



Sewer System Flood Reduction Measures in the Rockcliffe Area

Date: March 26, 2018

To: Public Works and Infrastructure Committee

From: General Manager, Toronto Water

Wards: Ward 11 York South-Weston

SUMMARY

The Rockcliffe area is located in the regulatory floodplain of Black Creek and has experienced surface and basement flooding during severe storms due to riverine flooding and overloading of the City's sewer systems. In 2014, Toronto Water and Toronto and Region Conservation Authority (TRCA) completed separate Environmental Assessment (EA) studies that investigated options and recommended measures to reduce sewer system and riverine flooding in the Rockcliffe area, respectively.

This report has been prepared by Toronto Water, in consultation with TRCA, to report back to City Council on the implementation of recommended measures from Toronto Water's 2014 Basement Flooding Study Area 4 EA (BF Area 4 EA) to reduce sewer system flooding in the Rockcliffe area. This report discusses the challenges of reducing sewer system flooding in the Rockcliffe area due to the impact of Black Creek (riverine) flooding on the sewer system and concludes that implementation of the BF Area 4 EA recommended sewer system improvements will not be effective in reducing basement flooding unless the TRCA EA's recommended riverine flood reduction measures are implemented.

On March 23, 2018, the TRCA Board approved that TRCA undertake feasibility and conceptual design studies in 2019 as a next step for the preferred measures to reduce riverine flooding in the Rockcliffe area from their 2014 Black Creek (Rockcliffe Area) Riverine Flood Management Class Environmental Assessment (TRCA EA). As riverine flood protection measures are completed in the Rockcliffe Area, Toronto Water will reassess the scope and costs of the BF Area 4 EA recommended sewer system improvements. Sewer system improvements that proceed to implementation, in accordance with City Council direction for the Basement Flooding Protection Program, will be identified through Toronto Water's annual Capital Budget process.

RECOMMENDATIONS

The General Manager of Toronto Water, recommends:

1. Public Works and Infrastructure Committee receive this report for information.

FINANCIAL IMPACT

This report has no financial impacts.

DECISION HISTORY

At its March 23, 2018 Authority meeting (Meeting #02/18), the TRCA Board considered a staff report (Item 7.2) titled "BLACK CREEK (ROCKCLIFFE) FLOOD REMEDIATION ENVIRONMENTAL ASSESSMENT Flood Remediation Measures in the Rockcliffe Area" and adopted a Resolution that TRCA, in consultation with appropriate City of Toronto Divisions, undertake feasibility and conceptual design studies in 2019, which will refine cost estimates and benefits, confirm construction feasibility, and identify design considerations and other implementation requirements for the TRCA EA recommended flood protection berms, channel widening and naturalization, and the Jane Street Crossing; and that TRCA make a funding request for 2019 to the City of Toronto, and for matching funds to the National Disaster Mitigation Program, to undertake the feasibility and conceptual design studies.

The report (Item 7.2) can be viewed at: https://trca.ca/wp-content/uploads/2018/03/02-18-Agenda-Package-Authority_Mar23_2018.pdf. The TRCA Board meeting minutes (Meeting #02/18) can be viewed at: <https://trca.ca/about/boards-committees/minutes-and-agendas/>

On June 10, 2014, City Council adopted the recommendation in a staff report titled "Coordinated Watercourse Management" that the Toronto and Region Conservation Authority (TRCA), with input from the General Manager of Toronto Water and the General Manager of Parks, Forestry and Recreation complete the Class Environmental Assessment (EA) for Black Creek Flood Management and report to Council on preferred measures to further mitigate valley land flooding of the Rockcliffe area in the Black Creek Watershed and a proposed funding mechanism. The Council decision can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2014.PW31.14>

COMMENTS

Background

The Rockcliffe area is located in Ward 11 (York South-Weston) and within the regulatory floodplain of Black Creek, which corresponds to the floodplain generated by

the regional storm rainfall centred over the watershed, which is the 1954 Hurricane Hazel event. There are 413 buildings located within the regulatory floodplain, which corresponds to 622 properties. Many of these properties have experienced surface and basement flooding during severe storms due to riverine flooding and overloading of the City's sewer systems.

