

DOWNTOWN WATER STRATEGY



APRIL 2018

Acknowledgments

We acknowledge that the City of Toronto is located on the traditional territory of the Huron-Wendat Confederacy, the Haudenasaunee Confederacy, the Mississaugas of New Credit First Nation, and the Métis people, and is home to many diverse Indigenous peoples.

The Downtown Water Strategy was developed as part of “TOcore: Planning Downtown.” TOcore is a comprehensive and integrated look at Toronto’s Downtown, its relationship to the City and region around it, and the planning framework governing growth, development and the provision of infrastructure. Informed by public and stakeholder consultation, this Strategy is the collaborative work of the following Divisions:

City Planning
Toronto Water
Environment and Energy Division

DOWNTOWN WATER STRATEGY

APRIL 2018

PREAMBLE

The Downtown Plan is a 25-year vision that sets the direction for the city centre as the cultural, civic, retail and economic heart of Toronto, and as a great place to live.

The Plan is a response to rapid growth in the core that is placing pressure on physical and social infrastructure. The Plan provides a renewed planning framework for 17 square kilometres—the whole of Downtown.

The Downtown Plan is supported by five infrastructure strategies:

- Downtown Parks and Public Realm Plan
- Downtown Community Services and Facilities Strategy
- Downtown Mobility Strategy
- Downtown Water Strategy
- Downtown Energy Strategy

These strategies set priorities for infrastructure investment, and guide implementation of the Downtown Plan, which encompasses the area from Bathurst Street to the Don River and from the waterfront to about the CP rail corridor/ Rosedale Valley Road. Each strategy outlines a series of transformative ideas and actions intended to align infrastructure planning with long-term growth.

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EXECUTIVE SUMMARY

The Downtown Water Strategy is one of five strategies designed to ensure that development Downtown is accompanied by investment in necessary water supply, wastewater and stormwater infrastructure. It guides implementation of the Downtown Plan through a suite of transformative actions intended to align infrastructure planning with long-term growth.

The intent of the Downtown Water Strategy is to identify infrastructure improvements that are required to accommodate population and employment growth. It recognizes challenges associated with the limited space available in the City's road allowance to accommodate additional infrastructure as well as capacity constraints imposed by groundwater infiltration and wet weather flows.

The Water Strategy outlines the following actions to enhance water supply, wastewater and stormwater infrastructure, and implement the strategy through the Toronto Water Capital Program:

1. Water supply infrastructure:

- Complete the Toronto Optimization Study to assess water supply system performance, as this relates to major components of the system, and identify any deficiencies to be resolved.
- Complete a plan to upgrade watermains with the potential to increase fire suppression capability to support future growth and implement the plan accordingly. These projects will be considered under Development Charges

2. Wastewater infrastructure:

- Implement recommendations of the Waterfront Sanitary Servicing Master Plan Environmental Assessment Update to resolve capacity constraints related to the Scott Street Sewage Pumping Station service area within the Downtown.
- Extend programs to find and fix deficiencies in the existing sewer system to reduce the impacts of wet weather flow and to optimize existing sewer capacity.
- Continue to improve hydraulic models to increase their accuracy as opportunities arise.

3. Stormwater infrastructure:

- Complete the Basement Flooding Protection Program studies and, based on the results, schedule specific infrastructure improvements through the Toronto Water Capital Works Program.
- Review the integration of projects identified by the Basement Flooding Protection Program and growth-related projects through the capital works program.
- Assess the feasibility of proposed Ministry of Environment and Climate Change stormwater controls in high-density development areas, such as Downtown .
- Update the City's Wet Weather Flow Management Guidelines.
- Complete an implementation strategy for the Green Streets Technical Guidelines.

4. Water Strategy Implementation:

- Complete infrastructure assessments to identify capacity constraints based on future growth, and implement projects to resolve the capacity constraints through the capital works program.

1. INTRODUCTION

The intent of the Downtown Water Infrastructure Strategy is to identify and implement infrastructure improvements required to accommodate future population and employment growth Downtown, while enhancing infrastructure resilience. In detailing a process to plan and implement capital projects, the strategy also addresses other factors that may affect infrastructure capacity—such as groundwater and wet weather flows.

Toronto Water operates and maintains complex systems of water supply, wastewater and stormwater infrastructure. There are about 294 kilometres of watermains used to distribute water, and a total of 428 kilometres of sanitary sewers (which convey wastewater), combined sewers (which convey a mix of wastewater and stormwater), and storm sewers. Infrastructure generally follows the roadway network. Wastewater flows are conveyed to and treated at the Ashbridges Bay Treatment Plant, just east of Downtown. The system requires continuous monitoring to ensure it is performing efficiently and has the capacity to meet future demands.

2. CHALLENGES

2.1 Pace & magnitude of growth

The pace and magnitude of the forecasted growth Downtown is using the capacity of Toronto Water infrastructure faster than projected. Staff must anticipate when and where growth will occur based on market conditions and then match infrastructure capacity upgrades as they are needed. As market conditions change over time, development may focus in new areas, and scheduled capacity upgrades may have to be updated accordingly. Figure 1 shows projected population change in Downtown to 2041.

2.2 Ageing infrastructure & tall buildings

In the Downtown, growth is increasingly accommodated in vertical communities. This type of development presents unique challenges to Toronto's ageing water infrastructure when managing inflow and infiltration of stormwater and groundwater. The increasing height and density of many proposed developments is placing unanticipated stress on the water system.

Sanitary sewers are designed primarily to collect wastewater generated by the population, with a small amount of additional capacity for the inflow of stormwater or infiltration of groundwater into the sewer. As a sewer ages, it becomes leakier, allowing inflow and infiltration into the pipe, consuming capacity that could otherwise be used to support growth. As buildings get taller, their foundations get deeper. Construction of multiple below-grade levels often means that buildings are reaching into the groundwater table, necessitating the pumping of water into the sewer that is taking up capacity in the pipe, and the potential premature replacement of sewers, which is undesirable.

