TORONTO

STAFF REPORT
ACTION REQUIRED

Investigations into Lower Simcoe Street CN Underpass Flooding

Date:	April 24, 2014
To:	Public Works and Infrastructure Committee
From:	General Manager, Toronto Water
Wards:	Ward 20
Reference Number:	P:\2014\Cluster B\TW\pw14002

SUMMARY

The purpose of this staff report is to present the findings of staff investigations into the recent flooding incidents at the Lower Simcoe Street CN underpass just south of Front Street West.

RECOMMENDATIONS

The General Manager, Toronto Water, recommends that:

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

Financial Impact

Funding for investigations and remedial measures related to the underpass are summarized below:

- Cost of investigations completed: $70,000
- Cost of remedial measures completed: $2,500
- Cost of investigations proposed: $100,000, plus $50,000/yr for two flow monitoring stations
- Cost of remedial measures proposed: $35,000

Funds for proposed work are available in Toronto Water's approved 2014 Capital Budget – CWW452-04.

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

DECISION HISTORY

City Council at its meeting on October 8, 9, 10 and 11, 2013, requested that the General Managers of Transportation and Toronto Water report the findings of their review on the flooding incidents on Lower Simcoe Street.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.EX34.4

ISSUE BACKGROUND

The Lower Simcoe Street CN underpass was opened to traffic in 2009.

Drainage of underpasses is always a concern. For this underpass, particular issues include the following:

- The elevation of the road is below the top of the pre-existing combined sewer overflow (CSO) sewers.
- The elevation of the road is close to lake level, so drainage to the lake can be slow, especially when the lake level is high.

To address these issues:

- Wet weather flow (storm runoff and CSO) from the drainage area north of Front Street West (more than 2.5 km^2; see Figure 1) is conveyed past the underpass in the closed CSO sewer with no drainage connections from the surface.
- The CSO sewer was lowered to accommodate the underpass, which means that it now operates under pressure as a siphon beneath the underpass. This section of the CSO sewer contains two new maintenance holes.
- There are no drainage connections to the CSO sewer south of Front Street West in the depressed section of the underpass.
- Stormwater runoff in the local area around the underpass drains to a new separate storm sewer, not the CSO sewer.
- A holding tank was installed as part of the separate storm sewer system to retain local stormwater runoff from large intensity storms and release it at a rate to match the constraints of the storm sewer system.

The underpass has flooded five times as follows:

Date	Rainfall Volume (mm)	Return Period (yr)	Lake Level (m)	Lake level relative to average (m)*
June 27, 2010	57.3	25	74.85	+0.06
May 23, 2011	13.6	< 2	75.42	+0.63
June 23, 2011	21.2	< 2	75.40	+0.61
July 8, 2013	92.3	> 100	75.30	+0.51
August 27, 2013	31.3	5	75.02	+0.23

* Average lake level for 2003-2012 was 74.79 m.

Any of the following factors or a combination of them may have caused the Lower Simcoe Street CN underpass flooding:

- Extremely intense rainfall events. For example, the biggest storm event occurred on July 8, 2013 where the intensity was more than a 100-year return period;
- High water levels in Lake Ontario; or
- Hydraulic constraints, such as blockages in the sewer system.

