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2020 CAPITAL BUDGET BRIEFING NOTE
Basement Flooding Protection Program – Program Status Update and Project List: 2020 to 2024

Issue:

City Council, through the creation of the City's Basement Flooding Protection Program, has directed staff to reduce the risk of basement flooding across the City through a combination of public drainage system improvements and through the use of policies, by-laws, and incentives to reduce flood risks on private and public properties.

This briefing note provides an update on Toronto Water's efforts to reduce the risk of basement flooding in the City. Ward by ward progress updates are provided to summarize the progress to date on Environmental Assessment studies, infrastructure upgrades, and private property flood protection device subsidies.

City Council has directed the General Manager of Toronto Water to submit an updated five year list of Basement Flooding Protection Program capital projects through the annual Capital Budget submission process. Accordingly, this briefing note provides a list of projects proposed for construction initiation in 2020 through 2024.

Background:

The Basement Flooding Protection Program (BFPP) increases the resilience of the City of Toronto by making "Toronto more resilient to climate change, including the hazards of flooding and heat". Specifically, Toronto Water contributes to the achievement of action items B1.1, B1.2, and B1.3 of the Toronto Resilience Strategy through its efforts to upgrade municipal drainage infrastructure, its continuous contributions to research, and its annual consideration of the program's accomplishments. Toronto's Resilience Strategy can be found at: https://www.toronto.ca/ext/digital_comm/pdfs/resilience-office/toronto-resilience-strategy.pdf

The Basement Flooding Protection Program (BFPP) was expanded to be City-wide following the severe storm of July 8, 2013. This expansion resulted in the creation of new Basement Flooding study areas, bringing the total to 67 study areas. City Council, at its meeting on March 10 and 11, 2015, requested the General Manager, Toronto Water, to initiate and expedite the completion of new Basement Flooding EA studies for the remainder of the City, specifically Study Areas 42 through 67, and in the order of priority

as shown in Schedule A to the report (December 18, 2014) from the General Manager, Toronto Water. The Council decision can be viewed at:
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.EX3.1

On August 7, 2018, the Black Creek Watershed was significantly impacted by a severe storm event whose rainfall intensity exceeded that of a 100 year return period storm event. Many homes were flooded, and this event triggered the need for the acceleration of EA studies, as presented in Toronto Water's 2019 Capital Budget submission. The accelerated EA studies were initiated through their award to 5 consulting firms in August, 2019.

Basement Flooding Environmental Assessment (EA) Studies

Environmental Assessment (EA) studies are undertaken to assess the capacities of the City's existing overland, storm, sanitary, and combined sewer drainage systems and recommend infrastructure improvements to these systems that reduce the chances of future basement and surface flooding. Deficiencies in private drainage systems are not identified and not assessed through the City's Basement Flooding EA studies.

As of September 1, 2019, EA studies have been completed for 41 Basement Flooding Study Areas. EA studies for five study areas are underway, of which two EA studies are scheduled to be completed in 2020 (Study Areas 43 and 45). Study Areas 42, 44, and 62 commenced in 2019 and, due to the size and complexity of the downtown area, are projected for completion in 2023. The remaining 21 EA study areas, Study Areas 46 through 61, and 63 through 67, were awarded in August 2019, and are scheduled to begin in September and October 2019, dependent upon the successful execution of contracts. These 21 studies are scheduled for completion in 2022. Opportunities to expedite study schedules are continually sought and implemented through the duration of the projects.

The 21 Study Areas awarded in August 2019 are being studied and delivered in six bundles, each consisting of multiple study areas. The bundle areas are depicted in Figure 1, with the study areas in each bundle area identified in Table 1.

