FUNCTIONAL SERVICING REPORT

5800 YONGE STREET
DRAFT PLAN OF SUBDIVISION
NORTH YORK, ON

CITY OF TORONTO

PROJECT 2018-4685
JULY 2019

Revision	Description	Prepared		Checked	
		By	Date	By	Date
1.0	Original Report	G.Volpe	July 2019	K.Shahbikian	July 2019

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1.0 INTRODUCTION

1.1 Study Objective and Location

This Functional Servicing Report is provided in support of a proposed mixed-use draft plan located at 5800 Yonge Street, in the City of Toronto. The subject site is located East of the intersection of Yonge Street and Turnberry Crescent, as shown in **Figure 1.1**.

The objective of this report is to define a feasible servicing plan for the proposed draft plan development, and to establish a servicing strategy and requirements to be used for future site plan developments within the subject site. The following sections of this report provide strategic information regarding the stormwater management (SWM), water supply, and sanitary servicing for the subject lands; while ensuring compatibility with existing services and conforming to the City of Toronto design criteria.

1.2 Existing Condition & Proposed Development Plan

Presently there is a large 2-storey office building which occupies the site area, and is accompanied by predominantly paved parking area on the site. Based on the proposed draft plan the subject site is approximately 3.28 ha. The site was previously part of hydro lands to the south, but has now been separated leaving an electrical power station to the south. The proposed development will consist of two (2) site plan blocks, which are currently expected to comprise of a park block (West) and a mixed-use high-intensity residential block (East). The mixed-use site plan development block is expected to be developed in 2 phases (Phase 1 and Phase 2) and the servicing scheme will be made to reflect this. The proposed development plan is shown in **Figure 1.2**.

Based on the City of Toronto's population density rates for different unit types (see **Appendix B**) the expected post-development site plan population is approximately 2991 persons. **Table 1-1** summarizes the estimated populations for the proposed land use of the development. Detailed population estimates are provided in **Appendix A** based on the City of Toronto Design Criteria.

Lastly, it is currently understood that the design of the Beecroft Road extension is currently underway, in consultation with the City of Toronto. Plans to extend Beecroft avenue were proposed as part of the *Infrastructure Master Plan for Yonge Street North Planning Study* (dated December

2013). The proposed North south running municipal right of way as part of the subject development, as seen in **Figure 1.2**, will ultimately be part of the proposed Beecroft Road extension. As such the discussion of requirements and design features for this stretch of roadway are subject to change based on the final Beecroft extension design, in consultation with the City of Toronto.

Table 1-1: Design Population Summary

Land Use	Population
Residential Units	2825
Commercial/Office Space	166
Total	2991

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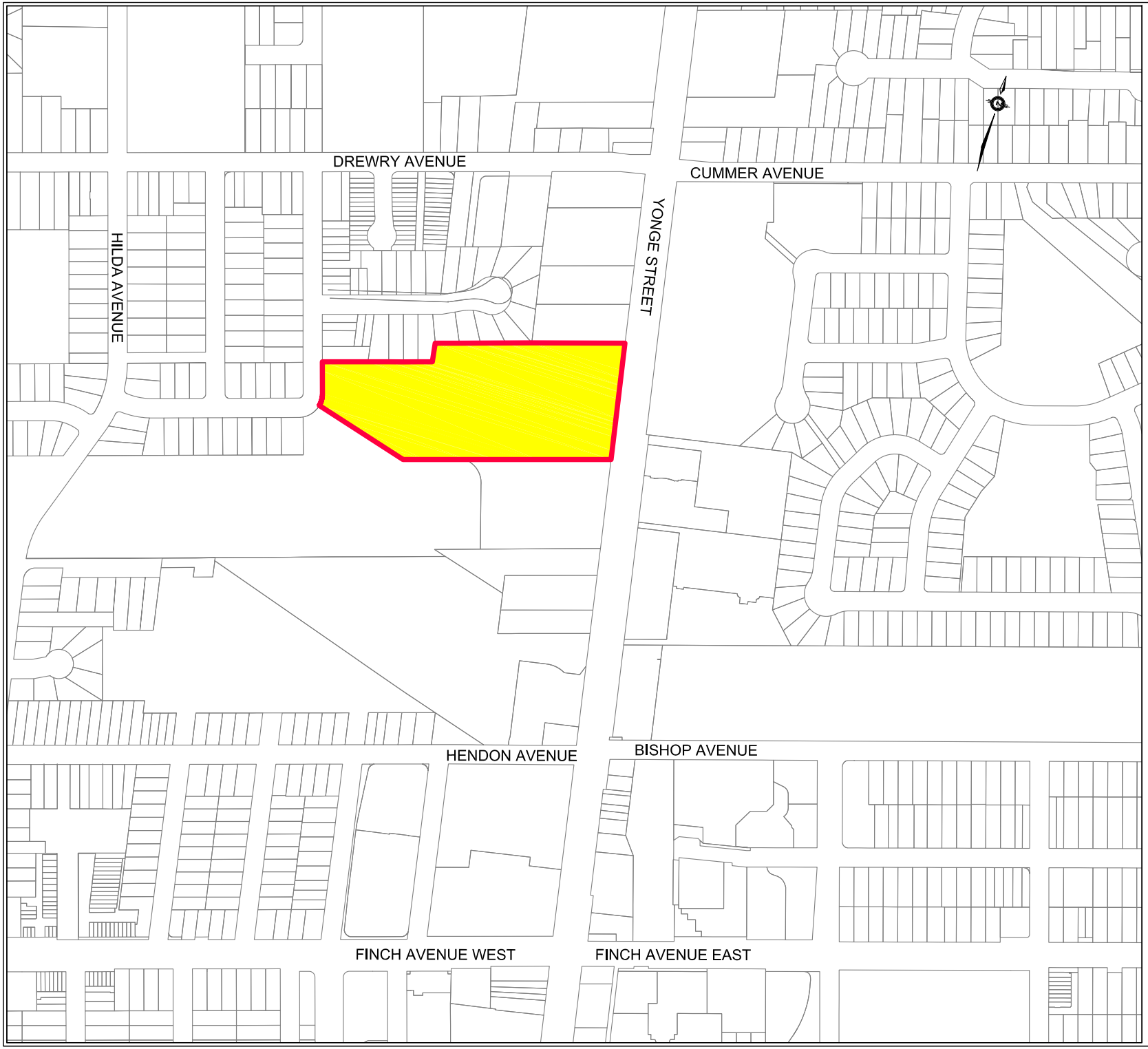

5800 YONGE STREET
MIX-USE HIGH-RISE DEVELOPMENT

LEGEND

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FIGURE 1-1
LOCATION PLAN

2018-4685	JULY 2019	SCALE: N.T.S.

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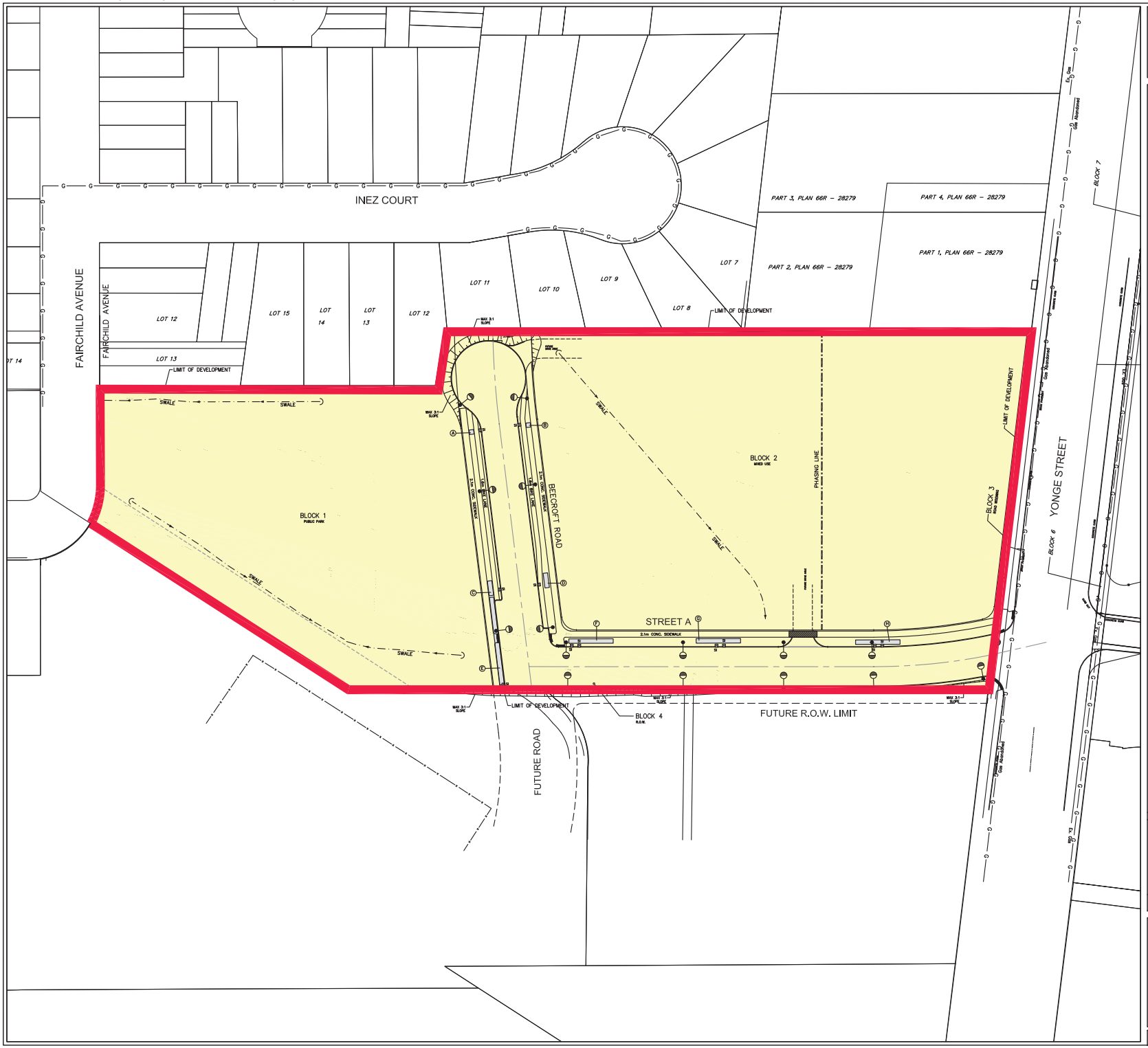

5800 YONGE STREET
TIMES 5800 INC.
CITY OF TORONTO

LEGEND

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FIGURE 1.2
SITE PLAN

2018-4685	JULY 2019	SCALE: N.T.S.

1.3 Background Reports

The following material has been reviewed in order to identify environmental constraints, existing topography, target release rates and storm water management criteria, which govern the proposed development within the subject area and form the basis of this report.

- ***Stormwater Management Practices Planning and Design Manual (SWMPPD)***

  Prepared by: Ministry of Environment and Climate Change; March 2003

- ***Stormwater Management Criteria (SWMC)***

  Prepared by: Toronto and Region Conservation Authority, August 2012

- ***Wet Weather Flow Management Guidelines (WWFMG)***

  Prepared by: City of Toronto; November 2006

- ***Design Criteria for Sewers and Watermains (DCSW)***

  Prepared by: City of Toronto; First Edition June 2019

- ***Preliminary Hydrogeological Investigation, 5800 Yonge St., Toronto, Ontario***

  Prepared by: DS Consultants Ltd , March 2019

- ***Geotechnical Investigation, 1 Tudor Gate, Toronto, Ontario***

  Prepared by: DS Consultants Ltd , February 2019

- **City of Toronto Green Streets Technical Guidelines**

  Prepared by: Schollen & Company Inc., August 2017

- **Infrastructure Master Plan for Yonge Street North Planning Study**

  Prepared by: LEA Consulting Ltd., August 2013.

2.0 WATER SUPPLY

The following section provides a summary of the nearby existing and proposed water supply services. Preliminarily calculations are provided to support the servicing of the proposed future site plan blocks in **Appendix A**.

2.1 Existing Water Supply Services

The subject site is located within pressure district 5 service area of the Metropolitan Toronto Water System. Currently a 250mmØ watermain exists along Yonge Street east of the site, which services the existing office building. An additional 400mmØ watermain is located along Fairchild Avenue in proximity to the site's western boundary. Furthermore, all internal site watermains are to be removed prior to development. The existing water supply infrastructure is shown in **Figure 2.1**.

2.2 Water Supply Design Criteria

The proposed water supply scheme will be designed in accordance with the City of Toronto Design Criteria for Sewer and Watermains, June 2019. The following summarizes the relevant design criteria.

The system shall be designed to provide sufficient flow and pressure to meet the greater of the Fire Flow Demand plus the Maximum Daily Demand, or the Peak Hour Demand;

- Design populations were estimated based on:
- Apartment (1-Bedroom)→1.4 persons/unit
- Apartment (2-Bedroom)→2.1 persons/unit
- Apartment (3-bedroom)→3.1 persons/unit
- Office→3.3 persons/100m^2
- Daycare(School) →2.58 persons/100m^2
- Per Capita Demand for multi-unit residential →191 L/capita/day
- Minimum Fire Flow Demand of 19,000 L/min for High-rise residential; and
- Minimum hourly demand, maximum daily demand and maximum hourly demand peaking factors for apartments shall be 0.84, 1.3 and 2.5, respectively.

2.3 Proposed Water Supply

The proposed site plan blocks are proposed to be serviced by a new connection from the proposed future public road to the existing 250mmØ watermain along Yonge Street. As the anticipated developments are to include high-rise towers, separate fire and domestic connections are proposed to connect to the existing infrastructure. Based on an FUS calculation of the largest building, a required Fire Flow of 11,000L/s (183L/s) is estimated to be required. This estimate assumes the use of fire-resistive, fully protected frame, vertical and horizontal openings, and a minimum NFPA 13 sprinkler system.

Since the site plan is currently planned to be developed in 2 phases, with four high-rise buildings, a minimum of 4 servicing connection will be made to the proposed 250mmØ watermain within the future road. Furthermore, booster pumps should be used to accommodate servicing to the high-rise tower; design of which will be handled by the mechanical engineer. The municipal water servicing layout can be seen schematically for the proposed development in **Figure 2.1**. The estimated water demand was determined using the aforementioned criteria and is summarized in **Table 2.1**, and considers both commercial and residential populations.

Table 2.1: Water Supply Demands

Population	Average Demand (L/s)	Maximum Day (L/s)	Maximum Hour (L/s)	Fire Flow* (L/s)	Max Day + Fire (L/s)
2991	7.59	9.59	17.22	183.33	192.93

*D*etermined using lower of the FUS Fire Flow and High intensity residential demand. Refer to **Appendix A** for detailed calculations.*

The estimated water demand was determined using the aforementioned criteria and is summarized in **Table 2.1**. Based on the *City of Toronto Infrastructure Master Plan for Yonge Street North Planning Study*, a maximum day demand of over 150L/s is available at the intersection of Yonge Street and Drewry Avenue. Relevant excerpts are provided in **Appendix A**.

A hydrant test conducted on May 7, 2019 by Aquazition along Yonge Street suggests that 45psi (311kPa) is available at static conditions. Based on these results the required 192.9 Max Day + Fire Flow is estimated to be available at 150 kPa, which is above the required 140kPa minimum.

PD5 operating elevations are typically around 163masl to 195masl and is known to operate at an HGL of around 230masl, typically fluctuating between 225 to 230masl during the day. As the subject development is at a proposed elevation of 191masl, which is within the PD5 operating range, it is expected that adequate servicing is available. However a booster pump may be required as it is on the high-end of the PD5 operating range.

A hydraulic model of the proposed development using the aforementioned hydrant test results to establish available boundary conditions was created using WaterCAD. Results of the model indicate that serviceability of the site is possible under peak hour and Max Day + Fire conditions. Furthermore as the site will incorporate high-rise developments, the site mechanical engineer shall design booster pumps, as deemed necessary for the development. Hydraulic modeling output, hydrant test results and demand calculations are provided in **Appendix A** for review.

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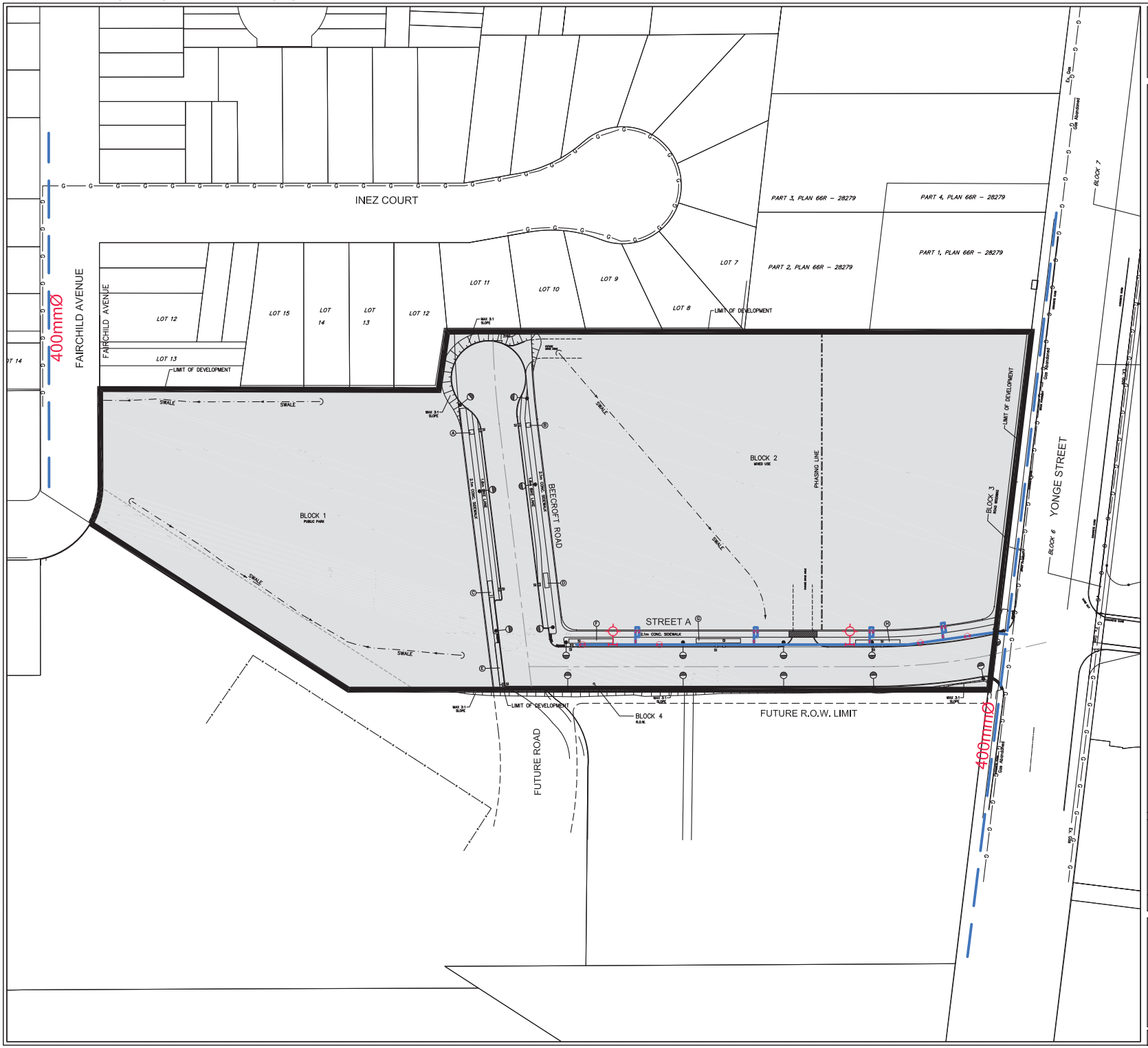

5800 YONGE STREET
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CITY OF TORONTO

LEGEND

- SUBJECT LOCATION
- PROPOSED WATERMAIN
- EXISTING WATERMAIN

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FIGURE 2.1
PROPOSED WATER SUPPLY SERVICING

2018-4685	JULY 2019	SCALE: N.T.S.