Significant riverine flooding of Black Creek occurred during the August 19, 2005 and July 8, 2013 extreme storms with many properties in the Rockcliffe area having been impacted. Numerous basement flooding incidents in this area were also reported to the City for the aforementioned storms as well as a previous storm event on May 12, 2000.

In 2014, the TRCA and Toronto Water completed two separate EA studies that examined options and recommended remediation measures to reduce riverine and sewer system flooding, respectively. These EA studies are:

- Black Creek (Rockcliffe Area) Riverine Flood Management Class Environmental Assessment, completed in 2014 by Amec Foster Wheeler for TRCA (TRCA EA)
- Basement Flooding Study Area 4 and Combined Sewer Overflow Control Environmental Assessment, completed in August 2014 by XCG for Toronto Water (BF Area 4 EA)

Toronto Water and TRCA consulted with each other during the above EA studies. Since the completion of the EA studies, Toronto Water and TRCA have continued consulting with each other on next steps and implementation considerations for the recommended measures from both EA studies to reduce flooding risks in the Rockcliffe area.

Riverine Flood Management in the Rockcliffe Area

This section summarizes riverine flooding issues and management in the Rockcliffe area, the 2014 TRCA EA findings and recommendations, and next steps for the recommended measures to reduce riverine flooding in the Rockcliffe area as presented in the TRCA staff report (Item 7.2) to the TRCA Board on March 23, 2018. The link to the TRCA staff report is provided in the Decision History section of this report.

The management of riverine flooding and floodplain management is the responsibility of TRCA. Conservation Authorities have been delegated the responsibility of representing the provincial interest on natural hazards encompassed by Section 3.1 of the Provincial Policy Statement (2014). Among these natural hazards is riverine flooding and it is TRCA's mandate to determine the flood hazard area for the rivers and streams within its jurisdiction.

TRCA identifies and ranks areas at risk of riverine flooding (i.e., flood vulnerable areas) through a Flood Risk Assessment process that considers flood damages and costs and is periodically updated. Currently, 43 flood vulnerable area clusters have been identified across TRCA's jurisdiction of which 17 are in Toronto. The 17 flood vulnerable areas in the City of Toronto are provided as Figure 5 in the 'Coordinated Watercourse

Management Plan' Staff report, which is referenced in the decision history section of this report.

Since 2008, the Rockcliffe area has been ranked among the top five priority areas for riverine flood risk within TRCA's jurisdictional area and is currently ranked the second highest priority area for riverine flood risk within Toronto. The Rockcliffe area was the first flood risk priority area selected by the TRCA to commence an EA study to investigate options to reduce riverine flooding.

In 2014, TRCA completed the Black Creek (Rockcliffe Area) Riverine Flood Management Class EA that investigated Black Creek flooding and recommended measures to reduce or remove the risk of riverine flooding to people and properties in the Rockcliffe area.

The TRCA EA identified 413 buildings, which corresponds to 622 properties at risk of riverine flooding (i.e., within the regulatory floodplain of the Rockcliffe area). The TRCA EA identified key factors that contribute to Black Creek flooding in the Rockcliffe area and riverine flood impacts to private property, which include alterations to the drainage area and the channelization of Black Creek, as well residential development in the floodplain over last 70 years.

The TRCA EA recommended measures to reduce riverine flooding with a preliminary EA cost estimated at \$28.4 to \$33.4 million, including the following measures:

- Jane Street Crossing upgrade and valley wall reshaping;
- Flood Protection Berms for Rockcliffe Middle School, Hilldale Road, and Black Creek Drive; and,
- Channel Widening and Naturalization - Rockcliffe Blvd. to Alliance Ave.