2.3 Space limitations

Construction of infrastructure upgrades or new infrastructure is more difficult Downtown since space in the City's road allowance is limited or non-

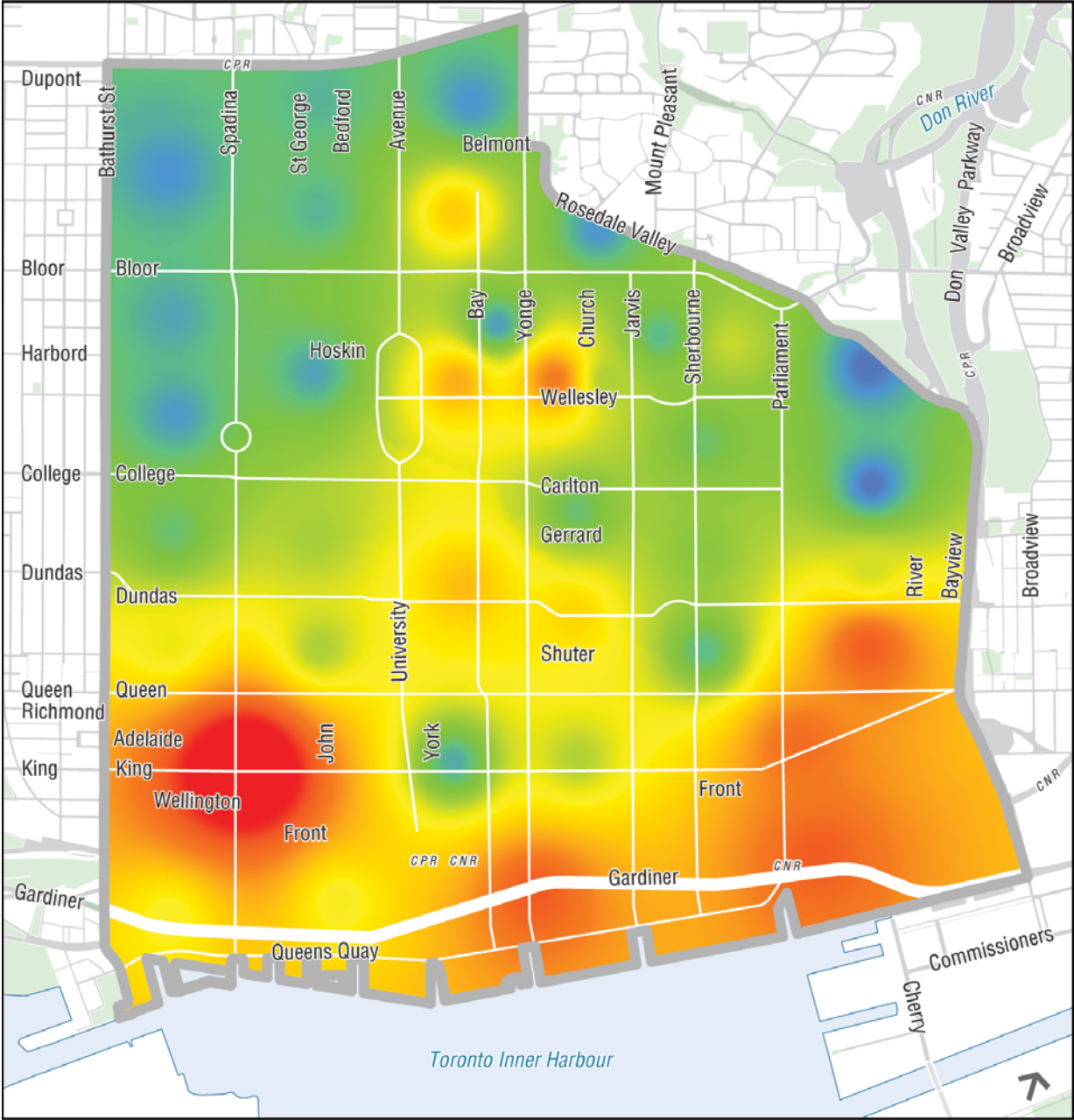
existent for additional infrastructure. Alternative solutions such as reducing inflow and infiltration from unintended sources, or green infrastructure that includes the reuse and recycling of stormwater can reduce additional demand on existing infrastructure, or delay the need for upsizing.

2.4 Data considerations

Toronto Water uses population projections in hydraulic models to determine if existing infrastructure has the capacity to accommodate additional growth. Toronto Water and City Planning will work together to support modelling by Toronto Water to optimize infrastructure upgrades.

The Provincial Growth Plan for the Greater Golden Horseshoe contains population and employment forecasts to be used for planning and managing growth in the Greater Golden Horseshoe. The Growth Plan (2017) forecast horizon is 2041. While growth scenarios to 2041 are used to analyze the capacity of water and wastewater infrastructure to accommodate future growth, new infrastructure can have a life cycle beyond 75 years under ideal conditions. Thus it is reasonable that Toronto Water consider engineering factors and upsizing to accommodate a range of potential growth for up to 75 years. This will ensure that the full life-cycle of the infrastructure is utilized to achieve full economic efficiencies.

As market conditions dictate the timing of some infrastructure improvements, it will not always be possible to optimize the infrastructure life cycle. Mechanisms may be needed to align upsizing with market trends, including through the use of holding by-laws for proposed development, where appropriate.



Projected Population Change 2011 - 2041



TOcore Study Area

Figure 1: Projected Population Change Downtown, 2011-2041. Source: Toronto City Planning Division, Research and Information - October 2016.

3. TRANSFORMATIVE ACTIONS

The Toronto Water Infrastructure Strategy addresses challenges associated with the capacity of the watermain and sewer infrastructure to accommodate a growing Downtown. This is done through infrastructure studies that identify constraints and provide recommendations as to how to address them. Also, the Toronto Water infrastructure implementation process can serve to prioritize and coordinate growth-related infrastructure upgrades with non-growth related upgrades, such as those relating to state-of-good-repair and service level enhancement. Through this process projects are prioritized, coordinated and funded.

3.1 Water Supply Infrastructure

Priority actions:

- Complete the Toronto Optimization Study to assess water supply system performance, as it relates to major components of the system, and identify any deficiencies to be resolved.
- Complete a plan to upgrade watermains with the potential to increase fire suppression capability, that supports future growth and implement the plan accordingly. These projects will be considered under Development Charges.

The Water Distribution Study for Pressure Districts 1, 1W, and 2 determined that the existing local water infrastructure distribution system is able to accommodate future growth in the Downtown based on domestic demand (e.g., drinking water and wash water uses). Further studies may indicate the need for additional infrastructure improvements where capacity constraints exist. Figure 2 shows the locations of Pressure District boundaries as they relate to Downtown.

3.1.1 Complete the Toronto Optimization Study

Toronto Water anticipates completing the Toronto Optimization Study early in 2018. These results will provide an assessment of the water supply system performance, as this relates to major components of the system, including transmission watermain infrastructure, pumping stations, and storage facilities in the city, and will identify any deficiencies that need to be resolved.

3.1.2 Address water demand for fire suppression

While Toronto Water is responsible for ensuring that the City watermain system can deliver enough water for domestic uses, with the benefit of fire suppression provided in most cases, developers are responsible for satisfying fire suppression requirements for their site. A developer may upgrade the adjacent City watermain system and/or provide on-site infrastructure such as storage in order to satisfy fire suppression requirements.

The City provides the benefit of fire suppression through the watermain system. To support future growth, staff have reviewed the future domestic demands and potential future fire suppression needs in the Downtown. Staff have drafted a plan to identify and proactively upgrade the distribution watermain system to support growth in the Downtown. This plan is being considered in conjunction with the City's Development Charge By-law update.