Figure 1 - Bundled Basement Flooding Study Areas

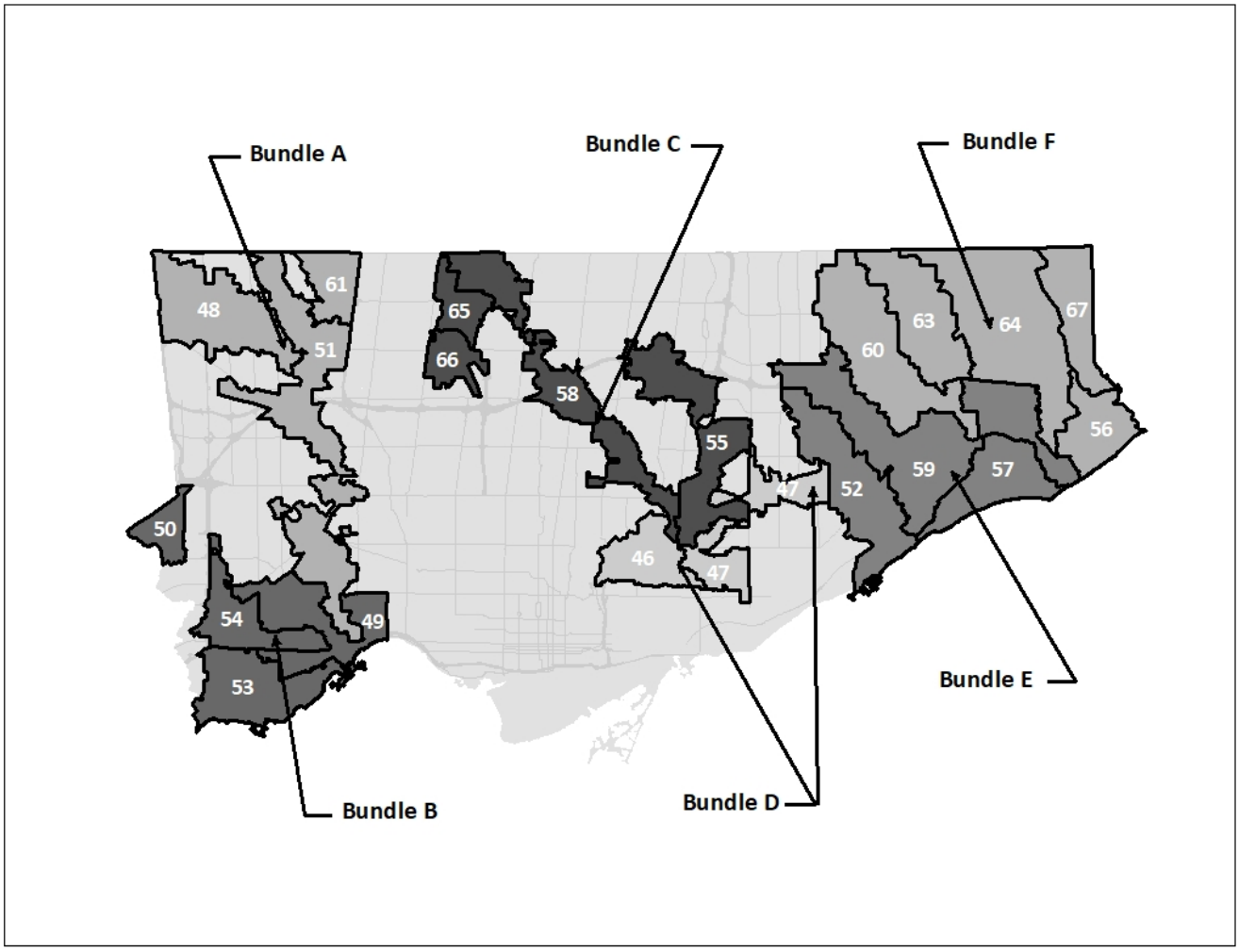


Table 1 - Basement Flooding Study Areas and Corresponding Bundle

Bundle Area	Study Areas
Bundle A	Study Areas 48, 51 and 61
Bundle B	Study Areas 49, 50, 53 and 54
Bundle C	Study Areas 55, 58, 65 and 66
Bundle D	Study Areas 46 and 47
Bundle E	Study Areas 52, 57 and 59
Bundle F	Study Areas 56, 60, 63, 64 and 67

A preliminary schedule (subject to future adjustments) for undertaking Basement Flooding EA studies was provided in the December 18, 2014 Staff Report. Toronto Water is committed to providing City Council with an updated schedule when there is a

change in the EA schedule (e.g. advancement or delay of an EA study start) that exceeds one year. As EA schedules have not changed from what was reported last year, a schedule update is not provided in this briefing note. Last year's Basement Flooding Protection Program Status Update Briefing Note can be viewed here: https://www.toronto.ca/legdocs/mmis/2019/ex/bgrd/backgroundfile-129668.pdf.

Implementation of Infrastructure Upgrades

Infrastructure upgrades to municipal drainage systems are prioritized and scheduled, as per Council approved criteria to protect the greatest number of properties as soon as possible, within approved budgets, and are coordinated with other capital projects. By the end of 2019, it is projected that approximately $445 million has been spent on construction and activities supporting construction (engineering, design, studies, flow monitoring, etc.) within the BFPP.