Challenges identified by TRCA in their March 23, 2018 staff report to the TRCA Board to implement the TRCA EA recommended measures to reduce riverine flooding are as follows:

- The Jane Street Crossing is an asset of Transportation Services, which has advised that the replacement of the Jane Street culvert is not anticipated for approximately 30 to 40 years based on the culvert's current state of good repair replacement needs;
- Feasibility and conceptual design studies are required for the berm and channel widening and naturalization measures, as well as the Jane Street Crossing flood protection measures, in order to refine cost estimates and benefits, confirm construction feasibility, and identify design considerations and other implementation requirements (e.g. easements).

On March 23, 2018, the TRCA Board approved the undertaking of feasibility and conceptual design studies in 2019 by the TRCA, in consultation with City divisions, as a next step for the recommended riverine flood reduction measures from their 2014 EA study. The feasibility studies will refine cost estimates and benefits, confirm construction feasibility, and identify design considerations and other implementation requirements for the TRCA EA recommended flood protection berms, channel widening

and naturalization, and the Jane Street Crossing flood protection measures. TRCA will make a funding request for 2019 to the City of Toronto, and for matching funds to the National Disaster Mitigation Program, to undertake the feasibility and conceptual design studies.

Sewer System Flood Management in the Rockcliffe Area

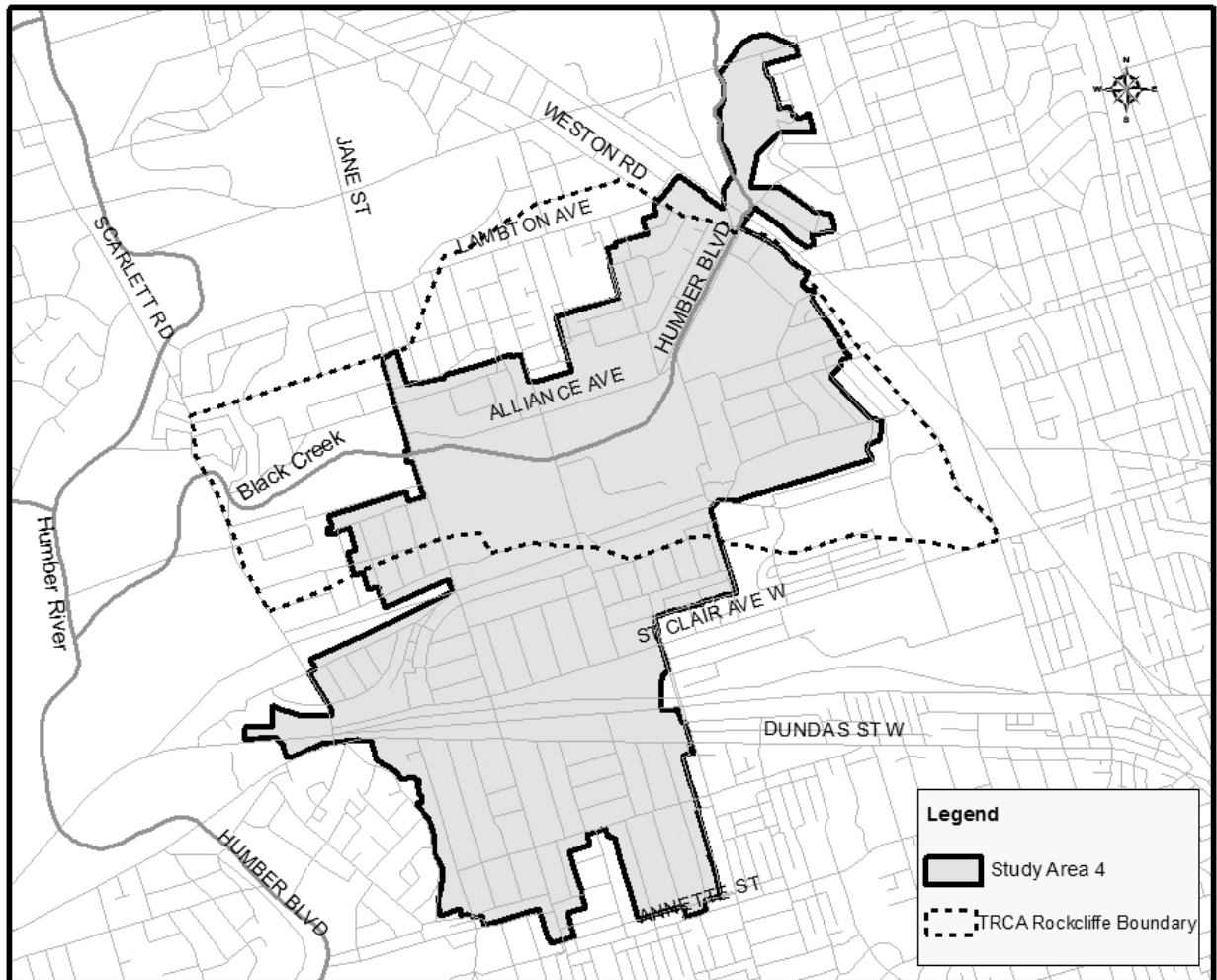
Toronto Water is responsible for managing sewer system flooding in the Rockcliffe area and throughout Toronto. Through the city-wide multi-year Basement Flooding Protection Program (BFPP), the City is reducing basement and surface flooding by making improvements to the City's sewer systems and overland drainage routes to provide an enhanced level of protection for severe storm events, (i.e., 100 year storm for the storm and combined sewer system, and the May 12, 2000 storm for the sanitary sewer system).