3.0 SANITARY SERVICING

The following section provides a summary of the nearby existing and proposed sanitary infrastructure. Preliminarily sanitary calculations are provided in **Appendix B** for the future site plan blocks.

3.1 Existing Sanitary Demand

A 250mmØ sanitary sewer exists along Yonge Street carrying flows northward to Cummer Avenue. From there flows are conveyed to a 675mmØ trunk which flows southeast within a ravine of a Don River Tributary. Furthermore an additional 375mmØ sanitary sewer exists along Fairchild Avenue to the west of the site. The existing office building is serviced through a connection to the 250mmØ sewer on Yonge Street. The existing design population consists of 271 persons and would generate an estimated peak flow of 3.99 L/s as summarized in **Table 3.1**.

Table 3.1. Existing sanitary demand

Population	Sanitary Demand (L/cap/day)	Average Demand (L/s)	Harmon's Peaking Factor	Total Peak* Flow (L/s)
271	250	0.78	4.0	**3.99**

*Includes allowance for extraneous flows of 0.852L/s based on 3.28ha.

3.2 Design Criteria

The proposed sanitary servicing of the subject site will be designed in accordance with current City of Toronto Design Criteria for wastewater systems (2019), these criteria are summarized below.

- Average dry weather sanitary flow for existing local sewers is 250 L/capita/day for commercial and 240 L/capita/day for residential.
- Average dry weather sanitary flow of 450 L/capita/day for design of new local sewers;
- If floor area is unknown, use equivalent population method for dry weather flow;
- Infiltration allowance shall be determined at 0.26 L/s/ha for all types of land use;
- New sanitary sewers are not permitted to accept foundation, weeping tile, or roof drainage;
- Design flows shall be equal to the average dry weather sanitary flow plus the infiltration allowance;

- Minimum sanitary sewer sizes shall be 250mmØ; and
- Maximum flow velocities shall not be greater than 3.0 m/s and minimum velocities shall not be less than 0.6 m/s for self-cleansing.

3.3 Proposed Sanitary Servicing

The proposed sanitary servicing layout can be seen schematically for the proposed development in **Figure 4.1**. There will be one (1) connection to the existing 675mmØ sanitary sewer on Yonge Street from the subject development area via a proposed 250mmØ to 375mmØ sanitary sewer proposed within the future public road.

As the future public road will be conveyed to the City, the proposed 375mmØ sanitary sewer will be part of the municipal sewer. As per the current draft plan, it is anticipated that four (4) connections are required to support the mixed-use residential site plan on the east side of the subdivision. These connections have been proposed in anticipation of the phased development, and multiple high-rise buildings of the proposed site plan block.

3.4 Proposed Sanitary Demand

The anticipated wastewater generation rates are presented in **Table 4.2**. A wastewater generation rate of 450 L/cap/day was used for both residential and commercial land uses as prescribed in the City's Water & Wastewater design criteria, in order to analyze the new sanitary sewer connection**.** Please refer to **Appendix C** for sanitary flow calculations.

Table 3.2: Proposed Sanitary Peak Flow

Category	Design Parameter	Sanitary Demand	Average Demand (L/s)	M	Infiltration (L/s)	Total Peak Flow (L/s)
Residential	2825 people	450 L/cap/day	14.71	-	-	-
Commercial	166 people	450 L/cap/day	0.86	-	-	-
Total	**2991 people**	-	15.58	**3.44**	0.852	**54.50**

3.5 Downstream Capacity Analysis

A detailed downstream sanitary analysis was conducted for the proposed development based on the existing InfoWorks model for the City of Toronto's Area 28. The sanitary analysis report has been provided for review in **Appendix D**.

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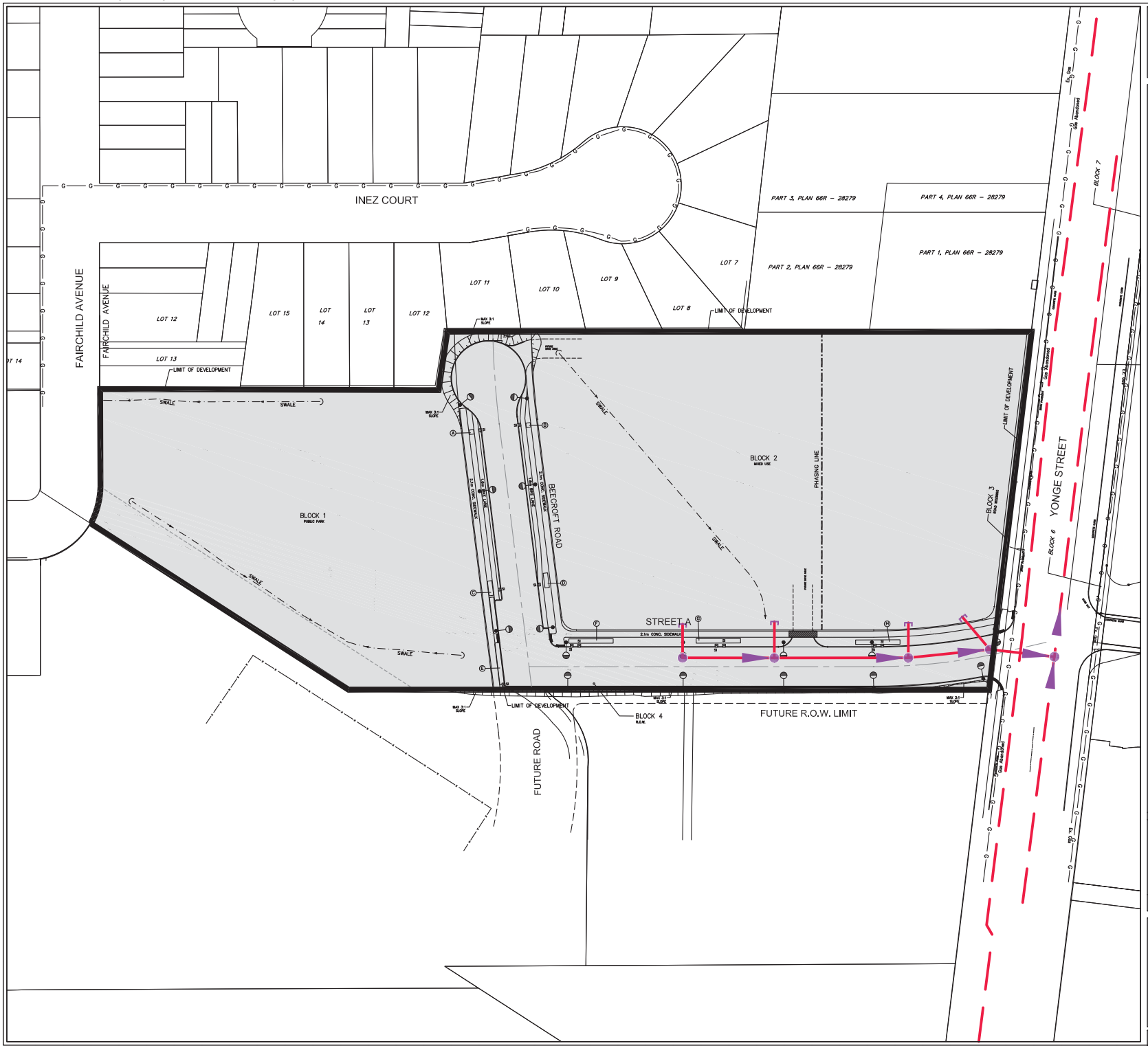

5800 YONGE STREET
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CITY OF TORONTO

LEGEND

SUBJECT LOCATION

PROPOSED SANITARY SEWER

EXISTING SANITARY SEWER

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FIGURE 3.1
PROPOSED SANITARY SERVICING

2018-4685	JULY 2019	SCALE: N.T.S.

4.0 STORMWATER MANAGEMENT

4.1 Existing Drainage Conditions and Background

The subject site is situated within the East Don River Watershed. Based on available topographic mapping, 1.78ha of the site generally drains in a south easterly direction and is ultimately captured and conveyed north along the existing 525mmØ to 825mmØ storm sewer along the west boulevard of Yonge Street. With supporting site investigations it was found that approximately 1.24ha of the site area is picked up by catchbasins along the existing private access road, and is conveyed north west to the existing 375mmØ storm sewer along Fairchild Avenue. Both sewers eventually drain east along the Cummer Avenue storm sewer, and discharge to the existing Silverview Drive outlet to Newton Brook Creek, a tributary of the Don River.

The final 0.25ha of the site was found to drain south and picked up by a full capture location, at a sag point along the private access road, just outside of the site's southern boundary. Site investigations were carried out in an attempt to determine the direction of captured flow. It is currently presumed that flows drain from the catchbasin to Yonge Street. However due to uncertainties regarding the existing servicing connections of the catch basin in question have not been taken as part of the pre-development area to Yonge Street at this stage.

Furthermore, some research was conducted regarding the existing office building, which was originally designed in the 1960's. From available information, including as-built site drawings, it is unclear to what extent quantity and quality controls have been implemented. Site investigations conducted by Schaeffers confirms site flows within the Office and associated parking area are conveyed to Yonge Street. No quantity or quality control measures were found for the site.

In additions, a few external areas exist which are tributary to the site. Approximately 0.38ha of residential land north of the site drains to the Fairchild Avenue Storm sewer through an existing swale and inlet located within the subject site along the northern site boundary. Based on available topographic survey data approximately 0.18ha of this residential area drains into the subject site and East to Yonge Street.

From site investigations, and available topographic data, it is understood that a significant area from the existing power station and hydro corridor southwest of the site drains to the site uncontrolled.

Southern external flows tributary to the site are currently captured by road side catch basins along the southern side of the existing private access road. From here the existing storm sewer conveys these flows to the Fairchild Avenue Storm Sewer. In order to facilitate these flows in the post development condition, it is recommended that flows are captured and bypassed to the Fairchild Avenue sewer. Details of this scheme will be further explored within the future Park Block's respective servicing report.

Furthermore, LEA Consulting Ltd. prepared an *Infrastructure Master Plan for Yonge Street North Planning Study* in 2013 outlining existing storm sewer capacities around the subject site area. As identified in this report hydraulic grade lines along Yonge Street and Cummer Avenue are more than 1.8m below existing grades. A such findings from their study indicate that future developments constructed under the City of Toronto's WWFMG should generally not cause capacity constraints over existing conditions as it provides a more stringent release rate than what was previously required.

Lastly, a hydrogeological Investigation Report was prepared by DS Consultants Ltd; relevant excerpts are presented in **Appendix C** for reference. According to the report, the subject site is underlain with a clayey silt till deposit, followed by a lower sand to sandy till layer. The ground water elevations across the site range from 187.6 to 191.0 masl.

4.2 Stormwater Management (SWM) Design Criteria

Stormwater management criteria, in accordance with the City of Toronto's and the MOE's current design criteria (WWFMG, Nov. 2006, DCSW, June 2014, & SWMPPD, March 2003) for controlling urban stormwater quality and quantity from the proposed development are discussed below. A summary of the established stormwater management design criteria is as follows:

- **Water Quantity** – Site post-development flows for storms up to and including the 100 year event to be controlled to the 2-year design storm event peak runoff rate. The pre-development runoff coefficient used in determining the peak flow rate will be a maximum of 0.5;
- **Water Quality** - to be achieved by providing a minimum enhanced level of TSS removal (80%) prior to discharging to the municipal sewer;
- **Water Balance** - to be achieved through the retention of 5mm of flows across site

impervious areas;

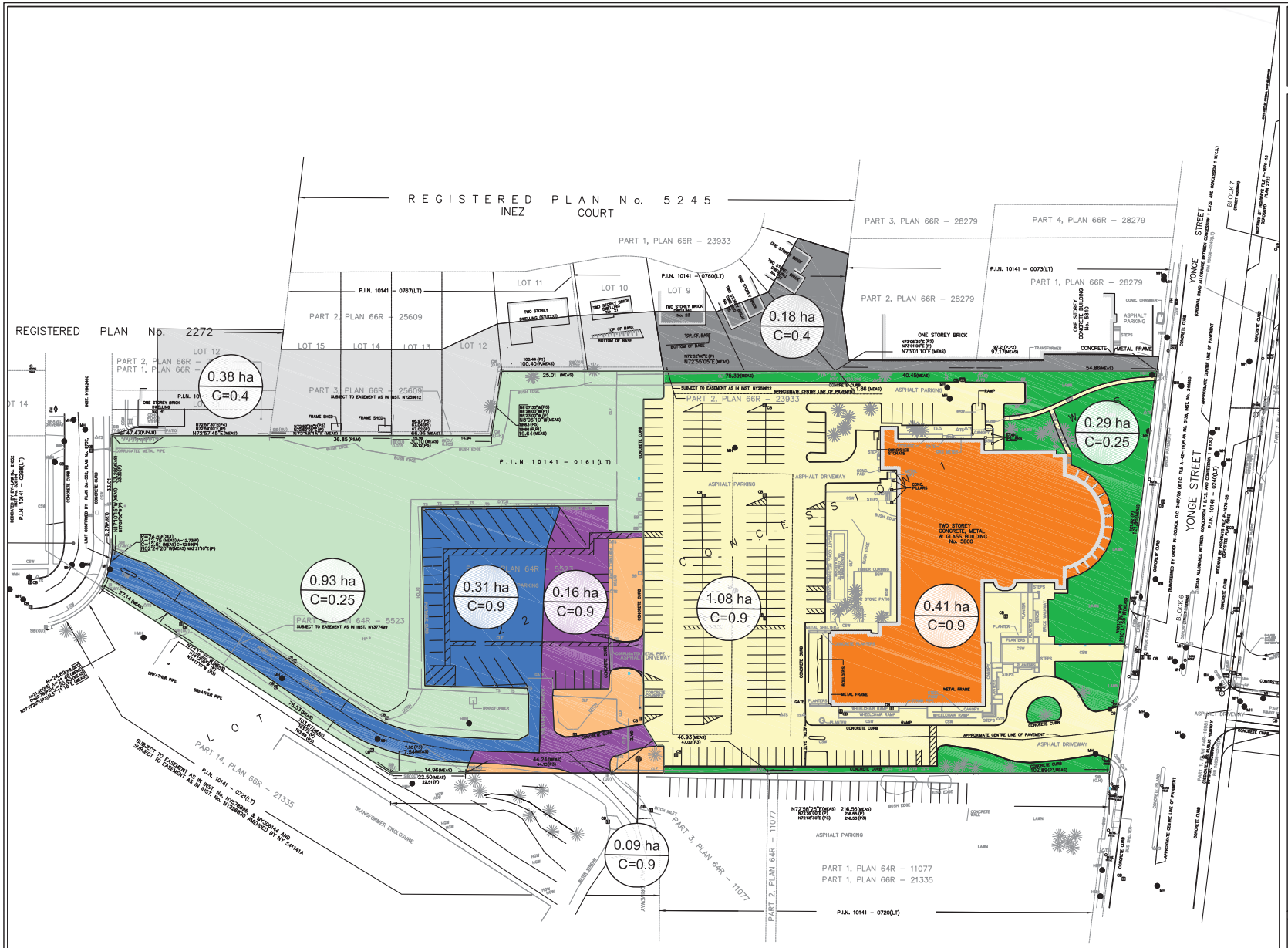
4.3 Proposed Stormwater Management Scheme

Due to the existing split drainage scheme of the subject site, it is proposed that the western Park Block is serviced by the existing storm sewers along Fairchild Avenue. The remainder of the site, including the proposed roadways and site plan blocks will drain to the existing Yonge Street sewer. The proposed SWM design will capture and control site runoff to the pre-development 2-year frequency flow to the Yonge Street storm sewer. **Figure 4.2** and **Figure 4.3** demonstrate the proposed drainage plan and proposed stormwater servicing scheme for the subdivision.

For the future site plan and park blocks , on-site underground storage is the preferred option to provide detention. It is currently understood that the eastern site plan block is to be developed in two phases, with a shared stormwater management system. Furthermore, a separate Clean Water Collector (CWC) pipe is proposed to carry flows from the site plan to the Yonge Street sewer. This will allow for site plan storage structures to be separated from that of the roadway, while also preventing clean site runoff from mixing with untreated roadway flows. This system is further explained in **Section 4.3.4**.

Detention storage to provide quantity controls within the future public roadways (including the Beecroft Road Extension and future public road) will be accommodated using underground pipe storage. Quality control within the public roadways will be provided by a treatment train approach. Water balance and volumetric controls will be provided using the retention of 5mm within the tree pits along the proposed roadways.

The 5mm retention requirement within site plan and park blocks are expected to be provided using LID's, such as infiltration or rainwater re-use options. Flows from the site plan and park block will also be treated to an enhanced level (80% TSS removal) prior to discharge to the future public roadways. This can be achieved through the use of an on-site filtration device, such as a Jellyfish unit. Details of this approach will be discussed within each block's respective servicing report.



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LEGEND

- LANDSCAPE TO FAIRCHILD AVENUE
- PAVEMENT TO FAIRCHILD AVENUE
- LANDSCAPE TO SOUTH CB
- PAVEMENT TO SOUTH CB
- ROOF TO YONGE STREET
- PAVEMENT TO YONGE STREET
- LANDSCAPE TO YONGE STREET
- EXTERNAL TO FAIRCHILD AVENUE
- EXTERNAL TO YONGE STREET

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FIGURE 4.1
EXISTING DRAINAGE

2018-4685	JULY 2019	SCALE: N.T.S.