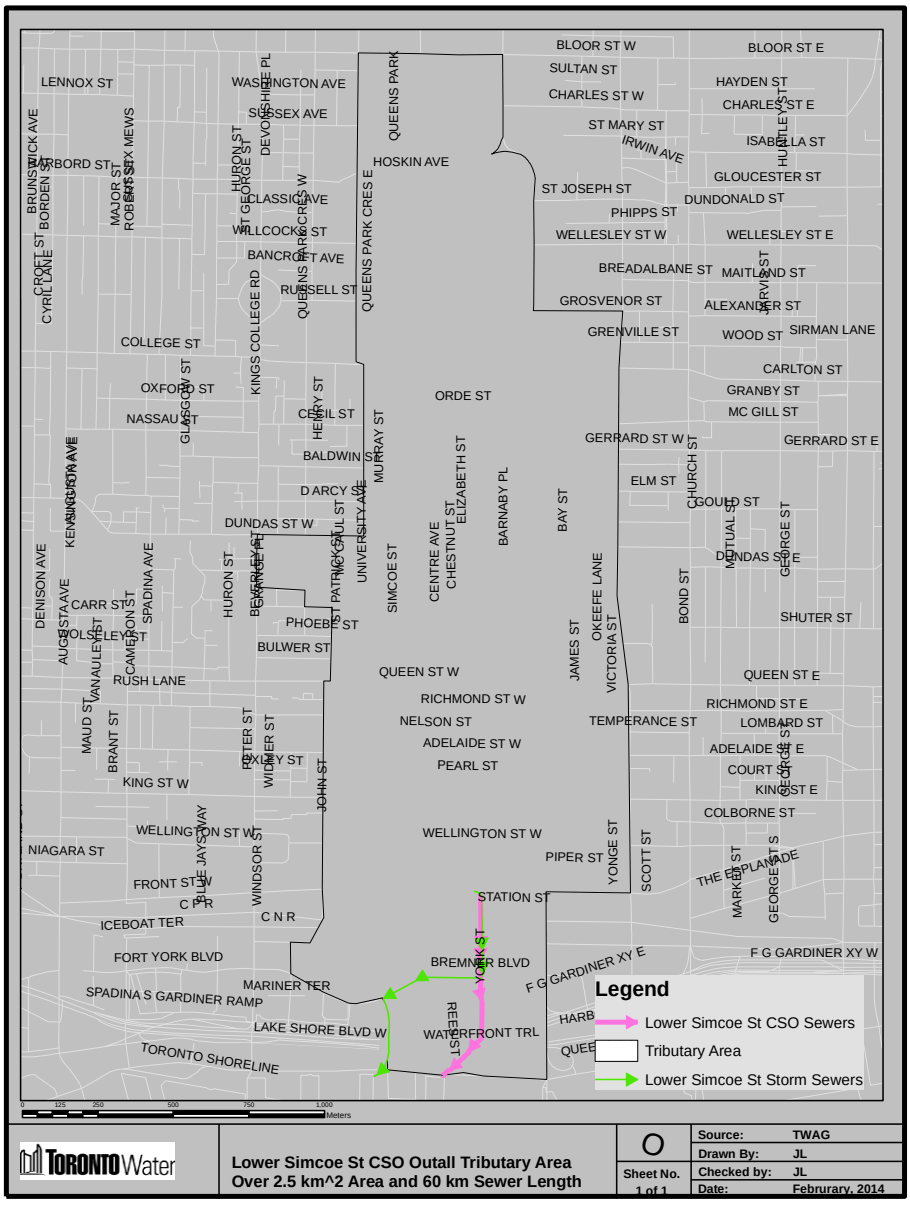

Figure 1 – Lower Simcoe Street Combined Sewer Service Area

COMMENTS

Investigations have determined that the primary cause of flooding for the events on June 27, 2010, July 8 2013 and August 27, 2013 was water spilling from the CSO sewer through a maintenance hole in the depressed area of the underpass, resulting from intense rainfall. On May 23, 2011 and June 23, 2011, even though rainfall was moderate, high lake levels caused surcharging of the sewer through the same maintenance hole.

In 2012, the cover of the maintenance hole was bolted down, and debris was removed from the CSO pipe. No flooding occurred following the undertaking of these measures until the 100-year storm event on July 8, 2013, even though there were other intense storms in the interim.

A field investigation on September 5, 2013 discovered that the four bolts that sealed the CSO maintenance hole were missing. On October 30, 2013, Toronto Water staff installed a new sealed maintenance hole cover, which is anticipated to prevent future spilling at this location.

Transportation Services has confirmed that arterial roads in the Toronto & East York District, including the Lower Simcoe underpass, are mechanically swept as many as 16 times per month (or up to eight times in winter months). When heavy rainfall events are expected and/or flood risk warnings are issued by the Toronto Region Conservation Authority (TRCA), Transportation Services clears low-lying roadway areas and catchbasins of any roadway surface debris to ensure that stormwater has a clear path into the storm sewer system. Transportation Services also monitors flood-prone roadways, including the Lower Simcoe underpass, in order to be able to quickly respond with emergency road closures at these locations for the duration of the flooding event.

As explained above, the flooding events were caused by intense rainfall and high lake levels, not by blocked catchbasins or un-swept streets. The new sealed maintenance cover is anticipated to prevent future spilling at this location.

Further CSO Sewer Inspection and Monitoring

In November 2013, a consulting team investigated and found the Lower Simcoe CSO pipe to be good condition with the exception of some construction debris at two locations and an internal pipe crossing at Lake Shore Blvd West. The sewer is otherwise in clean, serviceable condition; the overall condition of the sewer itself would not contribute to flooding occurrences. The City is following through with recommendations to remove construction debris and conducting a detailed hydraulic analysis with the use of two flow monitoring stations.

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SIGNATURE

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