Key components of the BFPP include:

- *Basement Flooding EA studies* - assess the capacity of the City's existing storm, sanitary, and combined sewer drainage systems, and overland flow routes during severe storms and recommend infrastructure improvements to increase capacity, where required, to reduce future flooding;
- *Implementation of Infrastructure Improvements* - design (preliminary and detailed) and construction of recommended infrastructure improvement projects from completed Basement Flooding EA studies, following Council adopted implementation criteria;
- *Basement Flooding Protection Subsidy Program* - provides a financial subsidy for property owners to implement flooding reduction measures on their property; and,
- *Sewer Inspections* - City-wide sewer maintenance program that involves regular visual and closed-circuit TV inspections of the City's sewer systems to identify sewers in need of maintenance, repair, or replacement .

The Rockcliffe area is partly located within Basement Flooding Study Area 4, as shown in Figure 1, which is serviced by a combination of sanitary, combined and storm sewers. Local sanitary and combined sewers discharge to the Black Creek Sanitary Trunk Sewer (STS) while local storm sewers discharge to storm sewer outfalls along Black Creek or its tributary, Lavender Creek.

Figure 1: Basement Flooding Environmental Assessment - Study Area 4



In 2014, Toronto Water completed a Municipal Class Environmental Assessment (EA) Study for Study Area 4. The BF Area 4 EA study included a comprehensive capacity assessment of the sewers within the study area and recommended sewer infrastructure improvements and other measures to provide an enhanced level of protection to reduce future flooding during severe storms.

The BF Area 4 study concluded that under most rainfall events, the sewer systems in the Rockcliffe area operate as designed and stormwater can discharge into Black Creek freely through storm outfalls. Similar to other areas in the City, sewer system flooding in the Rockcliffe area has occurred when the urban drainage system has become overloaded, resulting in stormwater or sewage backing up into residences (particularly basements) from pipe infrastructure or from overland flow that is directed towards properties and enters homes through elements such as basement windows.