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LEGEND

- SUBJECT LOCATION
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED 1200mmØ STORM SEWER

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FIGURE 4.3
PROPOSED SWM SERVICING

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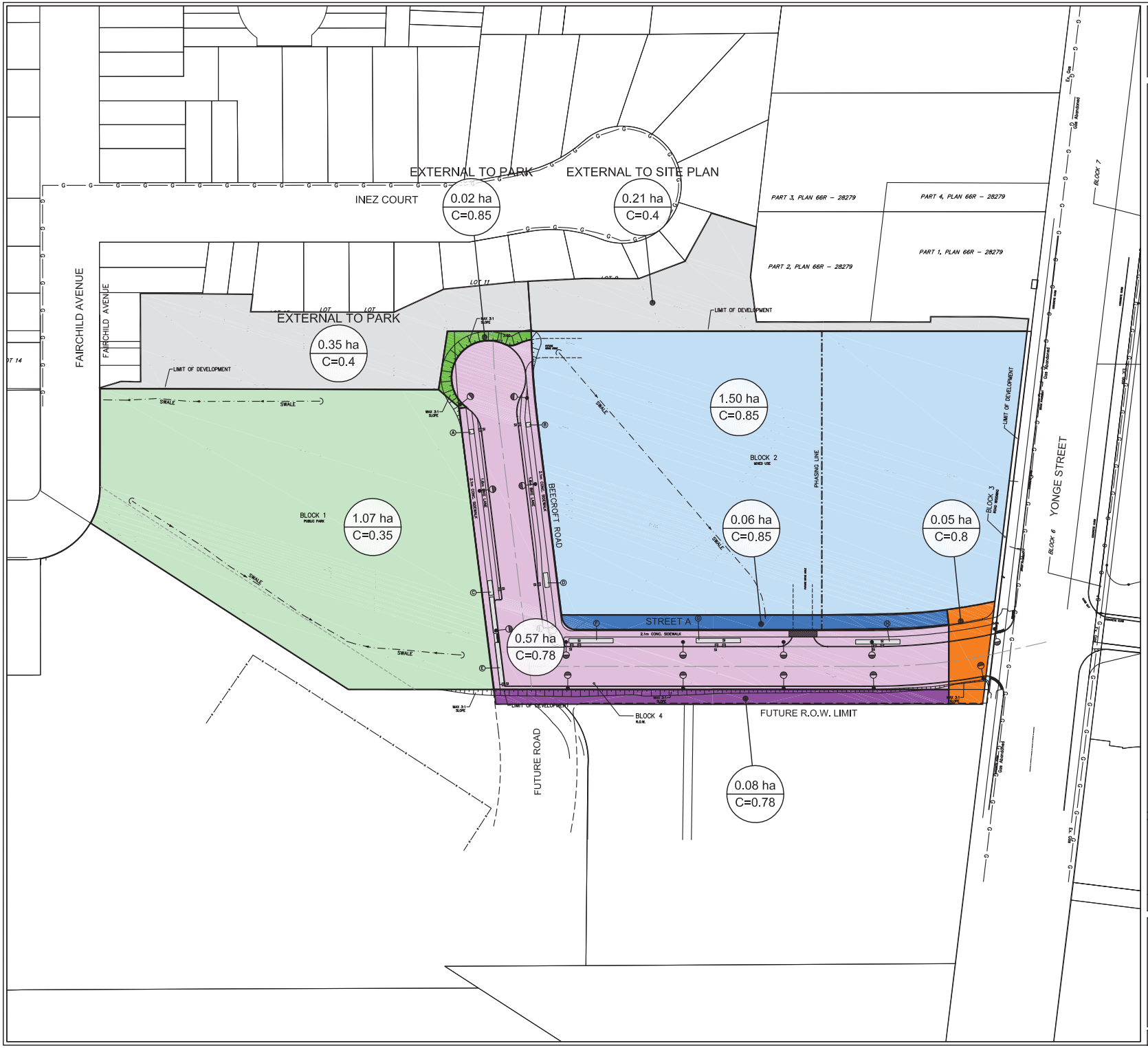

5800 YONGE STREET
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LEGEND

- PARK BLOCK
- UNCONTROLLED ROW TO PARK
- CONTROLLED SITE PLAN BLOCK
- UNCONTROLLED SITE PLAN TO ROW
- UNCONTROLLED ROW TO YONGE STREET
- CONTROLLED RIGHT OF WAY
- FUTURE RIGHT OF WAY WIDENING ALLOWANCE
- EXTERNAL DRAINAGE AREAS

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FIGURE 4.2
PROPOSED DRAINAGE PLAN

2018-4685	JULY 2019	SCALE: N.T.S.

4.3.1 DISCHARGE TO MUNICIPAL INFRASTRUCTURE

As per the City of Toronto WWFMG the allowable release rate to existing stormwater infrastructure is based on the pre-development 2-year design storm peak flow. The following sections discuss how the site release rates are established.

Release to Fairchild Avenue

In post development conditions it is proposed that the future park block is proposed to discharge west to Fairchild Avenue. To establish the release for this block the pre-development area of 1.24ha was considered with a runoff coefficient of 0.41. In addition a contributing external area of 0.38ha of single-detached home backyards (C = 0.40) currently drains into the site from the north, and follows an existing swale, which diverts flows to the Fairchild Avenue Storm Sewer. These parameters were used to develop an allowable release rate to Fairchild Avenue of approximately **161.9 L/s** including an allowance for external areas based on the 2-year storm frequency event.

Release to Yonge Street

As majority of the site is proposed to discharge to the existing Yonge Street storm sewer a release rate was established based on pre-development conditions. In this condition, approximately 1.78 ha of the proposed site drains to the Yonge Street storm sewer. In pre-development conditions this area has a run-off coefficient of 0.79; however, the maximum design runoff coefficient of 0.5 was used in determining the allowable release rate. An additional 0.18ha of external backyard drainage from single-detached residential land (C = 0.40) is tributary to the site. From these predevelopment parameters the total maximum allowable release rate to the Yonge Street storm sewer is **235.8 L/s**, which includes an allowance for external areas based on the 2-year storm frequency event.

In addition, based on available information regarding existing site service connections, the site is currently serviced by a 525mmØ storm sewer along the western boulevard of Yonge Street. However, due to constraints regarding the grading of the proposed future public ROW, as well as the shallow nature of the 525mmØ pipe, it will not be possible to provide a connection from the site to this storm sewer. This is because if a connection to the 525mmØ pipe is made, the proposed super pipe will not have sufficient cover.

In order to provide adequate storm servicing along Yonge Street it is therefore proposed to connect to the existing 675mmØ storm sewer along the eastern boulevard of Yonge Street. As the site does not

currently drain to this sewer the City of Toronto's InfoWorks storm sewer model was checked to assess the current available capacity of the 675mmØ sewer. Note that this sewer shares the same downstream sewer legs as the 525mmØ storm sewer, as it also drains to the downstream 3000mmØ trunk sewer at Doverwood Crescent. Based on the result of the existing sewer model, the 675mmØ storm has insufficient remaining capacity to accept further flows. In light of this there are two remaining options for servicing to the eastern 675mmØ sewer as noted below.

1. Upgrade of the 675mmØ sewer up to the 3000mmØ trunk sewer.
2. Optimization of existing pipe flows between the east and west storm sewers on Yonge Street.

As the first option would require an extensive amount of external work along Yonge Street, the optimization of flows within the east and west storm sewer system on Yonge Street is the most favourable option. Upon inspection of the existing sewers, including existing plan and profiles, it appears that a cross connection exists between the 525mmØ western storm sewer, and the 675mmØ eastern storm sewer, just upstream of the subject site's storm servicing connection. Based on the existing city InfoWorks storm sewer model for basement flooding area 28, this cross connection carries approximately **241L/s** of storm flows from the 525mmØ sewer, to the deeper 675mmØ storm sewer within Yonge Street's east boulevard. This is shown on **Figure C-3** in **Appendix C**.

Furthermore it was found that the western sewer leg, which increases to a 825mmØ downstream of the site, is currently underutilized such that this 241L/s of flow could be sufficiently conveyed by the western pipe without surcharge. As seen in Link 4912611497.1, in **Figure C-1** of **Appendix C**, currently 42L/s is conveyed during the 100 year storm. With the addition of 241L/s from the cross connection, this pipe would convey 283 L/s (i.e. 241 L/s + 42 L/s = 283 L/s) which is approximately 78% of the 525mmØ pipe's full flow capacity of 361 L/s.

Therefore as an alternative option it is proposed that this cross connection is eliminated by plugging the cross connection. This would free up approximately 241L/s of flow capacity from the 675mmØ sewer. Examining Link 4919011494.1, shown on **Figure C-2** in **Appendix C**, the current 100 year flow is 574 L/s within the 675mmØ sewer. By removing 241 L/s the pipe will then convey approximately 333 L/s (i.e. 574 L/s – 241 L/s = 333 L/s) which only represents 58% of the pipe's current full flow capacity of 575 L/s.

In doing this the 675mmØ sewer will have sufficient capacity to service the site based on the 2-year

pre-development release rate to Yonge Street (i.e. 235.8L/s). As a conservative measure it is proposed that the site's release is limited to **200L/s** in order to allow for extra capacity in the pipe. With this release rate in mind the 675mmØ pipe is expected to convey a new 100 year flow of 533 L/s (i.e. 333 L/s + 200 L/s = 533 L/s) which is approximately 93% of the 675mmØ pipe's full flow capacity.

With this drainage concept in mind, the prescribed release rates were pro-rated based on contributing areas to develop a release rate for each block. Note that an allowance for uncontrolled site plan areas and future widening along the southern boulevard has been considered in the ROW design. Prescribed release rates for each block to the existing storm sewers are summarized in **Table 4.1.**

Table 4.1: Proposed Release Rates to Municipal Sewers

Block	Release Rate to Fairchild Avenue (L/s)	Release Rate to Yonge Street (L/s)	Controlled Release with 100 Year Uncontrolled Removed (L/s)*
Right of Way	-	**80.1**	**52.3**
Park	**161.9**	-	**161.9**
Site Plan	-	**119.9**	**119.9**

*Uncontrolled areas, and resulting controlled release rates to be confirmed within each Block's respective servicing reports for site plan and park block.

4.3.2 WATER QUANTITY

The controlled drainage area runoff from the 2 to 100-year frequency storm events will be detained on-site through underground storage. The stormwater detention designs within each site plan will be detailed in their respective FSR reports. The following **Table 4.2** presents the theoretical required storage volumes required based on the established controlled release rates.

Table 4.2: Required Storage Volumes

Block	Controlled Area (ha)	Controlled Release Rate (L/s)	Theoretical Required Storage (m^3)
Right of Way	**0.71**	**52.3**	**204**
Park	**1.44**	**161.9**	**126**
Site Plan	**1.71**	**119.9**	**507**

With a total controlled area of 0.71ha (0.57ha on-site and 0.14ha of allowance as shown in **Figure 4.2**), a runoff coefficient of 0.78 and maximum controlled release rate of 52.3 L/s, the required on-site ROW storage volume is 204 m^3. In order to provide this volume pipe storage is proposed within the ROW, upstream of the control manhole. ROW flows will be controlled using a 150mmØ orifice plate at the control manhole. Detailed storage calculations are shown in **Appendix A**.

4.3.3 WATER BALANCE

In an effort to maintain the pre-development water balance, the WWFMG stipulates that 5mm of rain must be retained on-site through either infiltration, evapotranspiration or rainwater re-use. The required 5mm retention was assessed for each development block based on the anticipated post development imperviousness. The anticipated retention volumes required for each block are summarized in **Table 4.3**.

Table 4.3: Required Retention Volumes

Block	Area (ha)	Imperviousness	Required 5mm Retention Volume (m^3)	Calculation
Right of Way	0.63ha	83%	**26.1**	**0.63ha x 83% x 5mm x 10**
Site Plan (Park)	1.07ha	21%	**11.2**	**1.07ha x 7% x 5mm x 10**
Site Plan (Mixed-Use Phase 1)	1.57ha	93%	**73.0**	**1.71ha x 93% x 5mm x 10**

In order to achieve these volumes each site plan will be required to implement LID measures, such as rain water re-use, or infiltration options, to meet the requirement. Within the park block infiltration options are preferred, while topsoil amendment may be used if necessary. Note that the volumes required by these future site plans are estimates and should be revised as per detailed site plan land use within their respective block servicing report.

In order to accommodate retention within the future public right of way it is proposed that tree pits are installed within the road boulevards at regular frequencies. These tree pits will be designed to collect water using roadside inlets and have the first flush runoff flows collected within underlying filter media layers. The underlying treatment layers will be sized to provide a total 5mm of retention across the impervious road area by allowing road runoff to be retained and infiltrated, where deemed feasible with underlying groundwater levels.

Within the subsurface of the tree pits a 1m thick filter media layer will be provided to filter flows prior to infiltrating into underlying native soils, where possible. The filter media layer will be sized appropriately to provide 60% TSS removal (MOE, 2003 - Table 3.2), and will be used as part of a treatment train to meet the quality treatment target, further described in the following section.

Where infiltration is deemed not possible, due to high groundwater, the tree pits will be wrapped with an impervious liner to prevent groundwater contamination. All tree pits will be equipped with a 150mmØ perforated pipe below the sand filter layer to ensure filtration occurs along the full length of the pits, which will extend below walkway areas. Furthermore this perforated pipe will allow for excess, and non-infiltrated flows to drain to the storm sewer where they will be treated at the downstream OGS unit.

As a result of the high groundwater table across majority of the ROW, infiltration can only be credited within 0.31ha of the ROW, where a separation of 1m from the groundwater table is possible. Within these areas the 5mm retention requirement can be met using a 0.5m gravel layer below the perforated pipe, providing an infiltration volume of approximately **27m^3**. In order to achieve this volume it is proposed that gravel storage layers are extended below impervious sidewalk areas in order to maximize the usage of areas where infiltration is possible. Note that if the infiltration layers are not extended below paved areas the 5mm requirement would not be achievable within the ROW. Details of the tree pits are provided in drawing DET-3 for reference. Sizing calculations of the Tree Pits are provided in **Appendix C** for review.

4.3.4 WATER QUALITY

Site Plan Block Controls

The water quality target, as set out in the WWFMG, is the long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site based on the post development level of imperviousness. In meeting this requirement, each site plan shall provide internal treatment of runoff to an enhanced level of TSS removal (80%) prior to discharging to the downstream system, which is consistent with guidelines presented in the MOE SWM Planning and Design Manual (MOE, 2003). This requirement will be provided using a filtration unit within the private site plan area. The sizing and selection of the filter unit for each site plan block will be detailed within their respective servicing reports.

Public Right of Way Controls

Furthermore, the public roadways within the subject development will also be designed to provide an enhanced level of treatment (80% TSS removal) before discharging to the existing Yonge Street system. As the City of Toronto no longer credits oil /grit separators with 80% TSS removal, the use of a treatment train approach is proposed. The City of Toronto Green Street Technical guidelines were used in selecting appropriate LID measures to provide treatment within the ROW area.

As briefly described in the previous section, the treatment train used within the Public ROW will include the use of tree pits to provide an initial 60% TSS removal by collecting and filtering road runoff via roadside inlets. Tree pits will be sized as per MOE, 2003 Table 3.2. Sizing calculations have been provided in **Appendix C**.

Following initial treatment, flows within the proposed ROW storm sewers will be treated by a centralized OGS unit to provide an additional 50% TSS removal, as credited by the City of Toronto. Preliminary Sizing for the right of way suggests that an STC2000 OGS unit or equivalent is sufficient to provide treatment to the 0.71ha ROW area (IMP = 83%). Upon preliminary quality control calculations, the overall TSS removal for stormwater leaving the public right of way shall be approximately 84% (i.e. 60%+(100%-60%)*50% = 80%).

In excess of the proposed system, it is also proposed that tree pit inlets are followed by catchbasins along the road way. These catchbasins are proposed to be equipped with Catch Basin Shields (CB

Shields) to act as an emergency treatment precaution in the case that tree pits become clogged, or saturated, preventing flows from being treated. This is commonly the case during winter conditions when the soil is frozen, or in the event that tree pit inlets are blocked. In these events spill to downstream catchbasins will be treated to 50% TSS removal (as credited by the CB Shield ETV certification – provided in **Appendix C**) prior to being treated by the downstream OGS unit. If the use of CB Shields is not accepted by the City, then it is recommended that Gooseneck structures are used within catchbasins instead.

Furthermore due to site grading the capture of flows for a 0.05 ha area to the tree pits or the OGS units is not possible as it will drain uncontrolled to Yonge Street due to the grading of the ROW.

4.3.5 GROUNDWATER CONSIDERATIONS

A hydrogeological investigation for the subject site was undertaken by DS Consulting Ltd. and summarized in their Hydrogeological Investigation report, dated March 2019, to assess the potential effects of groundwater on the proposed development. Please refer to the excerpts from the Hydrogeology Investigation Report included in **Appendix C**.

According to the report, the subject site is underlain with a clayey silt till deposit, followed by a lower sand to sandy till layer. The ground water elevations across the site range from 187.6 to 190.0 masl. Furthermore, single well response tests were conducted on monitoring wells in February 2019. As per the results of percolation testing on-site a geometric mean infiltration rate of 1.31×10^{-7} m/s was found, translating to around a percolation rate of 25 mm/hour, which is used in preliminary LID calculations (see **Appendix B**).

Furthermore as per the current draft plan, the site plan is proposed to incorporate underground parking levels. The Preliminary Hydrogeological Investigation by DS Consultants Ltd. has indicated the construction dewatering will be required, at a rate of 318,000 L/day and 265,000 L/day for each of the currently planned Phase 1 and Phase 2 developments within the Site plan block respectively. Furthermore an estimated permanent dewatering rate of 0.05L/s is estimated to be required for the final site plan development.

The results of groundwater quality testing, as discussed in the Hydrogeological Investigation, found that TSS levels exceed limits found in the Toronto Region Sanitary Sewer criteria, which means that site groundwater flows cannot be discharged to the storm or sanitary sewer without treatment. Basic

treatment of groundwater flows is proposed to allow for discharge to the storm sewer. The quality of groundwater shall comply with the City's sewer by-law prior to its discharge to the municipal system. All filtration equipment for groundwater used on site shall be designed by a Filter Specialist, in accordance with City treatment requirements.

Due to the small amount of dewatering flows, a higher groundwater pumping rate of 2L/s has been conservatively considered. This flow, if treated to the City of Toronto storm sewer treatment requirements, can be discharged through the site plan storm connection. As such the 2L/s groundwater pumping rate has been included in the stormwater storage volumes described in Section 4.3.2. The sampling access port shall be installed prior to the control manhole as per the City's requirements. The applicant shall secure the required permitting for the groundwater dewatering and discharging, as required.