Figure 3 and Example 1 (below) provide further details on the potential extent and costs of this plan to address fire suppression constraints.

The first step of the plan outlines how watermain upgrades may be triggered by growth related fire suppression constraints:

- Based on requirements of the *Ontario Building Code*, use of the Fire Underwriters Survey (as a de facto standard), and observations of past trends that triggered upgrades in watermains for new development, it is apparent that new residential buildings greater than four storeys benefit by being connected to 300mm diameter watermains located in the adjacent roads.
- A review of the Official Plan, the policies within the Downtown Plan and population projection data will identify where buildings taller than four storeys are likely to be located in the Downtown, based on the 2041 future growth scenario. Therefore, any distribution watermain located along the City's minor or major arterial roads and adjacent to a building taller than four storeys may be upgraded to 300mm. The watermain should also be within 30m of a four-storey building. Examples of watermains that may be considered for upgrading are those located on Gerrard, Richmond, Front, Spadina, Bay, and Jarvis.
- Prioritization of upgrades would be considered for those arterial road allowances that have only one watermain along their length, the watermain is less than 300mm diameter, and are coincident with capital works planned by Transportation Services.
- To further refine the extent of watermain upgrades under this plan, upgrades to a

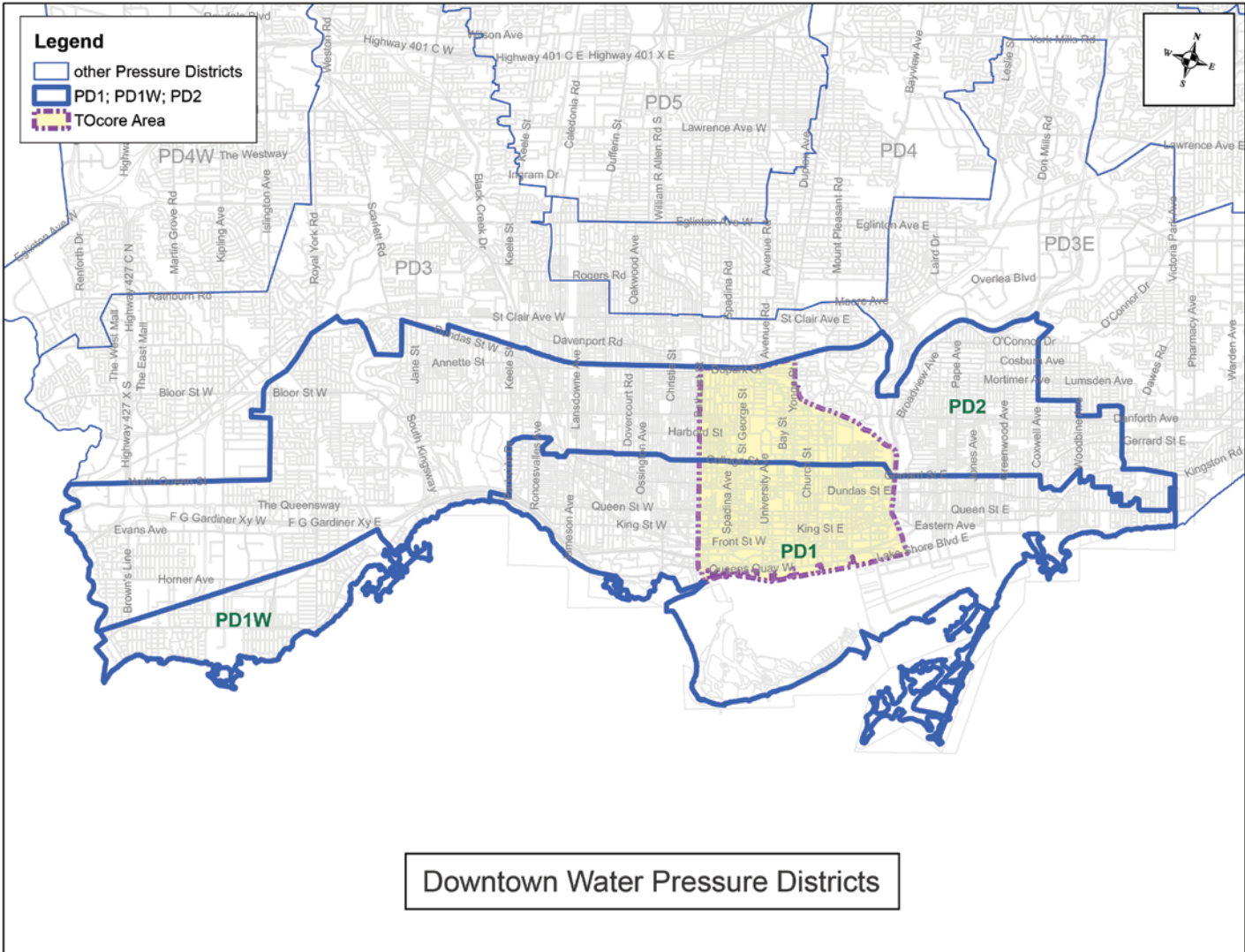


Figure 2: Location of pressure districts analyzed under the Water Distribution Study for Pressure Districts 1, 1W, and 2.

300mm diameter watermain must also connect directly to another 300mm diameter or greater watermain to ensure maximum hydraulic capacity.

The second step of the plan outlines how the watermain upgrades may be funded:

- If an existing watermain is identified for upsizing to a 300mm diameter and is already planned for renewal (e.g., lining or same size replacement) under Toronto Water's state-of-good-repair program, Toronto Water will pay a share (e.g., 50%) of the project cost through the City's water rate, with the balance of costs to be funded through development charges. If it is not planned for renewal under the program, the project cost will be funded entirely through development charges.
- The upsizing of watermains to accommodate water demand for fire suppression would then be incorporated into the Toronto Water Capital Works Program to take advantage of existing procedures to prioritize and coordinate City and utility infrastructure projects, as well as for scheduling and implementation.
- There may be situations where the implementation schedule for upgrades to watermains through the Capital Works Program will not meet the occupancy schedule for a new development. In these situations, the developer may implement the necessary upgrades in advance of the Capital Works Program, subject to the satisfaction of City Engineering and Construction Services, and in accordance with City specifications and standards.
- When a developer implements a watermain upgrade and the cost of the upgrade is shared