A key criteria in the decision to proceed with the design and construction of BFPP infrastructure upgrades is the requirement for storm sewer upgrade projects to cost less than or equal to $32,000 cost per benefitting property. This threshold was adopted by City Council at its meeting of September 21, 2011. The adopted staff report can be found at: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.PW7.6

Properties are considered to be benefitting if they move from not meeting the targeted levels of service for drainage to meeting the enhanced levels of service upon completion of infrastructure upgrades. The targeted levels of service, as previously adopted by City Council consist of the 100 year design storm for drainage systems, and the May 2000 design storm for sanitary drainage systems.

Projects that meet the $32,000 cost per benefitting property threshold at the completion of the EA stage proceed to preliminary design. The goal of the preliminary design stage is to ensure the physical constructability of projects and to better define project cost estimates. The design is refined at this stage, which may result in scope changes and a significant cost increase. At the completion of preliminary design, projects that meet the $32,000 cost per benefitting property threshold proceed to detailed design and construction. While it is typical for construction to start within two years following the completion of the preliminary design, projects can sometimes be delayed to allow coordination with the schedules of works being delivered by other City of Toronto divisions and utilities. Only once projects are moved into the detailed design stage, should they be communicated to the public as being projects that will be proceeding to construction.

Projects that do not meet the $32,000 cost per benefitting property threshold, either at the Environmental Assessment study stage or at the completion of the preliminary design stage, are removed from the long-term capital plan. These projects will be constructed on an opportunistic basis. These projects will be sequenced for detailed design and construction, as the replacement of the existing drainage systems becomes warranted due to poor structural condition or to address land development needs.

Projects are prioritized and entered into the capital plan based on the $32,000 cost per benefitting property criteria as listed above. These projects first appear in the Year 3 to Year 5 grouping of projects as highlighted by schematic shown in Figure 2.

Subsequent to the 2020 Capital Budget submission, new projects will likely need to be added to the program differently to accommodate changing city-wide capital coordination requirements. This anticipated change includes the capital coordination requirements moving from a 2 year lead time to that of a 3 year lead time on capital projects (i.e. new projects would only be added in Year 4 and Year 5). This change is expected to be offset somewhat as Toronto Water begins to undertake some preliminary design investigations prior to adding new projects to the BFPP capital project list (i.e. while projects are added later in time, the required design effort after a project is added to the project list should be reduced, thereby mitigating impacts of process changes).

Figure 2 - Schematic of Basement Flooding Protection Program
5 Year Capital Planning of Projects

Year 1 Projects	**Year 2 Projects**	**Year 3 – 5 Projects**
Projects are either; • Confirmed for Detailed Design and Construction • Still Undergoing Preliminary Design • Removed from the long-term capital plan and moved into the BFPP backlog		New Implementation Projects are Added Yearly. Projects are either; • Undergoing Preliminary Design • Planned to Start Preliminary Design

Of the approximately $3.4 billion of recommended infrastructure improvement projects identified to date, approximately 45% of the total value do not meet the $32,000 cost per benefitting property threshold or cannot be constructed due to physical constraints. These projects have not been scheduled for implementation within the 5 year capital plan, in accordance with City Council direction. The attached ward profiles in Schedule A provide further information on the implementation status in each ward.

With annual inflation eroding the effectiveness of the $32,000 cost per benefitting property threshold, and with the increasing construction of drainage system improvements, within a few years, a shortage of drainage system improvement projects that satisfy City Council adopted criteria is anticipated. A review of the program rules has been initiated with the goal of ensuring that the rate of City Resilience building against flooding is maximized by using available funds on infrastructure upgrades.

Toronto Water is planning on approaching City Council in 2020 with recommended improvements.

External Funding of the BFPP

In 2019, Toronto Water was successful in securing $110.36 million from the Government of Canada's Disaster Mitigation and Adaptation Fund (DMAF) to fund a portion of the construction of the Midtown Toronto Relief Storm Sewer (Assignment 17-15) and the Fairbank-Silverthorn Trunk Storm Sewer System (Assignment 03-03) projects. This funding program was geared towards large projects (>$20 million), and required that a minimum return on investment against natural hazards be achieved. While Toronto Water was only able to submit funding applications for a projects within the BFPP, due to eligibility criteria, Toronto Water will continue to explore further funding opportunities for specific Basement Flooding Projects as they are available.