SUMMARY AND CLOSING REMARKS

The information provided in this report and accompanying drawings demonstrates that the stormwater management, sanitary, and water supply servicing for the proposed residential development will be in accordance with the City of Toronto's current design criteria. In summary, this report established the following:

Peak flows from the proposed ROW will be reduced via a proposed 150mmØ orifice plate. ROW runoff detention will be provided through underground pipe storage. Water quality criteria will be satisfied through a treatment train approach consisting of tree pits followed by a centralized OGS unit. CB shields (or gooseneck structures) are proposed within catchbasins as an added precaution. Filter sizings for individual site plan will be detailed in their respective FSR's, and are required to provide 80% TSS removal.

The Water Supply will be provided to proposed site plans by connecting to the existing 250mmØ watermain on Yonge Street. The availability of appropriate pressures and flows have been confirmed with a hydraulic model, validated using hydrant test results along the Yonge Street watermain. The use of booster pumps for any high-rise developments within the site plan blocks is to be confirmed and selected by the site's mechanical engineer.

A 250mmØ sanitary sewer is proposed from the subject site to connect to the existing 250mmØ sanitary sewer along Yonge Street in order to provide sanitary servicing for the proposed residential development.

We trust the provided information is satisfactory, however should any questions or comments arise, please feel free to contact the undersigned.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

LICENSED PROFESSIONAL ENGINEER
K. SHAHBIKIAN
10009041
July 04/2019
PROVINCE OF ONTARIO

Giancarlo Volpe, M.Eng.,
Water Resources Analyst

Koryun Shahbikian, LLM, M.Eng., P. Eng.
Associate

SCHAEFFERS

APPENDIX A- WATER SUPPLY CALCULATIONS

Water Supply Calculation

Project: 5800 Yonge Street
Project No: 4685
Municipality: City of Toronto

Minimum Fire Flow Demand:	19000	litres/minute	(high-rise residential)	316.67 litres/sec
FUS Fire Protection:	11000	litres/minute		183.33 litres/sec
Average Residential Daily Demand:	191	litres/capita/day		

Average Daily Demand

Land Use	Population	Average Day Demand (l/s)
Residential	2825	**6.25**
Commercial	166	**1.34**

Max Daily Demand

Land Use	Population	Peaking Factor	Max Day Demand (L/s)
Residential	2825	1.30	**8.12**
Commercial	166	1.10	**1.47**

Peak Hour Demand

Land Use	Population	Peaking Factor	Max Hour Demand (L/s)
Residential	2825	2.50	**15.61**
Commercial	166	1.20	**1.61**

Max Day + Fire Flow

Land Use	Average Day Demand (L/s)	Max Hour Demand (L/s)	Max Day Demand (L/s)	Fire Flow (L/s)	Total Flow (L/s)
Total	7.59	**17.22**	**9.59**	183.33	**192.93**

As per City of Toronto Design Criteria for Sewers and Watermains
Commercial Water Supply Demand assumed to be equivalent to Sanitary Demand

Project: 5800 Yonge Street
Project No: 4685
Municipality: City of Toronto

Tower 1 (Largest)

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	**0.6**	

B = Largest Floor

Area:	3926	square metres (of largest floor)

C = Height (storeys)

Height:	44	Storeys

For Fire Resistive buildings, the two largest adjoining floors plus 50% of each of any floors immediately above them up to eight

D = Fire Flow (000's)

GFA	10,852	square metres
Construction Type	0.6	
Fire Flow	13,751	L/min.

As per the building design

-> Fire Flow	**14,000**	**L/min.**

note: FUS guide specifically states round off to 1000's here

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**11,900**	**L/min.**

note: FUS guide specifically states apply occupancy factor here

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	-40%	incl 10% Standard Connection Size

note: Include sprinkler system

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	3 side
30.1 to 45 m	5%	one side

North = 28.8m separation
South = >20m separation
West = 26.5m separation
East = >30m separation

Exposure Factor	35.00%	(no more than 75%)

H - Net Fire Flow Required

	Charge
F + G Factors	-5%

	11305	L/min.
Fire Flow:	11000	L/min.
	183	L/s
	2906	USGPM

note: FUS Guide states apply Sprinkler and exposure factors together her
note: FUS guide specifically states round off to 1000's here

5800 Yonge Street

Project No. 4685

Test 1 - AQUAZITION

Flow Test Results of May 7th, 2019

Location: Residual: 5800 Yonge Street

Flow: 5800 Yonge Street

Test Results			
Flow US. GPM	Residual Pressure psi	Flow L/s	Residual Presure kPa
0	45	0	311
990	42	62	290
1534	38	97	262

For a total required flow demand of **192.9 L/s** the equivalent residual pressure is

149	**kPa**
22	**psi**

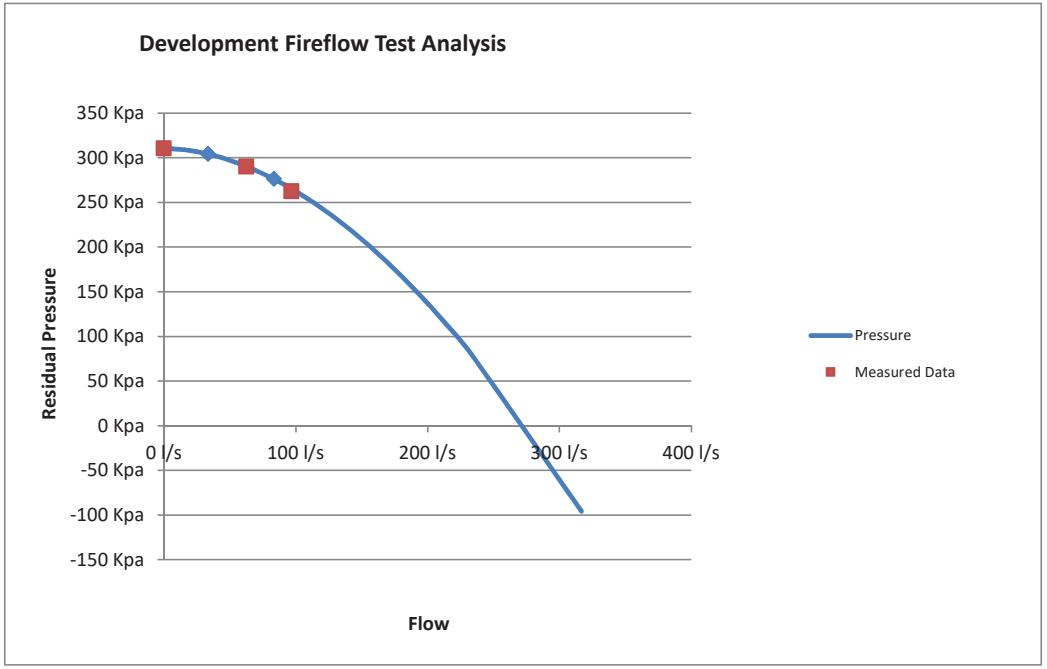
For a residual pressure of **20 psi** or **140 kPa** the equivalent flow is

198	**L/s**
3136	**USGPM**
2611	**IGPM**

1 USG = 3.785 litres

1 IG = 4.546 litres

1 psi = 6.9 kpa



5-200 Connie Cres. Concord ON L4K 1M1 Phone 416-883-9777 Fax 905-303-6977

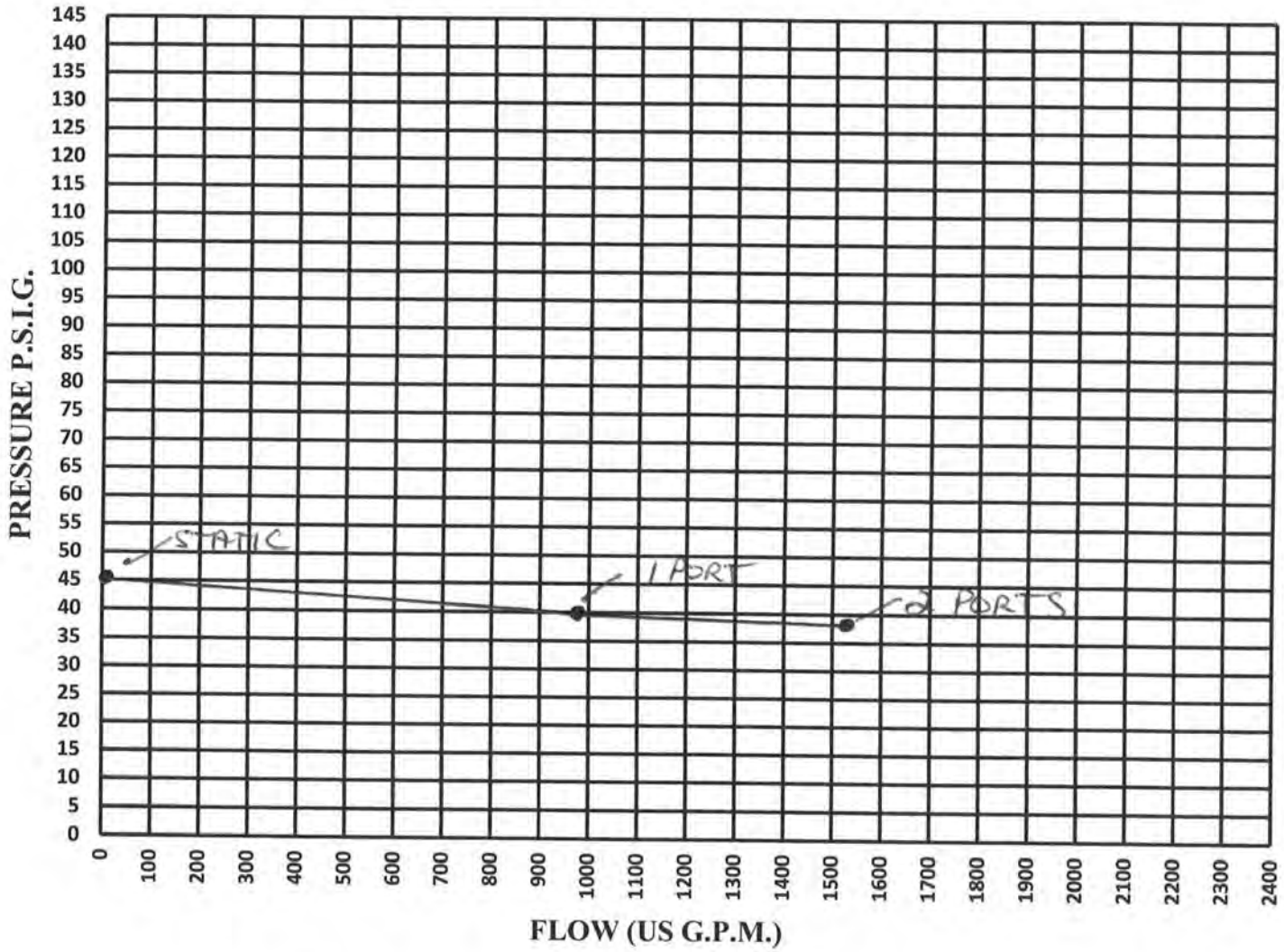
FLOW TEST REPORT

LOCATION OF RESIDUAL HYDRANT 5800 Yonge st.

LOCATION OF FLOW HYDRANT 5840 Yonge st.

TIME OF TEST 9:00AM WATERMAIN SIZE _____ STATIC PRESSURE 45

NUMBER OF OUTLETS	PITOT PRESSURE	FLOW (US G.P.M.)	RESIDUAL PRESSURE
One 2 ½" hydrant port	35	990	42
Two 2 ½" hydrant port	21	1534	38



PROJECT LOCATION 5840 Yonge st. DATE May 7th 2019

COMPANY NAME Times 5800 INC. (PRINT NAME) AQUAZITION EMPLOYEE JASON WALING (PRINT NAME)

9:00 am

Start Date

2019-04-26

End Date

2019-04-26

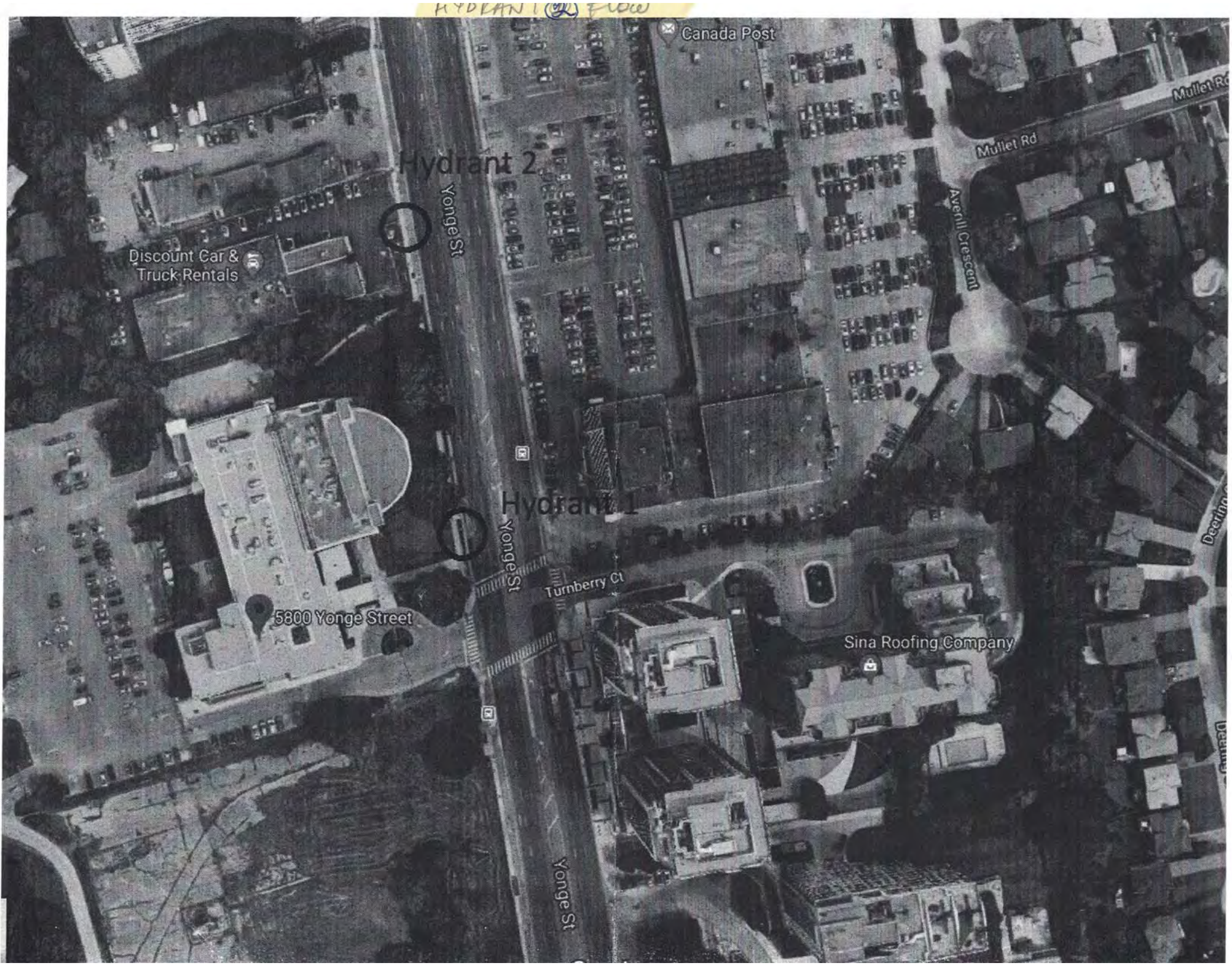
Hydrant Locations

Location: 5840 YONGE ST

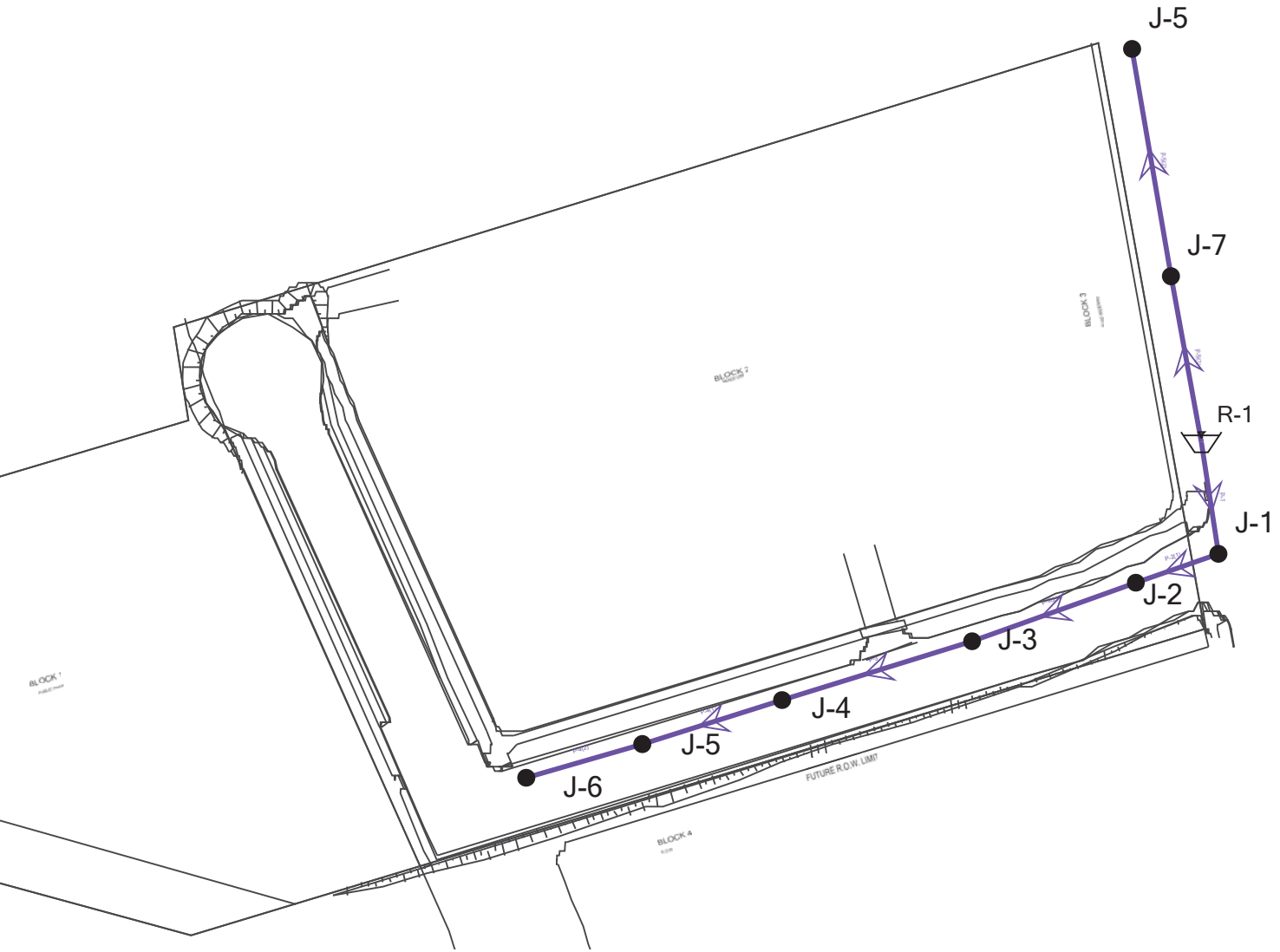
Customer Service Request Number: 1068196

Permit Holder Responsibilities:

1. This permit or a copy must be available for inspection at the location for which it is requested at all times.
2. The use of the fire hydrant(s) identified in this permit on dates other than those covered by this permit is an offence under Chapter 851 (Water Supply) of the Toronto Municipal Code.
3. The applicant is not permitted to connect any two inch (2") meter(s) provided by the City of Toronto to any fire hydrant. Toronto Water Distribution and Clilection staff will install and subsequently remove the meters flilowing the end of the permit period.
4. The City may request the Applicant provide his own backflow prevention device for the 2" meter.
5. The Applicant shall secure two inch (2") meter(s) to the hydrant(s) using his own chain and lock, and shall be responsible for the meter(s) and hydrant(s) until the meter(s) is removed by Toronto Water Distribution and Clilection staff flilowing notification by the Applicant that the meter(s) can be removed or flilowing the end of the permit period, whichever occurs first.
6. The Applicant is responsible for any claims that arise from the use of the hydrant(s) requested, and agrees to indemnify and hlid the City of Toronto harmless from any such claims.
7. The Applicant is responsible for the protection of fittings and water meter(s) supplied by Toronto Water, Distribution and Clilection. Costs of repairs for any damage or loss to these items or the hydrant(s) will be charged back to the Applicant.
8. For one inch (1") meter(s), Applicants must supply their own fittings, hoses and approved backflow prevention device for connecting the valve and meter assembly to the hydrant(s).
9. Any hydrant defects must be reported promptly by calling 311.