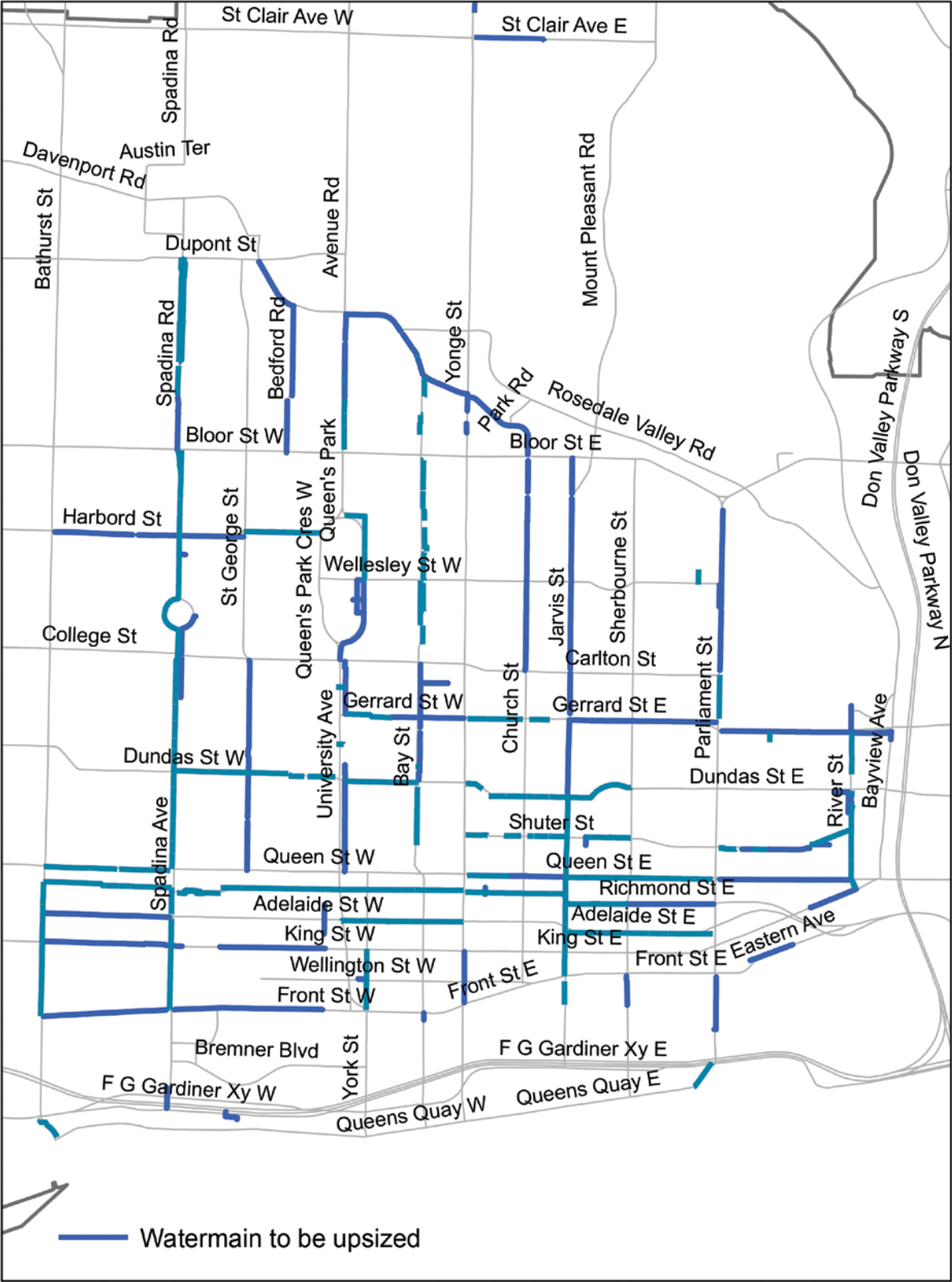


Figure 3: Locations of approximately 39 km of distribution watermain that would need to be upgraded under the criteria described above.

with Toronto Water (based on a state-of-good-repair component), the developer may claim the balance of costs through development charge credits to the extent available, and to the lesser of the accepted tender bid or the actual final cost of the upgrade as constructed.

- When the developer implements a watermain upgrade that has no state-of-good-repair component (i.e., no sharing of cost with Toronto Water), the developer may claim development charge credits to the extent available, and to the lesser of the accepted tender bid or the actual final cost of the upgrade as constructed.
- Where there is a state-of-good-repair component, Toronto Water will pay its share to the developer at such time as the watermain upgrade was originally scheduled for construction in accordance with the Capital Works Program.

EXAMPLE 1: POTENTIAL COSTS FOR FIRE SUPPRESSION UPGRADES TO ACCOMMODATE THE 2041 FUTURE GROWTH SCENARIO

ASSUMPTIONS

- Total length of watermain to be upsized to 300mm diameter = 39,200m
- Total length of state-of-good-repair (SOGR) watermain to be upsized for development, scheduled in the Capital Works Program (CWP) within the next 10 years, to be partially funded by Development Charges = 19,500m
- Cost sharing = 50:50
- Total length of non-SOGR watermain to be upsized, not in the 10-year CWP = 19,700m
- Estimated construction cost to upsize a watermain in the Downtown to 300mm diameter = \$12,000/m

CALCULATIONS

- Toronto Water total cost (SOGR) = (19,500m) (\$12,000/m) (50%) = **\$117,000,000**
- Development Charges = (19,500m) (\$12,000/m) (50%) = **\$117,000,000**
- Developer cost to upsize watermain with no SOGR component as local improvements = (19,700m) (\$12,000/m) (100%) = **\$236,400,000**

3.2 Wastewater Infrastructure

Priority actions:

- Implement recommendations of the Waterfront Sanitary Servicing Master Plan Environmental Assessment Update to resolve capacity constraints related to the Scott Street Sewage Pumping Station service area within the Downtown.
- Extend programs to find and fix deficiencies in the existing sewer system to reduce the impacts of wet weather flow and to optimize existing sewer capacity.
- Continue to improve hydraulic models to increase their accuracy as opportunities arise.

Hydraulic models are used to confirm the performance of sewer systems under existing and future growth conditions, including consideration of:

- Replacement and upgrades for the local sewer network, which comprises old sewer pipes with limited capacity.
- Optimization of the use of existing infrastructure, such as the trunk sewer system and its inter-connecting sewers.
- Reduction in dependency on a number of local sewage pumping stations, and identification of opportunities to replace them with a smaller number of centralized stations that would ensure sustainability and minimize operational costs.

A hydraulic model that covers Downtown has been updated and

was used to obtain preliminary results for the performance of sewers in the Downtown. The results will be further validated based on results from the Waterfront Sanitary Servicing Master Plan Environmental Assessment Update, which covers the waterfront; and future basement flooding studies, which will cover the rest of Downtown.

3.2.1 Waterfront Sanitary Servicing Master Plan Environmental Assessment update

The Waterfront Sanitary Servicing Master Plan Environmental Assessment Update provides recommendations for infrastructure improvements along the City's waterfront from Bathurst to the Port Lands, including existing and new sewage pumping stations. The

recommendations will inform future basement flooding studies Downtown. In particular the update recommends that the capacity of the Scott Street Sewage Pumping Station be upsized to accommodate future growth Downtown.