Water levels of the Black Creek channel can impact the performance of City of Toronto's sewer systems and contribute to basement flooding of homes within and outside of the regulatory floodplain limits of the Rockcliffe area. During storm events, water in the Black Creek channel can rise to a level that restricts the ability of storm sewers to discharge stormwater into the creek. This situation contributes to surcharging

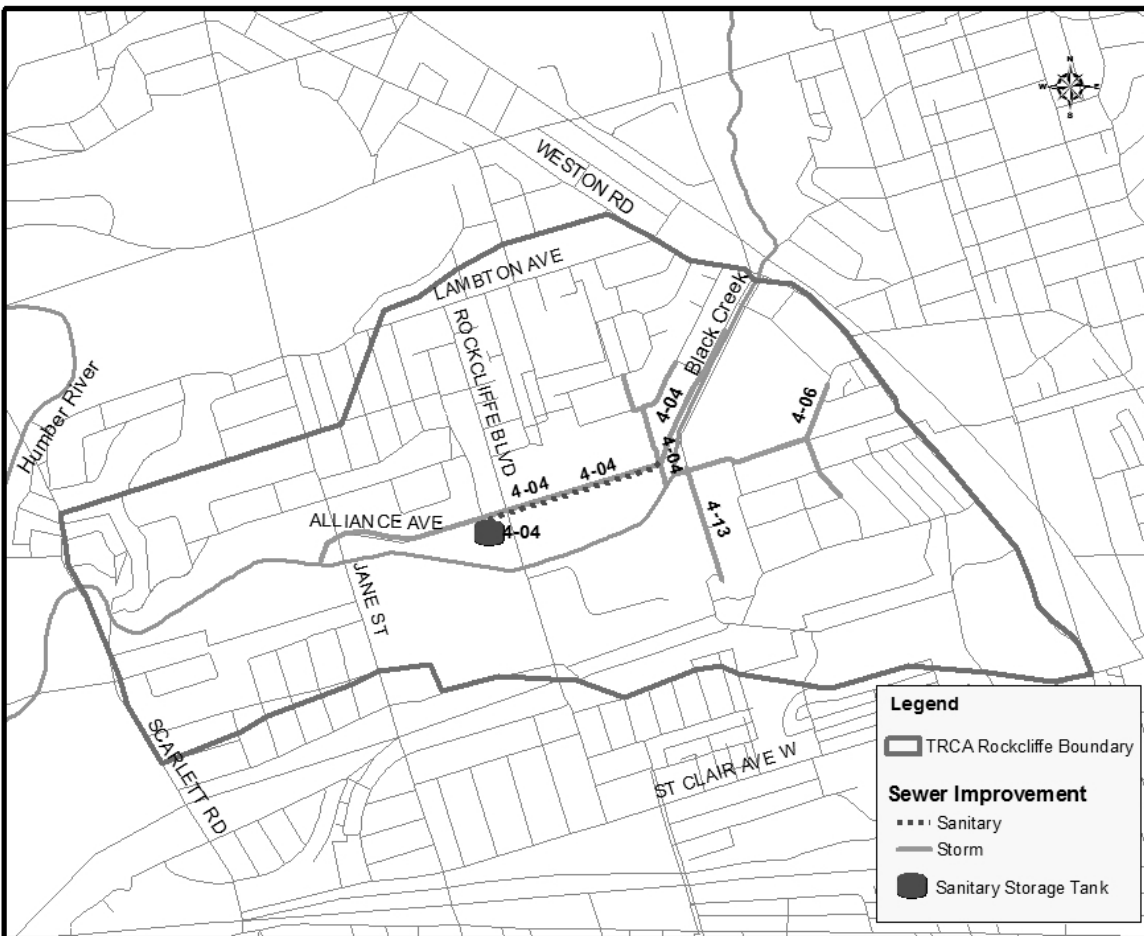
of storm sewers. When water levels in Black Creek rise over the river banks and spill onto roads, significant volumes of water from Black Creek can enter the storm and combined sewer systems through catch basins, maintenance hole covers, as well as from plumbing systems on private properties, which contributes to overloading of these sewer systems.