HYDRANT @ FLOW
Canada Post
Mullet Rd
Hydrant 2
Yonge St
Discount Car & Truck Rentals
Averill Crescent
Hydrant 1
Yonge St
Turnberry Ct
5800 Yonge Street
Sina Roofing Company
Yonge St

Scenario: Max Day



Color Coding Legend

Pipe: Diameter (mm)

<= 250.0

Other

Scenario: Average Day
Current Time Step: 0.000 h
FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Pressure Head (m)
J-1	190.63	0.00	222.64	313	32.01
J-2	190.88	1.63	222.63	311	31.75
J-3	190.73	1.78	222.63	312	31.90
J-4	190.86	1.53	222.63	311	31.77
J-5	190.91	1.67	222.63	310	31.72
J-6	190.85	0.00	222.63	311	31.78

W:\4600's\4685\WaterCAD\2019-06-10-4685-WaterCAD Model.wtg

Scenario: Peak Hour
Current Time Step: 0.000 h
FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Pressure Head (m)
J-1	190.63	0.00	222.62	313	31.99
J-2	190.88	4.08	222.61	311	31.73
J-3	190.73	4.46	222.59	312	31.86
J-4	190.86	3.81	222.58	310	31.72
J-5	190.91	4.18	222.58	310	31.67
J-6	190.85	0.00	222.58	311	31.73

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Scenario: Max Day
Current Time Step: 0.000 h
FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Pressure Head (m)
J-1	190.63	0.00	222.63	313	32.00
J-2	190.88	2.12	222.63	311	31.75
J-3	190.73	2.32	222.63	312	31.90
J-4	190.86	1.98	222.62	311	31.76
J-5	190.91	2.18	222.62	310	31.71
J-6	190.85	0.00	222.62	311	31.77

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Scenario: Max Day
Current Time Step: 0.000 h
Fire Flow Node FlexTable: Fire Flow Report

Label	Elevation (m)	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Flow (Total Needed) (L/s)	Fire Flow (Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated Residual @ Total Flow Needed) (kPa)	Demand (L/s)	Hydraulic Grade (m)
J-1	190.63	True	183.00	183.00	184.00	297	297	0.00	222.63
J-2	190.88	True	183.00	185.12	184.00	282	282	2.12	222.63
J-3	190.73	True	183.00	185.32	184.00	259	260	2.32	222.63
J-4	190.86	True	183.00	184.98	184.00	231	231	1.98	222.62
J-5	190.91	True	183.00	185.18	184.00	210	211	2.18	222.62
J-6	190.85	True	183.00	183.00	184.00	195	196	0.00	222.62

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APPENDIX B-SANITARY DEMAND CALCULATIONS

Population Estimate Calculation

Project: 5800 Yonge Street

Project No: 4685

Municipality: City of Toronto

Proposed Mixed-Use Development Phase 1 (Tower 1 & 2)

Site/Unit Type	Units/Area	Pop. Density (Person/unit) [1]	Pop. Density (Person/100m^2) [1]	Population [2]
1-Bedroom	440 units	1.4		616
2-Bedroom	254 units	2.1		534
3-Bedroom	77 units	3.1		239
Commercial	0 m²		1.1	0
Office	1082 m²		3.3	36
Daycare (school) [3]	741 m²		2.58	20
Total				1445

Proposed Mixed-Use Development Phase 2 (Tower 3 and 4)

Site/Unit Type	Units/Area	Pop. Density (Person/unit) [1]	Pop. Density (Person/100m^2) [1]	Population [2]
1-Bedroom	425 units	1.4		595
2-Bedroom	282 units	2.1		593
3-Bedroom	80 units	3.1		248
Commercial	1956 m²		1.1	22
Office	2656 m²		3.3	88
Daycare (school) [3]	0 m²		2.58	0
Total				1546
			Total Post-Population	2991

Pre-Development Conditions (Subject Site)

Site/Unit Type	Units/Area	Pop. Density (Person/unit) [1]	Pop. Density (Person/100m^2) [1]	Population [2]
Commercial	0 m²		1.1	0
Residential (unit mix unknown)	0 units	2.7		0
Office	8200 m²		3.3	271
Daycare (school) [3]	0 m²		2.58	0
Total				271

Notes:

(1) - Populations Densities based on City of Toronto Design Criteria for Sewers and Watermains

(2) - Population rounded up for each site/unit type before being carried forward for additional calculations

(3) - Assumed Daycare has equivalent population to school

Sanitary Demand Calculation

Project: 5800 Yonge Street
Project No: 4685
Municipality: City of Toronto

Infiltration Rate:	All types*	0.26	litre/second/ha
Generation Rate:	New Local Sewers*	450	litres/capita/day
Generation Rate:	Residential*	240	litres/capita/day
Generation Rate:	Commercial*	250	litres/capita/day
Generation Rate:	Commercial*	180,000	litres/floor ha/day
Site Area Overall		3.28	ha

Estimated Overall Site Discharge (Proposed Condition)

Site Discharge	Res. Units	Population	Average Demand (L/S)
Residential	1558	2825	14.71

Site Discharge	Floor Area (ha)	Population	Average Demand (L/S)
Non-Residential	0.64	166	0.86

Note: Average demands for new development estimated using 450 L/cap/day rate.

Full Site	Total Average Demand (L/S)	Harmon's Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)**	Total Peak Flow (L/s)
Res. & Commerc.	15.58	3.44	53.64	0.852	**54.50**

Total Flow =	**54.50**

Estimated Exisiting Site Discharge

Site Discharge	Floor Area (ha)	Population	Average Demand (L/S)	Harmon's Peaking Factor	Infiltration (L/s)**	Total Peak Flow (L/s)
Commercial	0.8200	271	0.78	4.00	0.852	**3.99**

Note: Makes use of 250L/cap/day.

*As per the City of Toronto Design Criteria for Sewers and Watermains
** Infiltration for the total site area is considered in the demand calculation

APPENDIX C- STORMWATER MANAGEMENT CALCULATIONS

City of Toronto - Design Criteria

Runoff Coefficient - Pre-Development Stage
Subject Site Area
Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Pre-development Site Landuse Summary:

	Area (ha)	Runoff Coeff.	A x C
Building Roofs	0.41	0.90	0.37
Pavement Area (Roadways / Sidewalk)	1.55	0.90	1.40
Pervious Lawn Area	1.31	0.25	0.33
Sub Total	**3.27**		**2.0915**
Weighted Coefficient			0.64

*Note - as the runoff coefficient is high, a pre-development coefficient of 0.5 will be applied.

Exisiting External Drainage Areas:

	Area (ha)	Runoff Coeff.	A x C
2 and 1 Storey Residential Backyards (North)	0.56	0.40	0.22
	0.56	**0.40**	**0.22**
Weighted Coefficient			0.40

City of Toronto - Design Criteria

Runoff Coefficient - Pre-Development Stage
To Yonge Street

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Pre-development Site to Yonge Street:

	Area (ha)	Runoff Coeff.	A x C
Building Roofs	0.41	0.90	0.37
Pavement Areas	1.08	0.90	0.97
Pervious Lawn Area	0.29	0.25	0.07
Sub Total	**1.78**		**1.4135**

Weighted Coefficient	0.79

*Note - as the runoff coefficient is high, a pre-development coefficient of 0.5 will be applied.

Exisiting External Drainage Areas to Yonge Street:

	Area (ha)	Runoff Coeff.	A x C
2 and 1 Storey Residential Backyards (North)	0.18	0.40	0.07
	0.18		**0.07**
Weighted Coefficient			0.40

Total Drainage Area to Yonge Street:

	Area (ha)	Runoff Coeff.	A x C
Total Area to ROW	1.96		1.49
Weighted Coefficient			0.76

City of Toronto - Design Criteria

Runoff Coefficient - Pre-Development Stage
To Fairchild Avenue

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Pre-development Site to Fairchild Avenue:

	Area (ha)	Runoff Coeff.	A x C
Building Roofs	0.00	0.90	0.00
Pavement Areas	0.31	0.90	0.28
Pervious Lawn Area	0.93	0.25	0.23
Sub Total	**1.24**		**0.51**
Weighted Coefficient			**0.41**

*Note - as the runoff coefficient is high, a pre-development coefficient of 0.5 will be applied.

Exisiting External Drainage Areas:

	Area (ha)	Runoff Coeff.	A x C
2 and 1 Storey Residential Backyards (North)	0.38	0.40	0.15
	0.38	**0.40**	**0.15**
Weighted Coefficient			0.40

Total Drainage Area to Fairchild Avenue:

	Area (ha)	Runoff Coeff.	A x C
Total Area to ROW	1.62		0.66
Weighted Coefficient			0.41

City of Toronto - Design Criteria

Runoff Coefficient - Pre-Development Stage
To Southern Catchbasin

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Pre-development Site to Fairchild Avenue:

	Area (ha)	Runoff Coeff.	A x C
Building Roofs	0.00	0.90	0.00
Pavement Areas	0.16	0.90	0.14
Pervious Lawn Area	0.09	0.25	0.02
Sub Total	**0.25**		**0.17**
Weighted Coefficient			**0.67**

*Note - as the runoff coefficient is high, a pre-development coefficient of 0.5 will be applied.

City of Toronto - Design Criteria
Total Site
Runoff Coefficient - Post-Development Runoff Coefficient

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Post Development Site Summary:

	Area (ha)	Runoff Coeff.	A x C
Site Plan - Park	1.07	0.25	0.27
Site Plan - Mixed-Use	1.57	0.85	1.33
ROW	0.63	0.78	0.49
Sub Total	**3.27**		**2.09**
Weighted Coefficient			**0.64**

External Drainage Areas:

	Area (ha)	Runoff Coeff.	A x C
2 and 1 Storey Residential Backyards(North)	0.56	0.40	0.22
5m Southern ROW Allowance	0.08	0.78	0.06
Sub Total	**0.64**		**0.29**
Weighted Coefficient			**0.45**

Total Drainage Area:

	Area (ha)	Runoff Coeff.	A x C
Total Post-Dev Area	3.91		2.38
Weighted Coefficient			0.61

City of Toronto - Design Criteria
Park Block
Runoff Coefficient - Post-Development Condition

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Post-development Park Block to Fairchild Avenue:

	Area (ha)	Runoff Coeff.	A x C
Site Plan - Park	1.07	0.35	0.37
Sub Total	**1.07**		**0.37**
Weighted Coefficient			0.35

External Drainage Areas:

	Area (ha)	Runoff Coeff.	A x C
2 and 1 Storey Residential Backyards (North)	0.35	0.40	0.14
Sub Total	**0.35**		**0.14**
Weighted Coefficient			**0.40**

Total Park Area:

	Area (ha)	Runoff Coeff.	A x C
Total Area to ROW	1.42		0.51
Weighted Coefficient			0.36

City of Toronto - Design Criteria
Mixed-Use Site Plan Block
Runoff Coefficient - Post-Development Condition

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Post-development Site Plan to Yonge Street:

	Area (ha)	Runoff Coeff.	A x C
Site Plan - Controlled	1.50	0.85	1.28
Sub Total	**1.50**		**1.28**
Weighted Coefficient			0.85

Exisiting External Drainage Areas:

	Area (ha)	Runoff Coeff.	A x C
North Residential External	0.21	0.40	0.08
Sub Total	**0.21**		**0.08**
Weighted Coefficient			**0.40**

Post-development Site Plan Uncontrolled Allowance to ROW:

	Area (ha)	Runoff Coeff.	A x C
5m Uncontrolled Site Plan Allowance to ROW	0.07	0.85	0.06
Sub Total	**0.07**		**0.06**
Weighted Coefficient			0.85

Total Controlled Drainage Area from Site Plans to Yonge Street:

	Area (ha)	Runoff Coeff.	A x C
Total Controlled Area	**1.64**	0.79	1.30
Weighted Coefficient			**0.79**

City of Toronto - Design Criteria
Public Right of Way
Runoff Coefficient - Post-Development Condition

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Calculations for Post-development Controlled Right of Way to Yonge Street:

	Area (ha)	Runoff Coeff.	A x C
Intersection	0.04	0.90	0.04
Beecroft Extension	0.26	0.76	0.20
New Public East-West Road	0.32	0.79	0.25
Sub Total	**0.63**		**0.49**
Weighted Coefficient			0.78

External Drainage Allowances:

	Area (ha)	Runoff Coeff.	A x C
5m Area from Site Plan	0.070	0.85	0.06
5m Future ROW Widening	0.080	0.78	0.06
Sub Total	**0.150**		**0.12**
Weighted Coefficient			0.81

Total ROW Area:

	Area (ha)	Runoff Coeff.	A x C
Total Area to ROW	**0.78**		0.61
Weighted Coefficient			**0.79**

City of Toronto - Design Criteria
Drainage Area to Fairchild Avenue
Runoff Coefficient - Post-Development Condition

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

Total Controlled Drainage Area from ROW to Park:

	Area (ha)	Runoff Coeff.	A x C
Uncontrolled ROW to Park	0.02	0.85	0.02
Sub Total	**0.02**		**0.02**
Weighted Coefficient			0.85

Total Effective Controlled Drainage Area to Fairchild Avenue

	Area (ha)	Runoff Coeff.	A x C
Uncontrolled ROW to Park	0.02	0.85	0.02
Park Block	1.42	0.85	0.51
Sub Total	**1.44**		**0.53**
Weighted Coefficient			0.37

City of Toronto - Design Criteria
Drainage Area to Yonge Street
Runoff Coefficient - Post-Development Condition

Project: 2018-4685

Criteria:

Runoff Coefficients were taken from the City's Design Criteria.

1. Total Uncontrolled Drainage Area to Yonge Street from ROW:

	Area (ha)	Runoff Coeff.	A x C
Uncontrolled ROW to Yonge St.	0.03	0.79	0.02
Uncontrolled Area from Site Plan	0.01	0.85	0.01
Uncontrolled 5m Future ROW Widening	0.01	0.78	0.01
Sub Total	**0.05**		0.04
Weighted Coefficient			**0.80**

**Note: 100 year Flows from this area to be removed from ROW's allowable release rate.*

2. Total Controlled ROW Drainage Area to Park Block:

	Area (ha)	Runoff Coeff.	A x C
Uncontrolled ROW to Park	0.02	0.85	0.02
Sub Total	0.02		0.02
Weighted Coefficient			0.85

3. Effective Controlled ROW Area to Yonge Street:
[i.e. (3) = Total ROW Area - (1) - (2)]

	Area (ha)	Runoff Coeff.	A x C
Controlled ROW	0.71	0.78	0.56
Sub Total	**0.71**		**0.56**
Weighted Coefficient			0.78

ROW - Beecroft Extension

Calculation based on lot Fabric

Total ROW Width	25.00	m
Total Sidewalk Width	4.20	m
Total Bike Lane Width	3.00	m
Total pavement Width	12.5	m

Number of Driveway W/O Sidewalk	0	
Width of TYP. Driveway	6.90	m
Length of TYP. Driveway	6.75	m
Total Area of Driveway	0.00	sqm

Number of Driveway With Sidewalk	1	
Width of TYP. Driveway	6.90	m
Length of TYP. Driveway incl. sidewalk	6.75	m
Sidewalk Width	2.1	m
Total Area of Driveway	32.09	sqm

Total Area of ROW	2544	sqm	From AutoCAD
Total Driveway Area	32	sqm	

Minimum TIMP based on Lot Fabric

C	0.76
TIMP	80%
XIMP	80%

ROW - New Public East-West Road

Calculation based on lot Fabric

Total ROW Width	20.00	m
Total Sidewalk Width	3.15	m
Total Bike Lane Width	3.60	m
Total pavement Width	9.90	m

Number of Driveway W/O Sidewalk	0	
Width of TYP. Driveway	6.90	m
Length of TYP. Driveway	5.1	m
Total Area of Driveway	0.00	sqm

Number of Driveway With Sidewalk	1	
Width of TYP. Driveway	6.90	m
Length of TYP. Driveway incl. sidewalk	5.1	m
Sidewalk Width	2.1	m
Total Area of Driveway	20.70	sqm

Total Area of ROW	3213	sqm	From AutoCAD
Total Driveway Area	21	sqm	

Minimum TIMP based on Lot Fabric

C	0.79
TIMP	84%
XIMP	84%

City of Toronto - Design Criteria

Allowable Release Rate to Yonge Street

Project: 2018-4685

Criteria:

The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	C	I (mm/hr)
2-Year	21.8	-0.78	88.189
5-Year	32.0	-0.79	131.792
10-Year	38.7	-0.80	162.268
25-Year	45.2	-0.80	189.522
50-Year	53.5	-0.80	224.324
100-Year	59.7	-0.80	250.320

Note:
T=10 minutes
I=A x T^C

Existing Peak Discharge Rate from Site to Storm Sewer

Runoff Coefficient, C	**0.79**	
Drainage Area	1.78	ha
2-Year Peak Flow, Q2	344.8	l/s
5-Year Peak Flow, Q5	515.2	l/s
10-Year Peak Flow, Q10	634.3	l/s
25-Year Peak Flow, Q25	740.9	l/s
50-Year Peak Flow, Q50	876.9	l/s
100-Year Peak Flow, Q100	978.6	l/s

Maximum Allowable Release Rate to Yonge Street Storm Sewer

Since the existing Weighted Coefficient is more than 0.50, a Runoff Coefficient of C=0.50 should be used.