Example 2 provides further details on the potential extent and costs of the preferred solution to resolve capacity constraints related to the Scott Street Sewage Pumping Station service area within Downtown.

EXAMPLE 2: PREFERRED SOLUTION TO RESOLVE CAPACITY CONSTRAINTS RELATED TO THE SCOTT STREET SEWAGE PUMPING STATION SERVICE AREA

Potential Costs to Implement the WSSMP EA Update Preferred Alternative to Accommodate Future Growth in the Downtown:

Capacity upgrade for Scott Street SPS	\$4,550,000
Bypass diversion conduit for Scott Street SPS	\$3,032,000
New sanitary sewer along Yonge Street from Harbour Street to The Esplanade	\$9,384,000
Total	\$16,966,000

The preferred alternative will be further developed by undertaking detailed design.

3.2.2 Reduce impacts of wet weather flow to optimize sewer capacity

Downtown is serviced by an interceptor system of sewers (i.e. trunk sewers) draining west to east, to the Ashbridges Bay Treatment Plant. Flow monitoring at various locations along this system indicates that there is available capacity to accommodate future growth based on the City's design criteria, which reflects dry weather conditions with an allowance for inflow and infiltration of stormwater and groundwater into the wastewater system of 0.26 L/s/ha (or to convey 2.5 times the average daily dry weather flow for the combined sewers). The same flow monitoring indicates that the available capacity to accommodate future growth is significantly reduced under wet weather conditions when the infiltration of water displaces available capacity.

Possible solutions to provide additional capacity are to upsize the sewers and/or expand the Ashbridges Bay Treatment Plant. These solutions would be expensive and require significant lead times to complete the necessary environmental assessments, design and construction. In addition, any existing Combined Sewer Overflows that may be impacted would need to be adjusted to maintain their design function, where appropriate.

A 'find and fix' solution, which is likely less expensive and would require less time to implement, involves identifying opportunities to reduce inflow and infiltration to free up capacity in the existing sewers and treatment plant. This approach could also provide opportunities for including green infrastructure in the public realm.

Additionally, 'peak shaving' through the use of storage attenuation could supplement system-wide upgrades. The City's Don River and Central Waterfront Project Class EA Study includes a Wet Weather Flow tunnel system along the lower Don River and waterfront to intercept Combined Sewer Overflows and treat the water at a proposed Wet Weather Flow Treatment Facility at Ashbridges Bay, before discharging into Lake Ontario. The tunnel system will be able to provide the necessary storage attenuation in support of future growth. The part of the tunnel system within Downtown is identified as Stage 4-Inner Harbour West Tunnel. Figure 4 shows the phasing of all projects that form part of this initiative, including Stage 4.

Field investigations are underway as part of a five-year program to find and fix undesirable infiltration and inflow of groundwater and stormwater in the Scott Street Sewage Pumping Station service area. These efforts will be expanded to the rest of Downtown to free up capacity in the sewers wherever possible. Investigations are prioritized based on current development demand.

The results of these infiltration and inflow investigations will also be considered in future Basement Flooding Protection Program Studies to confirm cost-effectiveness and to integrate solutions that optimize the use of sewer upsizing and infiltration and inflow reduction to mitigate any flooding issues.

3.2.3 Improve hydraulic model to increase accuracy

Continuous improvement of the wastewater hydraulic models is underway. This will enhance their accuracy through further validation—field verification of hydraulic control structures—and calibration—integration of flow monitoring results. Improvements to the models may identify additional infrastructure deficiencies that need to be addressed. Therefore, the list of projects to address the deficiencies will need to be updated accordingly.

Don River and Central Waterfront Project

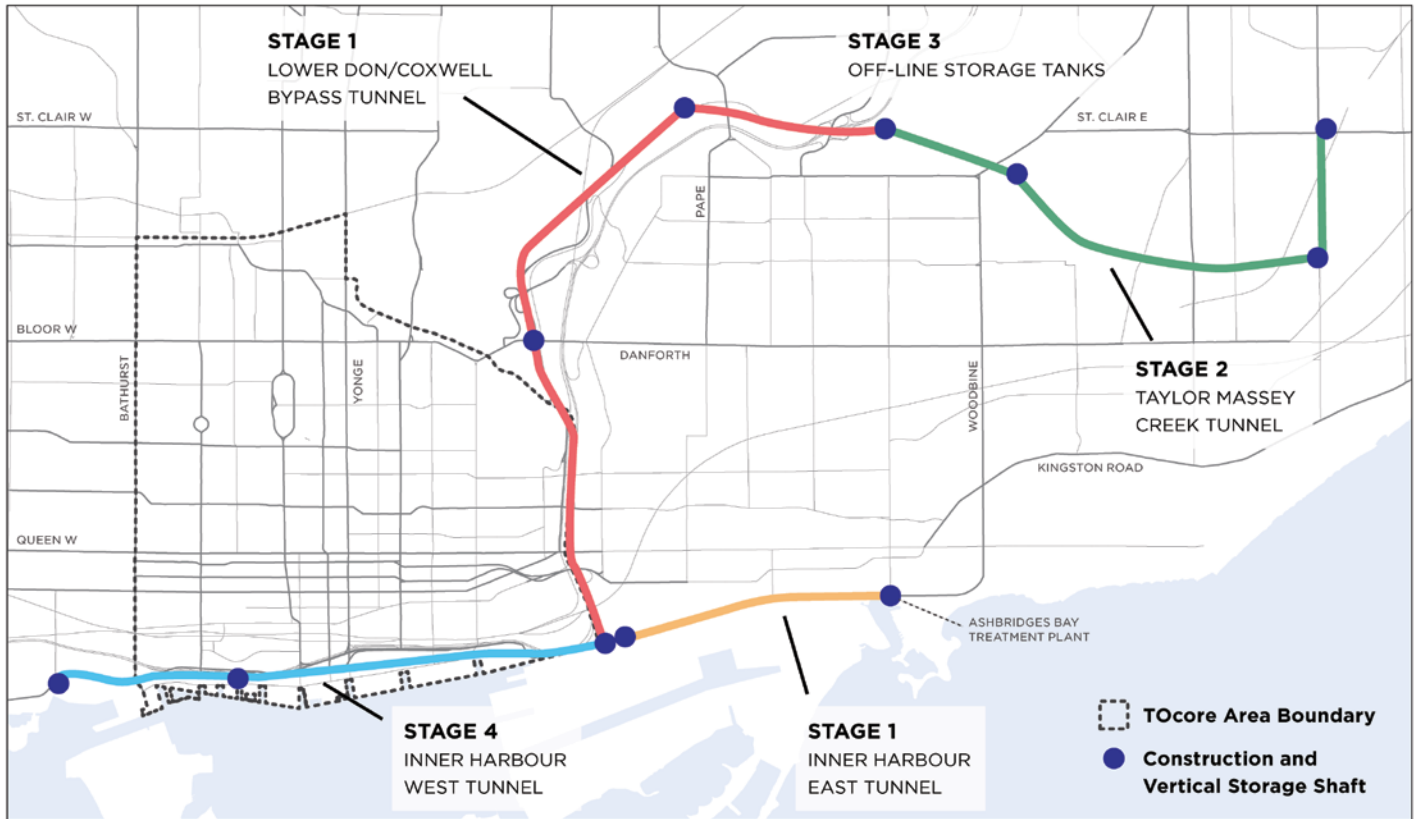


Figure 4: Phasing of projects under the Don River and Central Waterfront Project, including Stage 4-Inner Harbour West Tunnel along the waterfront of the Downtown.