Basement Flooding Protection Subsidy Program

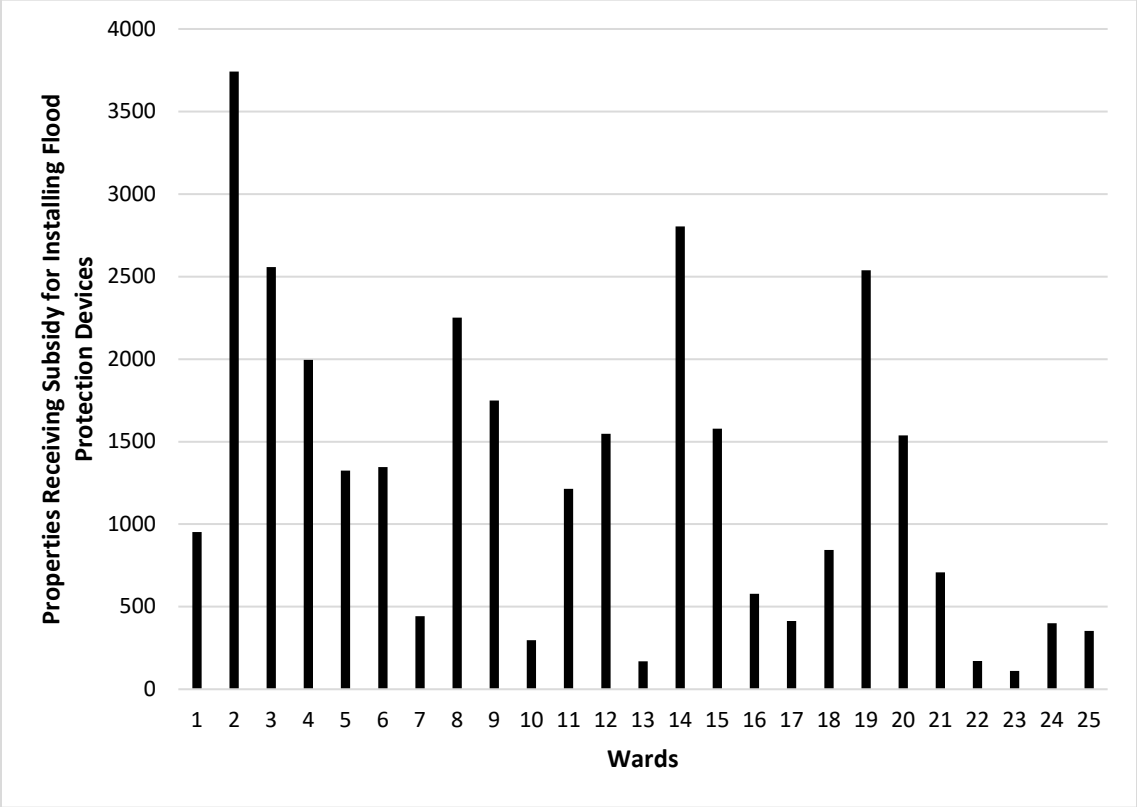
The City's Basement Flooding Protection Subsidy Program (BFPSP) offers property owners of single-family, duplex and triplex residential homes financial assistance of up to $3,400 per property to install flood protection devices, including a backwater valve, sump pump, and pipe severance and capping of the home's storm sewer or external weeping tile.

The BFPSP was initially created for homeowners in response to the May 12, 2000 storm event, and was initially known as the "Voluntary Private Home Isolation from Public Sewer System Program". As a result of properties being impacted by subsequent storm events including the August 14, 2003, August 19, 2005 and May 17, 2006 storm events, the program was expanded City wide. City Council at its meeting in July 2006 adopted a report to expand the program City-wide and requested the General Manager of Toronto Water to incorporate funding to support the Program in its 2007 Capital Budget submission. The Council decision can be viewed at:
http://www.toronto.ca/legdocs/2006/agendas/council/cc060725/pof6rpt/cl041.pdf

In 2017, the Auditor General audited the BFSP and issued a report, "Improving the Effectiveness of the Basement Flooding Protection Subsidy Program". Toronto Water is currently working to incorporate recommendations resulting from this report and, as recommended by the Auditor General, developing a long-term direction for the BFSP.

Since the subsidy program was expanded City wide in 2006, over 31,632 applications have been approved with $53.2 million in total subsidy payments issued to property owners by Toronto Water as of June 30, 2019. Properties may be approved for more than one subsidy, the total number of approved basement flooding protection program subsidies, including backwater valves, sump pumps, and severance and capping of the home's storm sewer is 39,998. On average, the City currently issues approximately $1,600 in subsidy payments to participating properties. The number of subsidy applications approved by the City have varied considerably from ward to ward as shown in Figure 3.