Runoff Coefficient, C	0.50	
Drainage Area	1.78	ha
Q1= Total Max allowable release rate = 2-Year Peak Flow	218.2	l/s

External North Flow to be Captured

Runoff Coefficient, C	0.40	
Drainage Area	**0.18**	ha
2-Year Peak Flow, Q2	17.7	l/s
5-Year Peak Flow, Q5	26.4	l/s
10-Year Peak Flow, Q10	32.5	l/s
25-Year Peak Flow, Q25	37.9	l/s
50-Year Peak Flow, Q50	44.9	l/s
100-Year Peak Flow, Q100	50.1	l/s

Max. allowable release rate = **235.8** l/s

City of Toronto - Design Criteria

Allowable Release Rate to Fairchild Avenue

Project: 2018-4685

Criteria:

The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	C	I (mm/hr)
2-Year	21.8	-0.78	88.189
5-Year	32.0	-0.79	131.792
10-Year	38.7	-0.80	162.268
25-Year	45.2	-0.80	189.522
50-Year	53.5	-0.80	224.324
100-Year	59.7	-0.80	250.320

Note:
T=10 minutes
I=A x T^C

Existing Peak Discharge Rate from Site to Storm Sewer

Runoff Coefficient, C	**0.41**	
Drainage Area	1.24	ha
2-Year Peak Flow, Q2	124.6	l/s
5-Year Peak Flow, Q5	186.3	l/s
10-Year Peak Flow, Q10	229.3	l/s
25-Year Peak Flow, Q25	267.9	l/s
50-Year Peak Flow, Q50	317.0	l/s
100-Year Peak Flow, Q100	353.8	l/s

Maximum Allowable Release Rate to Fairchild Avenue Storm Sewer

Runoff Coefficient, C	0.41	
Drainage Area	1.24	ha
Q1= Total Max allowable release rate = 2-Year Peak Flow	124.6	l/s

External North Flows to be Captured

Runoff Coefficient, C	0.40	
Drainage Area	**0.38**	ha
2-Year Peak Flow, Q2	37.3	l/s
5-Year Peak Flow, Q5	55.7	l/s
10-Year Peak Flow, Q10	68.6	l/s
25-Year Peak Flow, Q25	80.1	l/s
50-Year Peak Flow, Q50	94.8	l/s
100-Year Peak Flow, Q100	105.8	l/s

Max. allowable release rate = **161.9** l/s

City of Toronto - Design Criteria

Uncontrolled Flows from ROW

Project: 2018-4685

Criteria:

The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	C	I (mm/hr)
2-Year	21.8	-0.78	88.189
5-Year	32.0	-0.79	131.792
10-Year	38.7	-0.80	162.268
25-Year	45.2	-0.80	189.522
50-Year	53.5	-0.80	224.324
100-Year	59.7	-0.80	250.320

Note:
T=10 minutes
I=A x T^C

Uncontrolled Flow Calculations

Runoff Coefficient, C	**0.80**	
Drainage Area	0.05	ha
2-Year Peak Flow, Q2	9.8	l/s
5-Year Peak Flow, Q5	14.7	l/s
10-Year Peak Flow, Q10	18.0	l/s
25-Year Peak Flow, Q25	21.1	l/s
50-Year Peak Flow, Q50	24.9	l/s
100-Year Peak Flow, Q100	**27.8**	l/s

City of Toronto - Design Criteria

Development Block Pro-rated Allowable Release Rates
Adjusted as per Storm Sewer Capacity

Project: 2018-4685

Max. allowable release rate to Fairchild Avenue = **161.9** l/s

Development Block	Area (ha)	Release Rate (l/s)
Site Plan 1 - Park Block + North External	1.41	**161.9**
Total	1.41	161.9

Max. allowable release rate to 675mmØ Yonge Street Sewer = **200.0** l/s

Development Block	Area (ha)	Release Rate (l/s)
Site Plan - Mixed-Use Residential + North External	1.72	**119.9**
Public Roadway + Allowance	0.78	**80.1**
Total	2.50	200.0

Note: All areas based on post-development breakdown.

Allowable ROW Release Considering Uncontrolled Areas

Development Block	Area (ha)	Release Rate (l/s)
Total Public Roadway + Allowance	0.78	80.1
100 year Uncontrolled Rate to Yonge St.	0.05	27.8
Allowable Controlled Release from ROW*	-	**52.3**

**Notes release rate to be used in designing ROW control structure.*

Theoretical Estimate

Required Storage Volume Calculation - Site Plan: Park

Schaeffers Consulting Engineers

Project: 5800 Yonge Street
Project No.: 2019-4685

Modified Rational Method

Area (ha) =	1.44
C =	0.37
Allowable Release Rate (L/s) =	161.9
Actual Release Rate (L/s) =	**161.9**

Rooftop Storage Area (m^2)=	0
Release to Tank (L/s)=	0.00

100 Year Storm

Design Storm =	City of Toronto
A =	59.7
B =	0
C =	-0.8

	100 Year				Total	Maximum	Required
Time	Intensity	Total	Runoff	Total	Runoff	Release	Storage
(min)	100 year	Runoff (not Roof)	Roof	Runoff	Volume	Volume	Volume
	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(m^3)	(m^3)
10	250.32	370.77	0.00	370.77	222.46	97.14	125.32
15	180.98	268.06	0.00	268.06	241.25	145.71	95.54
20	143.77	212.95	0.00	212.95	255.54	194.28	61.26
30	103.94	153.96	0.00	153.96	277.13	291.42	0.00
40	82.57	122.31	0.00	122.31	293.54	388.56	0.00
50	69.07	102.31	0.00	102.31	306.94	485.70	0.00
60	59.70	88.43	0.00	88.43	318.34	582.84	0.00
70	52.77	78.17	0.00	78.17	328.30	679.98	0.00
80	47.43	70.25	0.00	70.25	337.19	777.12	0.00
90	43.16	63.93	0.00	63.93	345.23	874.26	0.00
100	39.67	58.76	0.00	58.76	352.58	971.40	0.00
110	36.76	54.45	0.00	54.45	359.36	1068.54	0.00
120	34.29	50.79	0.00	50.79	365.67	1165.68	0.00
130	32.16	47.64	0.00	47.64	371.57	1262.82	0.00
140	30.31	44.90	0.00	44.90	377.12	1359.96	0.00
150	28.68	42.48	0.00	42.48	382.36	1457.10	0.00
160	27.24	40.35	0.00	40.35	387.33	1554.24	0.00
170	25.95	38.44	0.00	38.44	392.05	1651.38	0.00
180	24.79	36.72	0.00	36.72	396.56	1748.52	0.00
190	23.74	35.16	0.00	35.16	400.87	1845.66	0.00
200	22.79	33.75	0.00	33.75	405.01	1942.80	0.00
210	21.91	32.46	0.00	32.46	408.98	2039.94	0.00
230	20.38	30.18	0.00	30.18	416.49	2234.22	0.00

Required Storage (m^3):	**126.0**

Provided Storage (m^3):	**-**

Theoretical Estimate

Required Storage Volume Calculation - Site Plan: Mixed-Use Residential

Schaeffers Consulting Engineers

Project: 5800 Yonge Street
Project No.: 2019-4685

Modified Rational Method

Area (ha) =	1.71
C =	0.79
Allowable Release Rate (L/s) =	119.9
Actual Release Rate (L/s) =	**119.9**

Groundwater Pumping Release to Tank (L/s)=	2.00

100 Year Storm

Design Storm =	City of Toronto
A =	59.7
B =	0
C =	-0.8

	100 Year				Total	Maximum	Required
Time	Intensity	Total	Pumping	Total	Runoff	Release	Storage
(min)	100 year	Runoff (not Roof)	Rate	Runoff	Volume	Volume	Volume
	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(m^3)	(m^3)
10	250.32	940.08	2.00	942.08	565.25	71.94	493.31
20	143.77	539.93	2.00	541.93	650.32	143.88	506.44
30	103.94	390.36	2.00	392.36	706.25	215.82	490.43
40	82.57	310.11	2.00	312.11	749.06	287.76	461.30
50	69.07	259.41	2.00	261.41	784.23	359.70	424.53
60	59.70	224.20	2.00	226.20	814.33	431.64	382.69
70	52.77	198.19	2.00	200.19	840.80	503.58	337.22
80	47.43	178.11	2.00	180.11	864.53	575.52	289.01
90	43.16	162.09	2.00	164.09	886.11	647.46	238.65
100	39.67	148.99	2.00	150.99	905.95	719.40	186.55
110	36.76	138.05	2.00	140.05	924.36	791.34	133.02
120	34.29	128.77	2.00	130.77	941.55	863.28	78.27
130	32.16	120.78	2.00	122.78	957.71	935.22	22.49
140	30.31	113.83	2.00	115.83	972.98	1007.16	0.00
150	28.68	107.72	2.00	109.72	987.47	1079.10	0.00
160	27.24	102.30	2.00	104.30	1001.26	1151.04	0.00
170	25.95	97.46	2.00	99.46	1014.44	1222.98	0.00
180	24.79	93.10	2.00	95.10	1027.07	1294.92	0.00
190	23.74	89.16	2.00	91.16	1039.20	1366.86	0.00
200	22.79	85.57	2.00	87.57	1050.88	1438.80	0.00
210	21.91	82.30	2.00	84.30	1062.15	1510.74	0.00
220	21.11	79.29	2.00	81.29	1073.04	1582.68	0.00
230	20.38	76.52	2.00	78.52	1083.59	1654.62	0.00

Required Storage (m^3):	**507.0**

Provided Storage (m^3):	**-**

City of Toronto
Orifice Control within Public ROW to Yonge Street
150mmØ Option

Allowable Release Rate to Yonge= 0.0523 m^3/s

CALCULATE DIAMETER KNOWING Q & H	
Q(m^3/s)=	0.0523
Td(m) =	1.11
Approx A=	0.0181
Approx D=	152
A(m^2) =	0.019
D(mm) =	**154**

Control Manhole Orifice Plate

DIA (mm)=	**150**	
AREA m^2=	0.018	
COEFF =	**0.62**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL=	0.00	m
Orifice Inv.=	187.91	m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.075	0.0000	0.000	187.99
0.400	0.475	0.0307	0.031	188.39
0.750	0.825	0.0420	0.042	188.74
1.160	1.235	0.0523	0.052	189.15
1.200	1.275	0.0532	0.053	189.19
2.100	2.175	0.0703	0.070	190.09
2.600	2.675	0.0783	0.0783	190.59

ORIFICE FLOW	Q(m^3/s)=	COEF*AREA*(2*GRAVITY*HEAD/K)^0.5	
	Approx A=	+$G$10/($B$8*(2*9.81*$G$11/K)^0.5)	
	Approx D=	((G12/@PI)^0.5)*2*1000	
	A(m^2) =	+$G$10/($B$8*(2*9.81*($G$11-(0.5*G21/1000))/K)^0.5)	
	D(mm) =	((G12/@PI)^0.5)*2*1000	
WEIR FLOW	Q(m^3/s)=	CLH^1.5	C=1.5

Printed: 19-Jun-19

Theoretical Estimate

Required Storage Volume Calculation - Public Road with Uncontrolled Allowance

Schaeffers Consulting Engineers

Project: 5800 Yonge Street
Project No.: 2019-4685

Modified Rational Method

Area (ha) =	0.71
C =	0.78
Allowable Release Rate (L/s) =	52.3
Actual Release Rate (L/s) =	**52.3**

Rooftop Storage Area (m^2)=	0
Release to Tank (L/s)=	0.00

100 Year Storm

Design Storm =	City of Toronto
A =	59.7
B =	0
C =	-0.8

	100 Year				Total	Maximum	Required
Time	Intensity	Total	Runoff	Total	Runoff	Release	Storage
(min)	100 year	Runoff (not Roof)	Roof	Runoff	Volume	Volume	Volume
	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(m^3)	(m^3)
10	250.32	385.38	0.00	385.38	231.23	31.38	199.85
12	216.35	333.08	0.00	333.08	239.82	37.66	202.16
15	180.98	278.62	0.00	278.62	250.76	47.07	203.69
20	143.77	221.34	0.00	221.34	265.61	62.76	202.85
25	120.27	185.16	0.00	185.16	277.74	78.45	199.29
30	103.94	160.03	0.00	160.03	288.05	94.14	193.91
40	82.57	127.13	0.00	127.13	305.11	125.52	179.59
50	69.07	106.34	0.00	106.34	319.03	156.90	162.13
60	59.70	91.91	0.00	91.91	330.88	188.28	142.60
70	52.77	81.25	0.00	81.25	341.24	219.66	121.58
80	47.43	73.02	0.00	73.02	350.48	251.04	99.44
90	43.16	66.45	0.00	66.45	358.83	282.42	76.41
100	39.67	61.08	0.00	61.08	366.47	313.80	52.67
110	36.76	56.60	0.00	56.60	373.53	345.18	28.35
120	34.29	52.79	0.00	52.79	380.08	376.56	3.52
130	32.16	49.52	0.00	49.52	386.22	407.94	0.00
140	30.31	46.66	0.00	46.66	391.99	439.32	0.00
150	28.68	44.16	0.00	44.16	397.43	470.70	0.00
160	27.24	41.94	0.00	41.94	402.59	502.08	0.00
170	25.95	39.95	0.00	39.95	407.51	533.46	0.00
180	24.79	38.17	0.00	38.17	412.19	564.84	0.00
190	23.74	36.55	0.00	36.55	416.67	596.22	0.00
200	22.79	35.08	0.00	35.08	420.97	627.60	0.00

Required Storage (m^3):	**204.0**

Provided Storage (m^3):	**210.0**

HWL	189.15

Table 1.1: Underground Storage Summary (ROW to Yonge St.)

Storage in CBs	0.00 m3
Storage in MH	19.41 m3
Storage in Pipes	190.89 m3
Total Underground Storage	210.30 m3
Total 100 year Required Storage	204.00 m3
Storage Deficit	**0.00 m3**

Table 1.2: Stage Storage Discharge Curve

Storm Event [Years]	High Water Level [m]	Discharge Rate [L/s]	Required Storage [m^3]	Provided Storage [m^3]
100-Year	189.15	0.0	204.00	210.30 m3

SCHAEFFERS
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design@schaeffers.com

City of Toronto

UNDERGROUND STORAGE DESIGN SHEET

(100-Regional YR. RAINFALL INTENSITY)

Designed By: GV
Checked By: KS
Date: May 2019
File No.: 2016-4404

5800 Yonge Street

MH ID	MH Size	Lowest Invert	Top of Grade	Is MH lower than HWL	Cross Sectional Flow Area	Volume
	[mm]	[masl]	[masl]	F/P/N	[m^2]	[m^3]
STM MH7	2400	188.66	191.45	P	4.52	2.22
STM MH6	2400	188.47	191.14	P	4.52	3.08
STM MH5	2400	188.37	190.85	P	4.52	3.53
STM MH4	2400	188.05	190.75	P	4.52	4.98
STM MH3	2400	187.91	190.85	P	4.52	5.61

---> Input Values
---> Calculated Values

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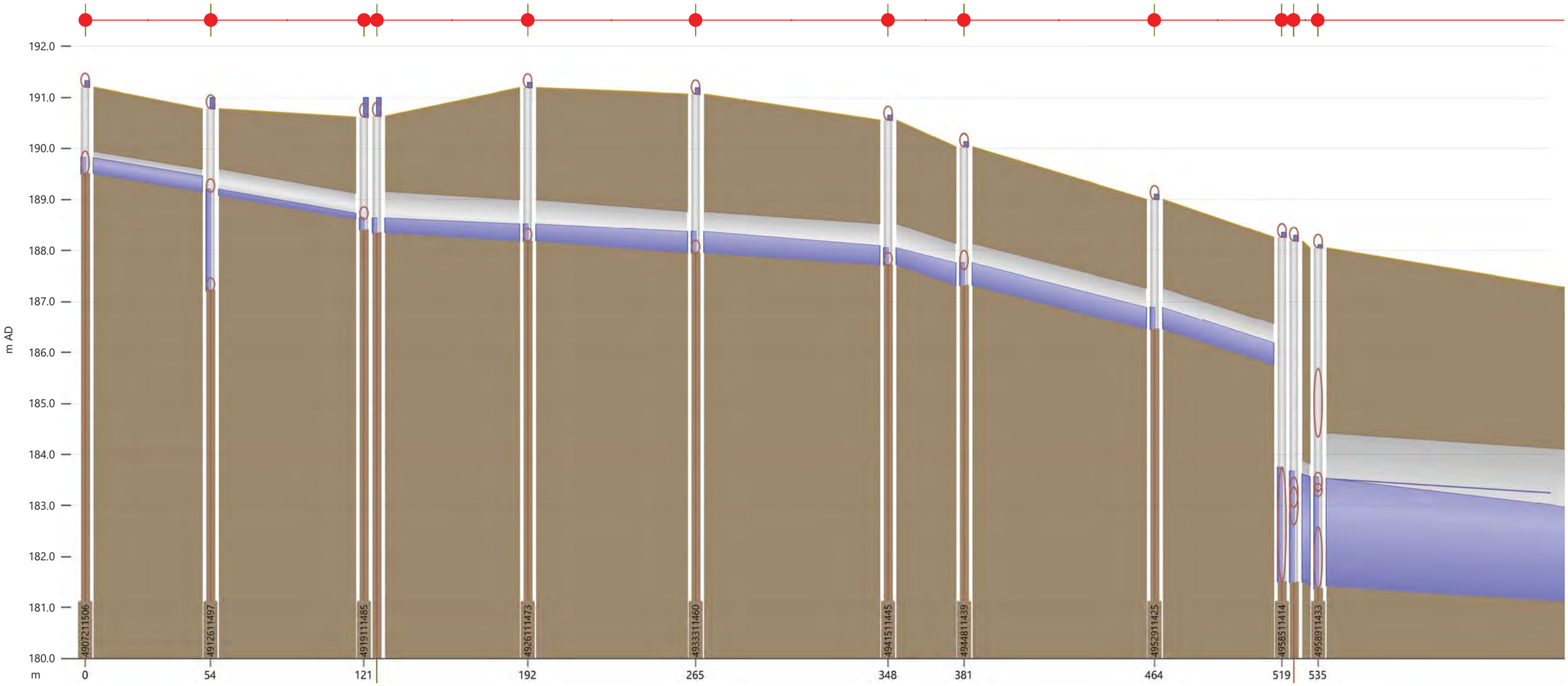
City of Toronto