3.3 Stormwater Infrastructure

Priority actions:

- Complete the Basement Flooding Protection Program studies and, based on the results, schedule specific infrastructure improvements through the Toronto Water Capital Works Program.
- Review the integration of projects identified by the Basement Flooding Protection Program and growth-related projects through the capital works program.
- Assess the feasibility of proposed MOECC stormwater controls in high-density development areas, such as Downtown.
- Update the City's Wet Weather Flow Management Guidelines.
- Complete an implementation strategy for the Green Streets Technical Guidelines.

The following actions provide examples of how existing infrastructure studies and further planning initiatives will be used to consider the impacts of growth on existing infrastructure and to improve specific infrastructure that may have capacity constraints.

3.3.1 Undertake Basement Flooding Protection Program studies

A Basement Flooding Protection Program (BFPP) study for Areas 42, 44, and 62, which includes Downtown, is expected to begin in early 2018 and, due to the complexity of the sewer system, take four years to complete. Figure 5 shows the boundaries for these study areas.

The study will assess the sewer and storm drainage systems, overland flow capacity, and recommend infrastructure improvements to reduce flooding during severe storm events. The studies also will assess the impacts of the 2041 growth scenario, identify any deficiencies in infrastructure capacity, recommend projects to mitigate the deficiencies, and provide cost estimates.

The BFPP study will incorporate use of the hydraulic model for wastewater systems which will help to reduce the effort and cost to undertake the BFPP Study.

Once the BFPP study is complete, the next step will be to undertake preliminary design for the recommended

solutions, confirm feasibility and costs, and schedule construction through the Toronto Water Capital Works Program.

3.3.2 Review Basement Flooding Protection Program

The current prioritization of projects recommended through the BFPP studies is based on the cost per benefitting property and the need to reduce the risk of basement flooding. Current funding of projects is limited to the annual Council approved budget. Therefore, less expensive projects are often prioritized in order to achieve the greatest benefit to the public at the lowest cost.

Toronto Water will review opportunities for the integration of BFPP projects and future growth-related projects that can be prioritized as part of the capital works budget process.

3.3.3 Review Ministry of Environment and Climate Change new stormwater management requirements

The Ministry of Environment and Climate Change (MOECC) has proposed new stormwater management requirements (e.g., runoff volume control) to manage the discharge of stormwater from development sites into downstream drainage systems. The Low-Impact Development Stormwater Guidance Manual, currently under preparation, focuses on the source and conveyance components of a treatment train approach, in order to mitigate the impacts of urbanized stormwater runoff.

As additional information from the MOECC becomes available, Toronto Water will assess the feasibility and effectiveness of such controls in high-density development areas, such as Downtown.

Based on this assessment, relevant requirements will be incorporated into an update of the City's Wet Weather Flow Management Guidelines.

3.3.4 Update Wet Weather Flow Management Guidelines

The Wet Weather Flow Master Plan, 2003 and policy provides a number of goals and objectives for achieving stormwater management in the City. The Wet Weather Flow Management Guidelines, 2006 provide specific requirements and technical direction for the practice of stormwater management in the City. Requirements of the guidelines must be implemented for all new developments in the City in order to reduce the quantity of stormwater runoff (to minimize flooding) and to improve the quality of stormwater runoff that discharges to the City's watercourses and Lake Ontario.

The Wet Weather Flow Management Guidelines provide direction as a component of the Toronto Green Standard. The Toronto Green Standard requires that the Wet Weather Flow performance measures be met for new development going through the planning process, and includes a higher performance standard for stormwater retention for Tier 2 developments, which are incented through a refund of development charges.

The Wet Weather Flow Management Guidelines is planned to be updated in 2018.