The BF Area 4 EA recommended sewer system improvement measures in the Rockcliffe area, as shown in Figure 2, to reduce basement flooding with a total estimated cost of approximately \$32 million. The recommended measures in the Rockcliffe area include:

- A new sanitary sewer on Alliance Avenue to provide basement flooding protection for Cliff Street and Cordella Avenue (4-04);
- A new sanitary storage tank to be located southwest of Alliance Avenue and Rockcliffe Boulevard (4-04);
- A new storm sewer on Cliff Street, Cordella Avenue, Humber Boulevard and Alliance Avenue to convey stormwater to Black Creek downstream of Jane Street.(4-04);
- New storm sewers on Cayuga Avenue, Avon Avenue, Cripps Avenue and Spears Street (4-06); and,
- A new storm storage sewer on Hilldale Avenue (4-13).

Other recommended measures include the installation of backwater valves in the City's sewer system to prevent water back-up from Black Creek and the Black Creek STS to the local storm and sanitary sewer systems during heavy rain storm events.

Figure 2: Basement Flooding EA Recommended Infrastructure Improvements



As per City Council direction for the implementation of BFPP projects, recommended projects from completed Basement Flooding EA studies proceed to engineering design (preliminary and detailed design) and construction if the cost is less than or equal to \$32,000 per benefiting property. All of the BF Area 4 EA recommended sewer system improvement projects (4-04, 4-06, and 4-13) that would reduce basement flooding for properties within the regulatory floodplain of the Rockcliffe area, exceed the cost per benefiting property threshold at either the EA or preliminary design stage and have not proceeded to construction.

Another challenge in implementing the BF Area 4 EA recommended measures in the Rockcliffe area is that their effectiveness in reducing basement flooding depends on the implementation of the TRCA EA recommended measures to reduce riverine flooding (i.e., to remove properties from the floodplain). For example, although the recommended storm sewers would be upgraded to provide capacity for a 100 year storm, the effectiveness of the upgraded storm sewers without the riverine flood protection measures would be greatly reduced as Black Creek flood levels rise. In addition, once Black Creek overtops its banks, buildings within the floodplain would experience flooding irrespective of the sewer infrastructure improvements.

In short, without the implementation of TRCA EA's recommended riverine flood reduction measures, the City BF Area 4 EA recommended sewer system improvement measures will not be effective in reducing sewer system flooding for properties in the Rockcliffe area.

Conclusion and Next Steps

The Rockcliffe area has been identified by TRCA as one of the highest priority flood vulnerable areas. The reduction of riverine and sewer system flooding in this area is a long-term endeavour by TRCA and Toronto Water, respectively.

As a next step to advance the riverine flood reduction measures from the 2014 TRCA EA, TRCA plans to undertake feasibility and conceptual design studies, in consultation with City divisions, in 2019 that will refine cost estimates and benefits, confirm construction feasibility, and identify design considerations and other implementation requirements for the TRCA EA recommended flood protection berms, channel widening and naturalization, and the flood protection measures for the Jane Street Crossing. Transportation Services has advised that it will consider the TRCA EA recommended Jane Street Crossing Upgrade flood mitigation measures at such a time in the future that the Jane Street culvert is identified for State of Good Repair replacement works.

As noted previously, the City BF Area 4 EA recommended sewer system improvement measures will not be effective in reducing sewer system flooding for properties in the Rockcliffe area without the implementation of the TRCA EA recommended riverine flood reduction measures. As riverine flood protection measures are completed in the Rockcliffe Area, Toronto Water will reassess the scope and costs of the BF Area 4 EA recommended sewer system improvements in the Rockcliffe Area. Sewer system improvements that proceed to implementation, in accordance with City Council direction for the Basement Flooding Protection Program, will be identified through Toronto Water's annual Capital Budget process.

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