5 Mathieu MC-210 units which are designed specifically for separated bicycle lanes. In addition, SWMS has 1 Ravo unit that can only fit wider separated bicycle lanes. SMWS attempts to sweep each bicycle lane every other day. In 2021, SMWS accomplished approximately 1,000 sweeping hours.