UNDERGROUND STORAGE DESIGN SHEET
(100-Regional YR. RAINFALL INTENSITY)

5800 Yonge Street

Designed By: GV
Checked By: KS
Date: June 2019
File No.: 2016-4404

	MH		Inverts		Size (Nominal Diameter Ø)	Length	Slope	Actual Diameter	Obverts		Is Pipe lower than HWL		d/Dia value		a/Area		Cross Sectional Flow Area		Volume		Volume
			U/S	D/S					U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	Full/Partial both ends	Full/Partial one end	
	From	To	[masl]	[masl]	[mm]	[m]	[m/m]	[mm]	[masl]	[masl]	F/P/N	F/P/N	--	--	--	--	[m^2]	[m^2]			[m^3]
1	STM MH 4	STM MH 3	188.05	187.98	1500	23.3	0.30%	1524	189.574	189.504	P	P	0.72	0.77	0.77	0.82	1.406037587	1.487501773	33.70973354	0	33.709734
2	STM MH 5	STM MH 4	188.37	188.05	1500	105.9	0.30%	1524	189.894	189.574	P	P	0.51	0.72	0.51	0.77	0.935297674	1.406037587	123.9737021	0	123.9737
3	STM MH 6	STM MH 5	188.47	188.37	1500	31.5	0.32%	1524	189.994	189.894	P	P	0.45	0.51	0.42	0.51	0.773054079	0.935297674	26.90654012	0	26.90654
4	STM MH 7	STM MH 6	188.66	188.47	1500	62.7	0.30%	1524	190.184	189.994	P	P	0.32	0.45	0.28	0.42	0.503224183	0.773054079	40.01132353	0	40.011324



Link		4907211506.1	4912611497.1	-	4919711485.1	4926111473.1	4933311460.1	4941511445.1	4944811439.1	4952911425.1	-	-
length (m)		54.4	66.6	-	65.5	72.9	83.5	33.0	82.7	55.3	-	-
width (mm)		450	525	-	825	825	825	825	825	825	-	-
grad (m/m)		0.00644	0.00706	-	0.00250	0.00316	0.00287	0.01182	0.01052	0.01266	-	-
pfc (m3/s)		0.229	0.361	-	0.718	0.807	0.770	1.561	1.473	1.616	-	-
surc		0.70	0.23	-	0.41	0.51	0.51	0.53	0.53	0.53	-	-
US flow (m3/s)		0.18680	0.04178	-	0.18149	0.26285	0.40171	0.48435	0.77244	0.85345	-	-
DS flow (m3/s)		0.18680	0.04148	-	0.18206	0.26237	0.40041	0.48719	0.77073	0.85258	-	-

Node	-	4912611497	4919111485	4919711485	4926111473	4933311460	4941511445	4944811439	4952911425	-		4958911433
flood dep (m)	0.119	0.211	0.374	0.356	0.095	0.113	0.092	0.096	0.095	0.086		0.058

4685 - Area 28 Storm Sewer Model - 100 year Storm Event

Figure C-1: Yonge Street - West Boulevard Sewer

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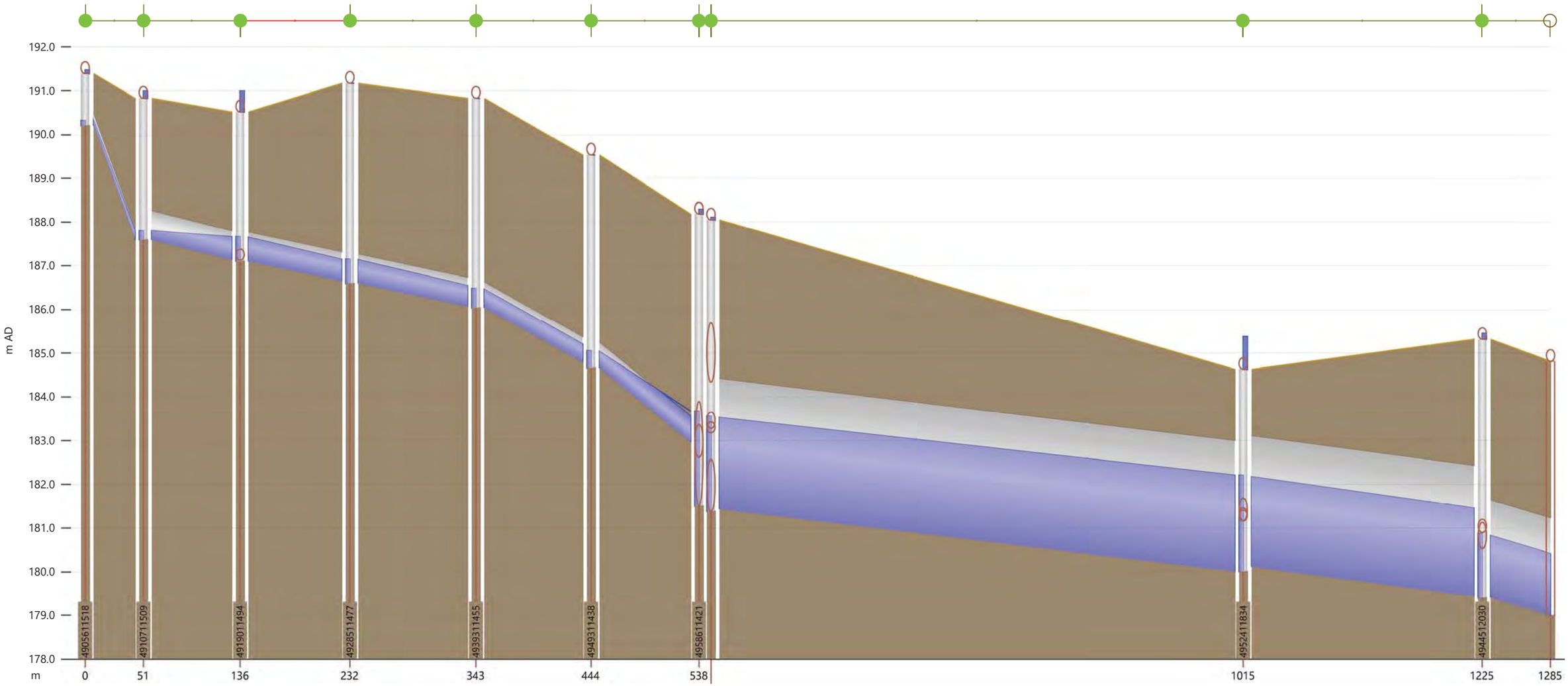

Link	-	4910711509.1	4919011494.1	4928511477.1	4939311455.1	4949311438.1	-	4958911433.1	4952411834.1	-
length (m)	51.1	84.8	96.3	110.5	101.0	94.6	-	466.7	209.6	59.8
width (mm)	300	675	675	675	600	600	-	3000	3000	3000
grad (m/m)	0.05131	0.00543	0.00467	0.00480	0.01248	0.01797	-	0.00304	0.00324	0.00685
pfc (m3/s)	0.219	0.619	0.575	0.582	0.686	0.823	-	24.763	25.567	32.021
surc	0.69	0.79	0.81	0.80	0.71	1.00	-	0.73	0.69	0.64
US flow (m3/s)	0.06194	0.10458	0.57400	0.57243	0.57166	0.57154	-	20.14422	21.03025	21.60137
DS flow (m3/s)	0.06186	0.10203	0.57248	0.57167	0.57155	0.57139	-	20.05557	21.02391	21.60106

Node	-	4910711509	4919011494	4928511477	4939311455	4949311438	-	4958911433	4952411834	4944512030	-
flood dep (m)	-	0.167	0.476	0.000	0.000	0.000	0.104	0.058	0.744	0.133	

4685 - Storm Sewer Downstream - 100 year Storm Event

Figure C-2: Yonge Street - East Boulevard Sewer

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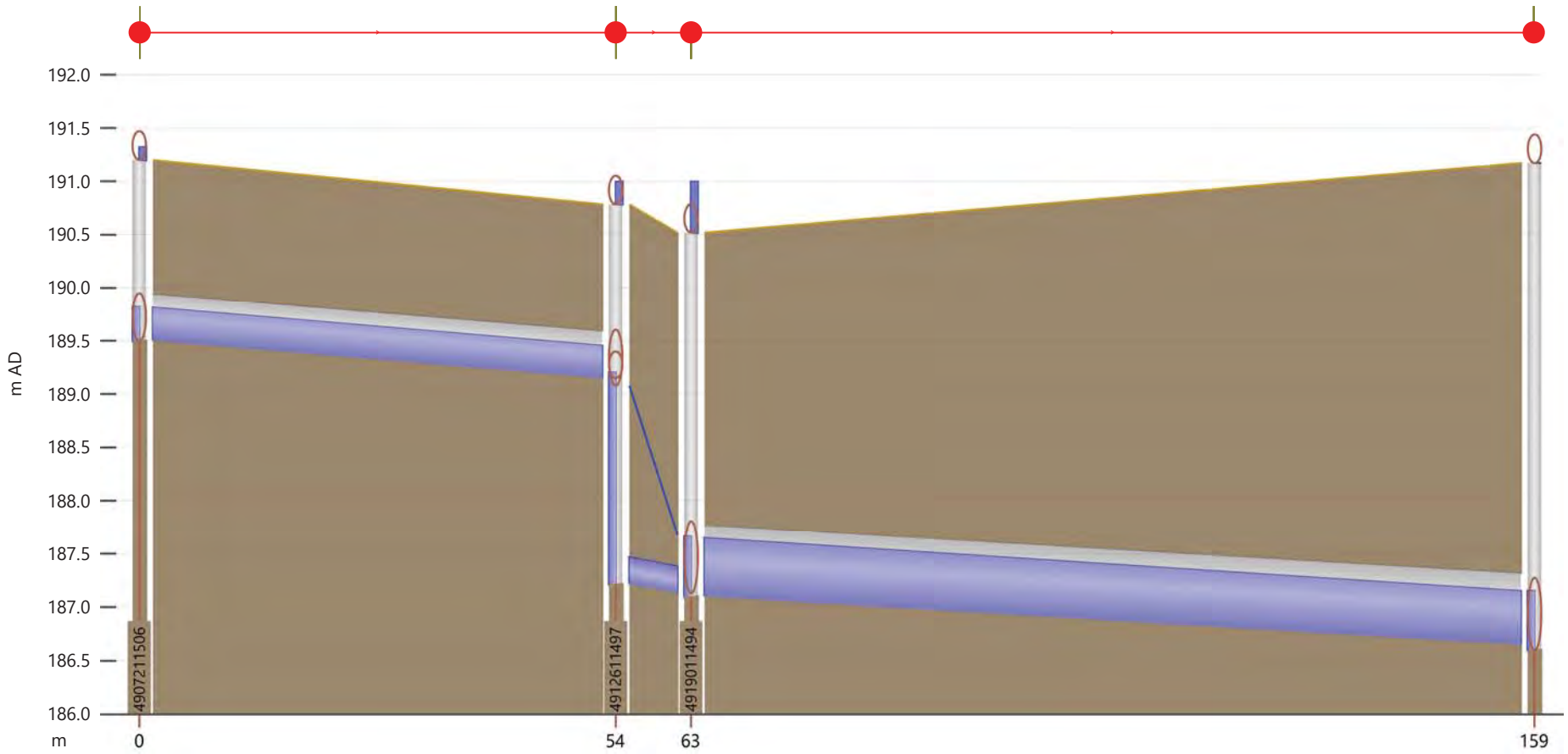

Link		4907211506.1		-		4919011494.1			
length (m)		54.4		8.6		96.3			
width (mm)		450		250		675			
grad (m/m)		0.00644		0.01000		0.00467			
pfc (m3/s)		0.229		0.059		0.575			
surc		0.70		2.00		0.81			
US flow (m3/s)		0.18680		0.24146		0.57400			
DS flow (m3/s)		0.18680		0.24146		0.57248			

Node	4907211506	4912611497	4919011494	4928511477
flood dep (m)	0.119	0.211	0.476	0.000

4685 - Area 28 Storm Sewer Model - 100 year Storm Event
Figure C-3: Yonge Street Cross Connection

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The City has since proceeded with remediation measures and has implemented several of them as indicated on the attached **Figure No. 01** "***Basement Flooding Improvement Progress (May 2012)***." In addition to this, basement flooding improvement works on Averil Crescent, Cummer Avenue, Deering Crescent and Silverview Drive, within the study area are also planned to be undertaken in the near future.

3.3 Existing Municipal Storm Sewer System

From information provided by the City of Toronto, the existing municipal storm sewer system within the Study Area has been illustrated on attached ***Drawing No. 9022-C03*** *and* ***C03B, Storm Network Plan***. The existing pipes range in size from 250mm diameter to 3000mm diameter and drain easterly to Newtonbrook Creek. The study area consists of 3 sub-catchment areas that drain via 3 outfalls into Newtonbrook Creek and a smaller sub-catchment at the south-west corner which drains westerly along Finch Avenue West to a 2700mm diameter storm trunk sewer located in Edithvale Park.

The dual storm drainage system consists of the storm sewer network (minor system) and the overland flow system typically consisting of municipal roadways with flows constrained by the curbs along both sides of the street (major system).

The minor storm sewer system was originally designed to handle a 2 to 5 year design storms. The pronounced gentle surface slopes and sagged street segments in the Study Area collect runoff from both sides of the street and convey runoff to depressed catchbasins. During large storm events, these low points on the road system either store the runoff or allow significant inflow into the minor system. Storm flows exceeding the capacity of the storm sewer system flow overland along the streets to a surface drainage outfall.

The existing municipal storm sewer system collects storm water drainage from the residential, institutional and commercial areas through respective service connections and surface drainage. The roadway drainage is collected through a series of catch basins positioned along the curb lines of the roadways. Most of the existing building foundation drains within the Study Area have been connected to the sanitary sewer system according to the North York Sewer Use By-law that was in place during the time that this area was originally constructed. Roof downspouts either discharge to the surface (as per the latest City By-law) or are connected to the storm sewers directly. Many houses in the Study Area have reverse-sloped driveways which slope from the street downward towards the house. Surface flows can accumulate at the bottom of the driveway and storm sewer surcharge can cause surface and basement flooding.

Refer to **Appendix A** for available spare flow capacities of existing storm sewers.

3.4 Existing Storm Sewer Flow Capacity and Constraints

According to the Investigation of Chronic Basement Flooding – Sewershed Area 28, the estimated hydraulic gradeline of existing storm sewers within the study area has been shown on ***Drawing No. 9022-C03-1, Existing Storm Sewer System – 5-Year Design Storm.***

The location, diameter and spare flow capacity of existing local storm sewers on Yonge Street and the trunk storm sewers on Newtonbrook Park trail within the study area are

summarized in **Table 2**, based on the sewer modeling data provided by the City of Toronto. For details refer to **Appendix A**.

Based on sewer modeling data provided by the City of Toronto all the existing storm sewers on Yonge Street have adequate spare flow capacity and will not pose any potential risk on basement flooding during 5-year design storm events.

Table 2 Spare Flow Capacity of Existing Storm Sewers

Location	Outlet	From	To	Size (mm)	Spare Flow Capacity (L/s)
Yonge Street	Silverview Outlet	16	2	525-1200	69 - 873
Yonge Street	Silverview Outlet	8	2	375-1350	138 – 2237
Yonge Street	Silverview Outlet	10B	2	300-675	170 – 241
Yonge Street	Silverview Outlet	20	3	375-825	76 – 782
Yonge Street	Silverview Outlet	3	2	2400	3965
Dover Ct & Newtonbrook Park Trail	Silverview Outlet	2	1	3000	12184

In summary, proposed future development within the study should not pose any new additional burden on the existing storm sewers as the storm drainage release rate from a new development in the City of Toronto must conform to the current City of Toronto ***Wet Weather Flow Management (WWFM) Guidelines***. The new more stringent allowable release rate from the WWFM guidelines will, in most cases, reduce the minor storm drainage flows that are currently being directed to the municipal storm sewer system.