Figure 3 - Number of Properties Receiving a Subsidy for Installing Flood Protection Devices by Ward (up to end of June 2019)



Key Points – BFPP Program:

- The costs associated with managing, designing, and constructing Basement Flooding Protection Program solutions increases annually. With the cost per benefitting threshold being set in 2011, the impacts of this annual inflation are being felt, with fewer projects each year costing less than the fixed cost threshold value. To ensure that infrastructure upgrades continue to be undertaken at a pace commensurate with the City's ability to fund upgrades, beginning in late 2019, Toronto Water will be considering how to adjust the program's rules in late 2019 and early 2020. Toronto Water is intending to present a modified approach for the prioritization of implementation projects to City Council in mid-late 2020 for consideration.

- Homes can flood for a large variety of reasons. The Basement Flooding Protection Program exists to reduce the risk of flooding associated with surcharging of local municipal drainage systems that can happen during extreme weather events (e.g. 100 year return period storm and/or May 2000 design storm event), as long as the cost to do so is less than $32,000 per benefitting property. As a result of this approach, the solutions that are needed for homes

that flood even during smaller events are often too expensive to be implemented. In concert with the consideration of the $32,000 per benefitting property rule, this bias will be considered and discussed further in 2020.

Key Points – Ward Profile Summaries (Schedule A):

Progress in the Basement Flooding Protection Program varies considerably from ward to ward. This briefing note provides a ward by ward summary in Schedule A and highlights the accomplishments achieved to date. Specifically, the progress regarding EA studies, construction of infrastructure upgrades, and participation in the subsidy program is provided.

A substantive acceleration of EA study efforts has been initiated, with the goal of increasing and accelerating the delivery of drainage system upgrades in the City. These summaries highlight that while significant effort has been expended, there still remains a great deal of effort to achieve the enhanced level of service to reduce the risk of basement flooding across the entire City.

The summary for each City ward includes:

- A map showing the limits of each ward, the private properties that have installed flood protection devices, and the boundaries for the EA studies along with different shading to identify the portions of each ward where EA studies have been completed, are ongoing, or are planned to begin;

- A pie chart and table illustrating the proportion of each ward where an EA study has been completed, is ongoing, and is planned to begin in the future.

- A pie chart illustrating the status of the infrastructure improvement works that were recommended through completed EA studies. The chart is subdivided into five categories, namely 'Constructed', 'Under Construction', 'Design Process Initiated', 'Planned for Design Initiation', and 'Deferred Projects'. To align with the typical budgeting cycle, expected construction costs to the end of the 2019 calendar year have been estimated. The pie charts represent the portions of the ward where EA studies have been completed. Infrastructure improvement costs for the portions of the ward not yet studied are not estimated within the provided values.

- As projects move though the implementation process, cost estimates are updated and replaced with actual costs, which results in variations in the values from year to year.

- Bar charts are provided to illustrate the accomplishments of the City's Basement Flooding Protection Subsidy Program, which provides financial assistance to pay for some of the costs of installing flood protection devices. Both program

participation and program expenditure summaries up to June 30, 2019 are provided.

Key Points – Project List 2020-2024 (Schedule B):

- Table 2 (attached) contains a 5-year list of projects organized by year and by Ward. This list reflects Toronto Water's 2020 Capital Budget, and the 2021 to 2024 Capital Budget Plan.

- This Briefing Note uses the best available scheduling information at the time of writing. Schedule and scope change requests matching the schedules and scopes proposed in this Briefing Note may have not yet been submitted to Major Capital Infrastructure Coordination (MCIC). Likewise, since the writing of this briefing note, the need for project changes may have arisen that are shown in the tables in this BN. As change requests are processed, the City's website (T.O. INview) will be updated and may not reflect some proposed schedules and scopes within this Briefing Note.

- The scheduling of construction projects is subject to change, due to capital coordination issues and regulatory approvals which may be necessary. Schedules are updated throughout the year through submissions to the Major Capital Infrastructure Coordination unit. These updates are regularly uploaded to the City's website.

- The projects presented in the 5 year list were identified from the 41 completed Environmental Assessment (EA) studies as of September 1, 2019. To ensure that as many projects as possible are initiated without delay, moving forward, recommended projects from EA studies will be assigned for preliminary design at the same time those projects are presented to the public as part of the EA study process. Should solutions need to change as a result of feedback received through the public review process, sufficient time exists within the engineering design process to incorporate such changes prior to construction.

- This briefing note only lists those projects that have been removed, during 2019, from the long-term capital plan and moved into the BFPP backlog, upon completion of preliminary design. The list does not include projects that had been moved into the BFPP backlog through budget submissions in prior years.

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