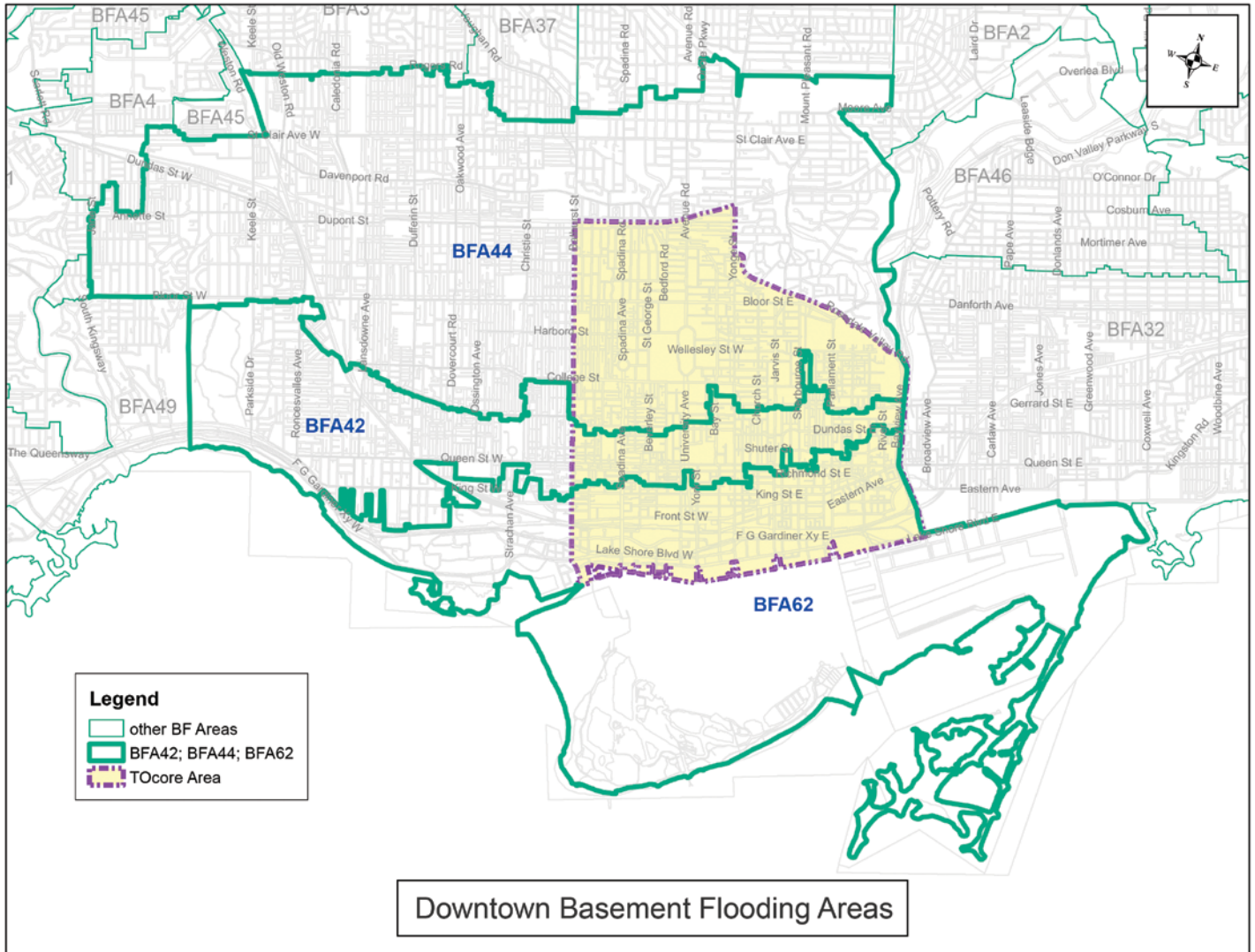


Figure 5: Boundaries of Basement Flooding Protection Program Studies for the Downtown.

3.3.5 Complete Green Streets Technical Guidelines

Green Streets are roads or streets that incorporate natural and human-made infrastructure to enhance the ecological and hydrological functions related to the environment. The benefits of Green Streets include stormwater management that results in less flooding and less water pollution, increased climate change resilience, improved air quality and energy efficiency. All contribute to an improved quality of life in the City.

The Guidelines inform City divisions, developers, and property owners about how to plan, design, integrate, and maintain Green Streets, where appropriate. An implementation strategy is to be completed by mid-2018.

3.4 Implementing the Downtown Water Strategy

Priority action:

- Complete infrastructure assessments to identify capacity constraints based on future growth, and implement projects to resolve the capacity constraints through the Toronto Water Capital Works Program.

The Downtown Water Strategy, including improvements that are necessary to resolve capacity deficiencies related to future growth, will be implemented through the Toronto Water Capital Works Program at a manageable and sustained pace. Depending on timelines, development may have to be held until the infrastructure improvements are implemented by the City. Or, if permitted by the City, developers may make suitable arrangements to undertake the necessary infrastructure improvements themselves.

A number of infrastructure assessments are currently underway. As final results become available, the deficiencies in the infrastructure for the Downtown will be reviewed to identify specific zones of concern that need attention. These will be mapped against improvements for state-of-good repair and service level enhancements to identify synergies, including cost savings, where both improvements coincide. These combined infrastructure improvements would

then be considered for implementation through the capital works program.

Toronto Water and City Planning will work together to prioritize infrastructure projects related to future growth in five-year increments up to 2041 for now. Figure 6 shows current infrastructure upgrades that are planned and included in the 2018 Toronto Water Operation and Capital Budgets, and a 10-year Capital Plan that includes watermains and sewers.

Over time, City Planning will monitor any significant changes in population growth trends in terms of the amount and distribution of population, and advise Toronto Water accordingly. Toronto Water will then look at the feasibility of adjusting the priority of infrastructure improvements through the capital works program.

Currently, there is limited flexibility to allow for adjustments or changes to infrastructure projects in the capital works program. The current coordination process would have to be reviewed

in conjunction with the City's Major Capital Infrastructure Coordination (MCIC) office to increase flexibility, especially with the addition of infrastructure projects related to future growth.

Infrastructure improvements identified in the Capital Works Program are then scheduled for construction, which, based on current experience, may take up to five years to plan, coordinate, design, tender and construct.

Infrastructure improvements that support future growth—above and beyond those supported under the state-of-good-repair or service level enhancement programs—would be funded through the of development charges or funded as local improvements by individual or groups of developers, depending on the scope of the upgrades.

To accommodate the additional infrastructure projects related to growth, the City will have to review the capacity of its existing resources (e.g., staff and funds) to deliver these projects, and make any necessary adjustments.

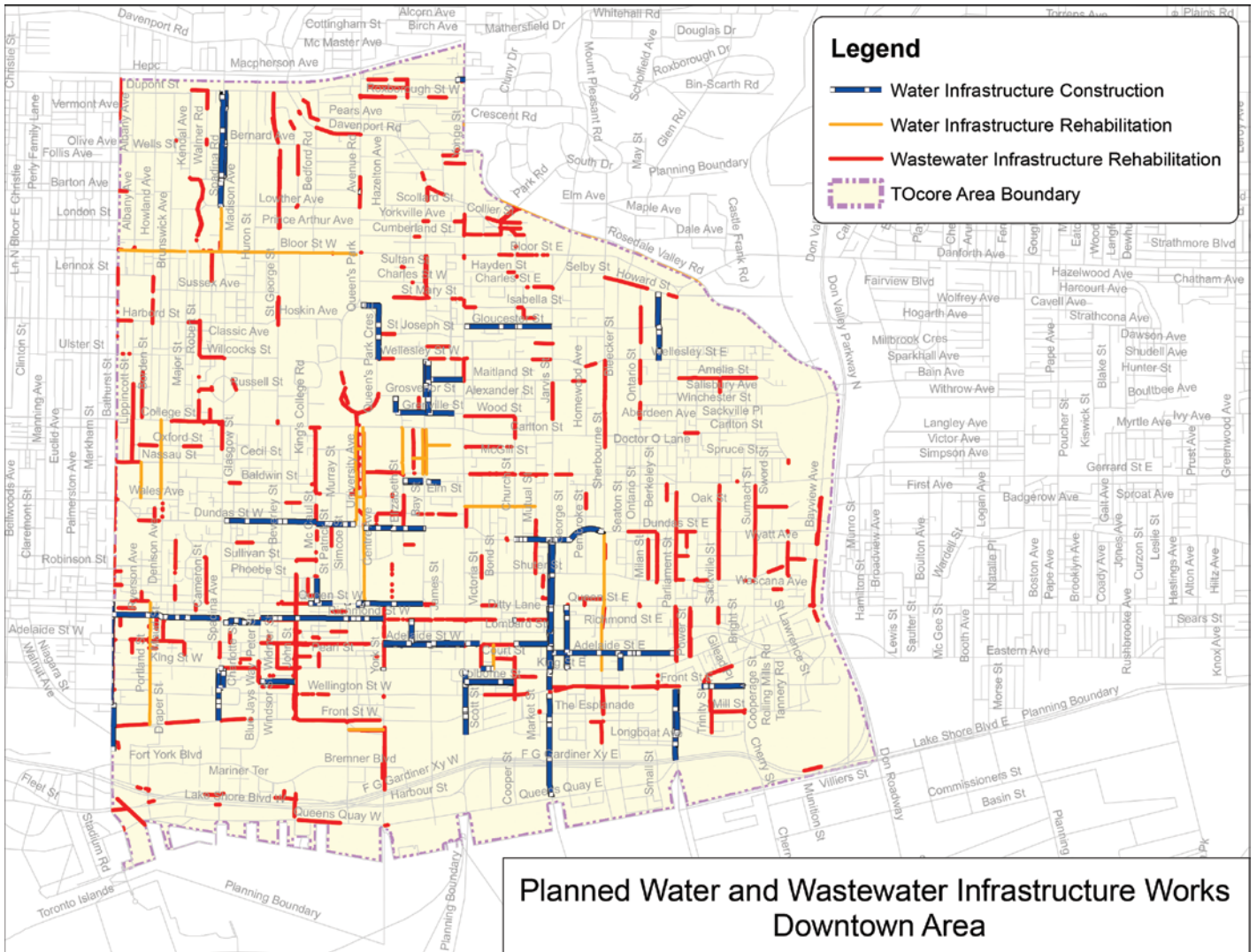


Figure 6: Location of projects in the Downtown that are related to the 2018 Toronto Water Operation and Capital Budgets, and 10-year Capital Plan.

Construction projects generally involve replacement or upsizing of infrastructure while rehabilitation projects generally involve in-situ lining.

4. OTHER ALIGNED INITIATIVES

There are two technical matters currently under consideration that will influence the Downtown Water Strategy, including guidelines for sanitary and combined sewer assessments and the groundwater discharge policy. Further, there are other City initiatives such as the Toronto Green Standard, and Deep Lake Water Cooling, which offer the potential to support Toronto Water in attaining its business goals and objectives. Toronto Water will continue to collaborate on such initiatives.

4.1 Sanitary and Combined Sewers Capacity Assessment Guidelines

Toronto Water has drafted criteria for the assessment of sewers and is preparing supporting guidelines. The criteria and guidelines would be used by developers to demonstrate available infrastructure capacity to service their developments on a site-specific basis, without the benefit of a master servicing plan. Where there is not enough capacity, developers must indicate how the matter will be resolved.

Ideally, master servicing plans such as those prepared through Basement Flooding Protection Program studies are the preferred method of demonstrating capacity of existing infrastructure, or identifying deficiencies with recommendations for resolution. A master servicing plan is usually based on large service or catchment areas, which avoids the need to do several servicing assessments for smaller areas. A master servicing plan also provides a comprehensive and optimal set of solutions to resolve infrastructure deficiencies based on effectiveness and efficiency.

However, in the absence of a master servicing plan, or until such time as a master servicing plan has been completed, the criteria and guidelines will help establish a consistent and effective approach for developers to analyze capacity on a site-specific basis.

4.2 Groundwater Policy

It has become apparent that groundwater is being discharged from developments' foundation drains into the City's sewers without formal approvals, as required by the City's Municipal Code 681-Sewers. In response, Toronto Water has implemented a reporting requirement for owners of all new developments to formally identify their plans to discharge groundwater to the City's sewers, and to demonstrate that existing sewers have adequate capacity.

Toronto Water is also preparing a policy for groundwater discharge that will provide direction on the amount of groundwater that may be discharged to the City's sewer systems from developments in the future.

The City's Design Criteria for Sewers and Watermains will be updated to recognize the additional demand on infrastructure capacity by groundwater infiltration. A new groundwater policy is anticipated to be completed in 2018.

4.3 Development Charges By-law review

The Development Charges By-law provides a process to fund improvements for infrastructure that are required to support future growth.

The City's Development Charges By-law must be updated every five years and it is currently under review. When infrastructure assessments associated with the Toronto Water Infrastructure Strategy are completed, relevant improvements will need to be incorporated into the City's Development Charges By-law.

4.4 Toronto Green Standard

The Toronto Green Standard (TGS) is a set of sustainable performance measures required for new development through the planning process. The TGS includes requirements for water balance (stormwater runoff), water efficiency, and erosion and sediment control which helps reduce stormwater runoff and potable water consumption while improving the quality of stormwater that discharges to Lake Ontario. The TGS also includes as core a higher performance measure for water balance for development seeking to meet Tier 2 incented through the TGS Development Charge Refund Program. The TGS implements the Wet Weather Flow Management Guidelines.

4.5 Deep Lake Water Cooling and Sewer Heat Recovery

The Downtown Energy Strategy identifies opportunities to access Toronto Water infrastructure to capture low-carbon thermal energy sources. For example, Toronto Water has experience with Deep Lake Water Cooling (DLWC), which involves the shared use of infrastructure in collaboration with Enwave Energy Corporation. DLWC can provide energy efficient cooling for buildings in the Downtown.

Another potential low-carbon energy source is heat recovered from new wastewater infrastructure. Expanded involvement with DLWC or sewer heat recovery projects would have to be reviewed on a case-by-case basis to confirm alignment with Toronto Water's business goals and objectives.

GLOSSARY OF TERMS

The following key technical terms are used in a discussion to describe the Strategy and accommodation of future growth:

- **STATE-OF-GOOD-REPAIR (SOGR):**
programmed maintenance or rehabilitation activities that ensure existing infrastructure will function as originally designed
- **SERVICE LEVEL ENHANCEMENT:**
improvements to infrastructure that increase the functionality of existing infrastructure and therefore provide a higher level of service to the customer
- **INFLOW AND INFILTRATION (I/I):** I/I is a component of flow that discharges into a sewer from unintended sources (e.g. stormwater that flows directly into the sewer, or groundwater that infiltrates into the leaky joints of an old sewer)

- **HYDRAULIC MODEL:** a computer program that replicates the physical infrastructure of a water-related system and is able to simulate a response to an applied demand (e.g. what happens to the capacity of a sanitary sewer if more wastewater is added to it)
- **CAPITAL WORKS PROGRAM:** a list of projects identified by Toronto Water that upon implementation will maintain SOGR or Service Level Enhancement, generally funded by the water-rate.
- **DEVELOPMENT CHARGES:** fees paid by developers to the City to build infrastructure that provides additional capacity to support future growth.
- **PEAK SHAVING:** the reduction of peak flows in a pipe through the use of a storage element.
- **TREATMENT TRAIN:** a sequence of stormwater controls that manage runoff at source, as it is conveyed along a pipe, and as it discharges at the end of a pipe.