3.5 Land Use Options Evaluation

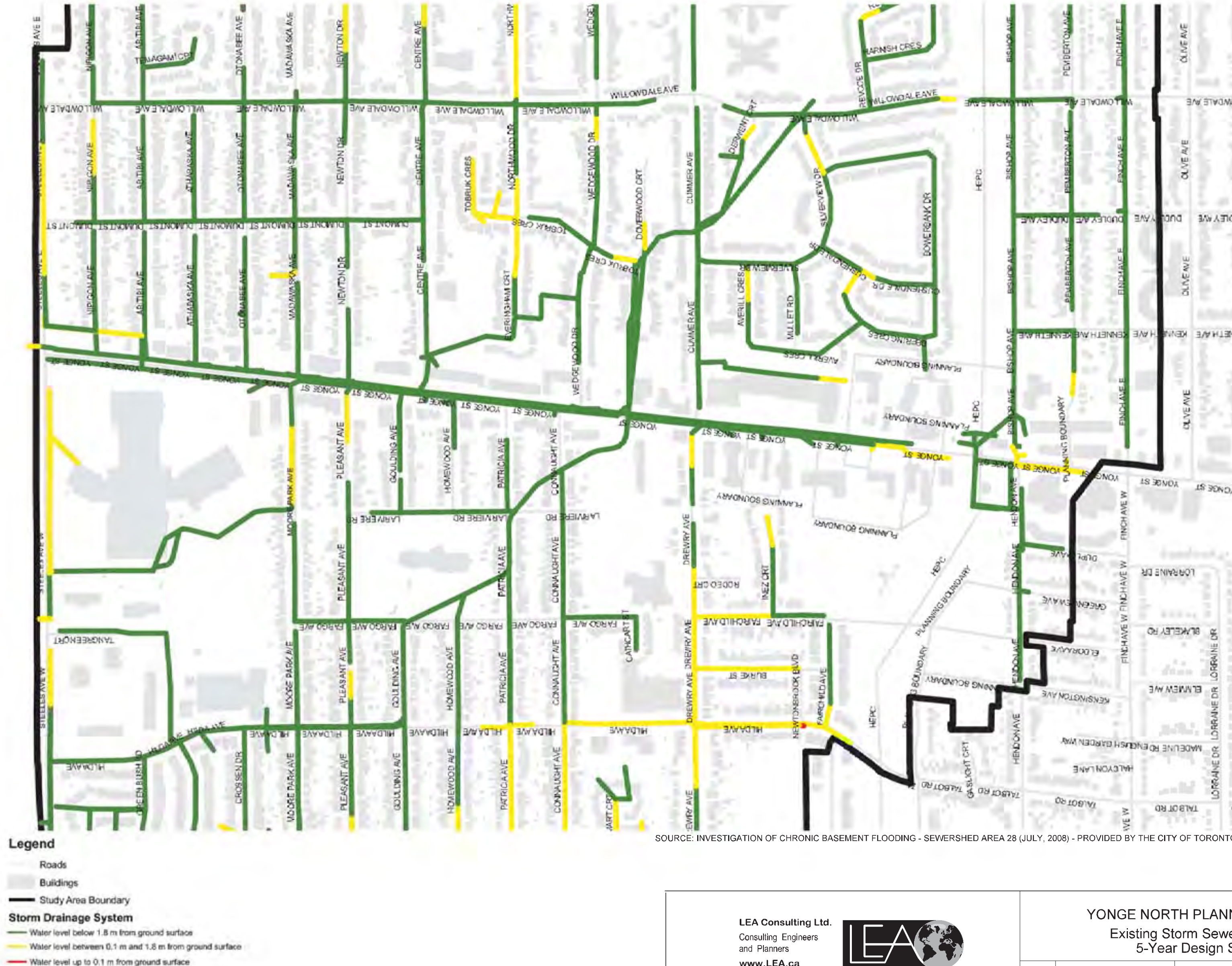
Different future land use options have been proposed as shown on **Fig. 3** to **Fig. 6**. Each option shall have different impact on municipal servicing. Evaluation of different land use options has been undertaken to assess the impact on municipal servicing based on a set of evaluation criteria. **Appendix G** includes the impact on servicing, evaluation criteria and other details of evaluation.

The qualitative impact assessment indicates land use option impacts to municipal services, from a high impact to a low impact.

- Option 1 - Centre Extended: High impact
- Option 3 - Nodes and Wider Mid-Rise Avenue: Intermediate impact
- Option 2 – Nodes and Mid-Rise Avenue: Low impact

The Do Nothing (Option-0) alternative will not have any impact on Municipal Services and therefore has not been included evaluation matrix.

Option-2 has the least impact on the municipal servicing infrastructure, and therefore would be considered the preferred land use option **from the perspective of municipal servicing**. However, through overall evaluations from different perspectives, a preferred



SOURCE: INVESTIGATION OF CHRONIC BASEMENT FLOODING - SEWERSHED AREA 28 (JULY, 2008) - PROVIDED BY THE CITY OF TORONTO

LEA Consulting Ltd.
Consulting Engineers
and Planners
www.LEA.ca

YONGE NORTH PLANNING STUDY
Existing Storm Sewer System
5-Year Design Storm

SCALE:	N. T. S.	DRAWING NUMBER	9022-C03-1
DATE:	APRIL 4, 2012		

Water Quality Control- Bioretention Planters

Calculations for Interim Site within Draft Plan Area

PROJECT NO.: 2018-4685
LOCATION: 5800 Yonge Street
DATE: 19-Jun-19
Area: 0.63
IMP: 83%

ROW Total - 5mm Requirement:
26.15 m^3

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Table: Water Quality Storage Requirements Based on Receiving Waters

Protection		Storage Volume (m^3/ha) for Impervious Level				
Level		0%	35%	55%	70%	85%
Level 3 -60% TSS Removal			20	20	20	20

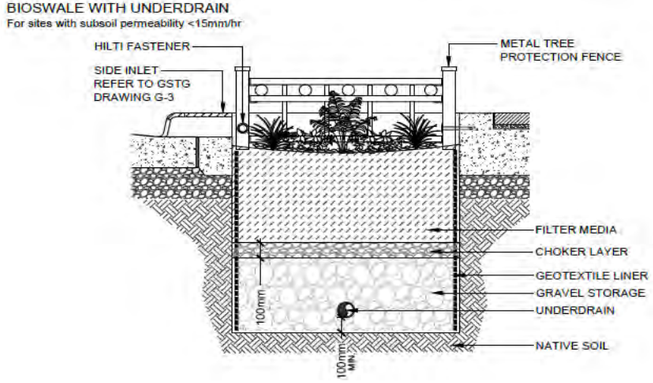
	Area (ha)[1]	Required Storage Volume (m3)		Bioretention Planter Design											Quality Target	5mm Retention Target		
		60% TSS	5mm Water Balance	Native Soil Infiltration Rate[3] (mm/hr)	Safety Factor	Design Infiltration Rate (mm/hr)	Void Space of Filter Media Layer	Void Space Ratio of Gravel Layer	Depth of Filter Media Layer	Depth of Gravel Layer Below Underdrain (m)	Actual Length of Bioretention Cell	Actual Width of the Bioretention Cell	Provided Surface Area (m2)	Filter Drawdown time (hrs)	Infiltration Drawdown time (hrs)	Total Filter Storage Provided (m3)	Total Infiltration Storage Provided below Subdrain (m3)	Tree Pit Ponding Volume $(m3)^2$	Total (m3)
Beecroft	0.08	1.6	3.32	25.00	2.50	10.00	0.20	0.40	1.00	0.00	-	-	**8.00**	20.00	0.00	**1.60**	**0.00**	**0.80**	**0.80**
Beecroft	0.14	2.8	5.81	25.00	2.50	10.00	0.20	0.40	1.00	0.00	-	-	**14.00**	20.00	0.00	**2.80**	**0.00**	**1.40**	**1.40**
Beecroft	0.04	0.8	1.66	25.00	2.50	10.00	0.20	0.40	1.00	0.50	-	-	**45.00**	20.00	20.00	**9.00**	**9.00**	**4.50**	**13.50**
East West Road	0.10	2.0	4.15	25.00	2.50	10.00	0.20	0.40	1.00	0.50	-	-	**45.00**	20.00	20.00	**9.00**	**9.00**	**0.00**	**9.00**
East West Road	0.11	2.2	4.57	25.00	2.50	10.00	0.20	0.40	1.00	0.50	-	-	**45.00**	20.00	20.00	**9.00**	**9.00**	**0.00**	**9.00**
East West Road	0.10	2.0	4.15	25.00	2.50	10.00	0.20	0.40	1.00	0.00	-	-	**10.00**	20.00	0.00	**2.00**	**0.00**	**1.00**	**1.00**
Total	**0.570**	**11.4**	**23.66**													**33.40**	27.00	7.70	**34.70**

1. Assumes area for entire road segment (both boulevards).
2. 10cm of ponding is provided across tree pit areas, which will be evapotranspired through vegetation or evaporation.
3. Soil infiltration rate estimated as minimum 25mm/hr based on geometric mean of in-situ measurements as per DS Consultants Ltd.'s Hydrogeological Investigation (dated March 2019).
4. Gravel Layer only provided for tree pits constructed in areas with minimum 1m separation from ground water table.

A.2 FILTER MEDIA

- Pre-mixed from an approved vendor;
- Filter media composition (by weight):
  - Sand - 75 to 85%
  - Fines - 2 to 5%
  - Organic Matter - 8 to 10%
  - P-Index value 12 to 30 ppm
  - Soluble Salts <2.0mmhos/cm
  - Cationic exchange capacity >5 meq/100 g
  - pH - 5.5 to 7.5
  - Infiltration rate > 120 mm/hr, max. 300mm/hr
- Materials testing by an independent testing lab is required to confirm filter media composition. Sample to be collected at supply site by a Geotechnical engineer using standard protocols. If issues arise with the performance of an installation, then samples should be collected from the constructed facility for further testing;
- Depth varies - Minimum recommended depth 1.0 - 1.25m for enhanced pollutant removal;
- Bioretention with trees - minimum depth 1.0m. Total **volume 30m³/tree or 20m³/tree for trees sharing soil.**
- Capacity - Volumetric computation should be based on surface area and depth.
- Refer to TS 5.10 - Construction Specification for Growing Media

BIOSWALE WITH UNDERDRAIN
For sites with subsoil permeability <15mm/hr



Source: City of Toronto Green Streets Technical Guidelines - WQ-7.1d, (2017)

A.3 GRAVEL STORAGE

- Depth - Min. 300 mm;
- Material - 50 mm dia. washed clear stone;
- Capacity - Volumetric computation based on depth;
- Choker Layer: 100 mm pea gravel layer between filter media and gravel storage layers.

Brief Stormceptor Sizing Report - 5800 Yonge Street ROW

Project Information & Location			
Project Name	5800 Yonge Street	**Project Number**	4685
City	Toronto	**State/ Province**	Ontario
Country	Canada	**Date**	4/10/2019
Designer Information		**EOR Information (optional)**	
Name	Giancarlo Volpe	**Name**	
Company	Schaeffers Consulting Engineers	**Company**	
Phone #	905-738-6875	**Phone #**	
Email	gvolpe@schaeffers.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	5800 Yonge Street ROW
Target TSS Removal (%)	80
TSS Removal (%) Provided	81
Recommended Stormceptor Model	STC 2000

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 300	65
STC 750	75
STC 1000	77
STC 1500	77
STC 2000	81
STC 3000	82
STC 4000	86
STC 5000	86
STC 6000	88
STC 9000	91
STC 10000	91
STC 14000	94
StormceptorMAX	Custom

Stormceptor®

FORTERRA

Sizing Details

Drainage Area	
Total Area (ha)	0.71
Imperviousness %	83.0

Rainfall	
Station Name	TORONTO CENTRAL
State/Province	Ontario
Station ID #	0100
Years of Records	18
Latitude	43°37'N
Longitude	79°23'W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

City of Toronto PSD

Particle Diameter (microns)	Distribution %	Specific Gravity
10.0	20.0	2.65
30.0	10.0	2.65
50.0	10.0	2.65
95.0	20.0	2.65
265.0	20.0	2.65
1000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

CANADIAN ENVIRONMENTAL TECHNOLOGY VERIFICATION

Enhancing the Credibility of Environmental Technologies

TECHNOLOGY VERIFIED:
CB Shield™ Stormwater Quality Device

Performance Claim(s)

Claim 1: Capture test

During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent test sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

Claim 2: Scour test

For a catch basin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catch basin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

VERIFIED* PERFORMANCE:
OCTOBER 2016

John D. Wiebe, PhD
Executive Chairman

GLOBE PERFORMANCE SOLUTIONS

License Number: ETV 2016-06

Issued to: CB Shield Inc.

Expiration Date: OCTOBER 31, 2019

Canada

* This verification conforms to the Canadian ETV Program's General Verification Protocol and the ISO/FDIS 14034:2015(E). Please refer to Technology Fact Sheet for additional information on the verification of this performance claim.

CANADIAN ETV VERIFIED

CB Shield™ Stormwater Quality Device

Technology Fact Sheet for CB Shield Inc.

Technology description and application

The CB Shield technology provides an environmental benefit of controlling sediment wash off at upstream locations. A standard catch basin has a 1.2 m waterfall inflow that churns up sediment in the sump below causing a very poor rate of sediment retention. The CB Shield is a flow deflection device that is inserted into a standard catch basin. It contains a sloped plate to direct runoff to the back wall of the catch basin, thereby dissipating the energy of stormwater inflows. The dissipation of inflow energy allows time for settling of sediment in stormwater runoff, increasing capture and reducing scour/ re-suspension of previously deposited sediment. Installation involves lowering the unit into a standard sized catch basin, and adjusting the height of the unit to the height of the permanent pool in the sump. The unit is manufactured with durable fiberglass requiring little maintenance and is estimated to be operated on the same cleanout schedule set for the catch basin. Due to high rates of scour in a standard catch basin, they are seldom filled beyond 40% of sump capacity. Clean out routines and expenses are optimized when the CB Shield captures and retains more sediment within the sump.

In an urban setting, there are typically approximately 5 catch basins installed per hectare. Assuming an equal distribution of overland flow, the tested flow rates for the scour and capture tests are meaningful in the context of 78 L/s per hectare and 42 L/s per hectare, respectively. The CB Shield's scour prevention performance has been evaluated in a laboratory setting relative to a standard unshielded catch basin for flows of 1.2 to15.6 L/s. The device's sediment capture performance was evaluated for flows of 0.24 to 8.4 L/s. Hydraulically, the CB Shield has been tested to pass flows up to 60 L/s without any negative impacts (i.e., surcharging).

Performance conditions

Claim 1: Capture test

The capture test is carried out in a laboratory with a constructed simulated street scape (1 % slope along its 2.4 m (96 inch) length, 2 % slope along its 1.2 m (48 inch) width). The catch basin was clean of any litter or debris. Capture performance was tested by comparing the mass of retained sediment with the influent sediment mass for each of six inflow rates: 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s. The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the *Procedure for Laboratory Testing of Oil Grit Separators (TRCA, 2014)*. Sediment was injected onto the street scape at a point just upstream of the catch basin to allow mixing prior to discharge while avoiding excessive buildup of sediment on the street scape. The sediment feed rate was adjusted for each flow rate to keep the influent concentrations consistent at 200 mg/L. The tests were conducted with a false floor set at 300 mm below the outlet invert simulating a catch basin that is filled to 50% of the manufacturer's recommended maximum sediment storage.

Claim 2: Scour test

The scour test was carried out in a laboratory on catch basins with and without the CB Shield insert with a constructed simulated street scape (1 % slope along its 2.4 m (96 inch) length, 2 % slope along its 1.2 m (48 inch) width) and the catch basins clean of any litter or debris. A false floor was set in the catch basins at 254 mm below the outlet invert and preloaded with the test sediment (1- 1000 micron silica blend) test up to 150 mm below the outlet invert simulating a catch basin that is ¾ full of sediment. Water was filled to the effluent pipe and sediments were allowed to settle for 12-24 hours. Flows of 1.2, 4.8, 8.4, 12, and 15.6 L/s were tested on a continuous run with flow rates maintained at 5 minutes and a one minute transition time between flow rates. A minimum effluent grab sample of 500 mL was collected in 1000 mL jars by holding it under the entire effluent stream. A sample was taken at 30 seconds during the flow transitions to account for scour during the transition. Background samples were also taken at least once every flow rate and effluent concentrations were corrected accordingly. Effluent flow was filtered using a 10µm filter and was recycled during the continuous 30 min test.

Performance claim(s)

Claim 1: Capture test

During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent test sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

Claim 2: Scour test

For a catch basin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catch basin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Performance results

The test sediment used to evaluate the CB Shield technology was the same as that required by CETV for the evaluation of Oil Grit Separators. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 1 indicates that the test sediment was finer than the specified PSD, with a median particle size of approximately 50 microns.

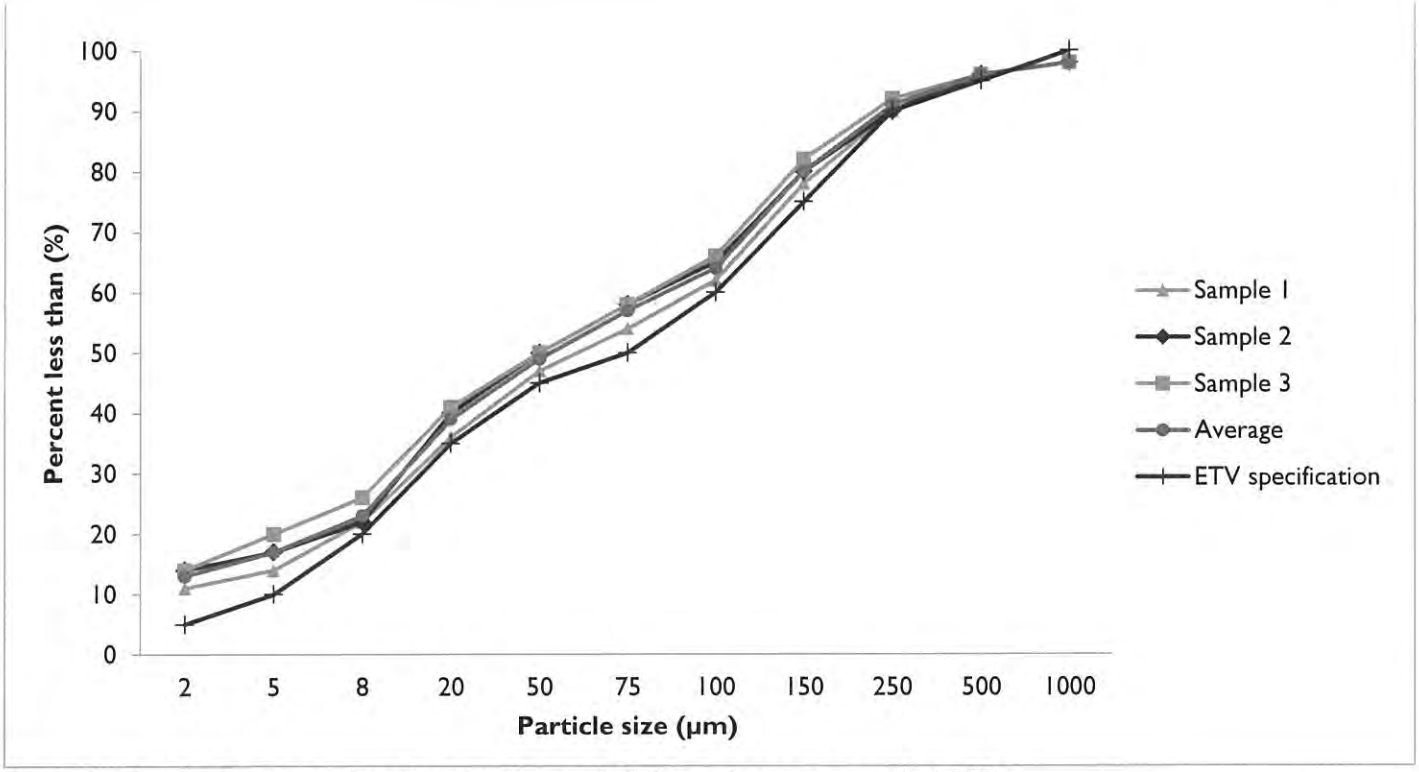


Figure 1. Test sediment particle size distribution (PSD) in relation to specified PSD.

The capacity of the device to retain sediment was determined at six surface loading rates using the modified mass balance method (see TRCA, 2014). During each of the tested flow rates, a known quantity of sediment was injected at a constant rate onto a simulated street scape just upstream of the catch basin containing the CB Shield technology. Based on these results, removal efficiencies were determined for each of the tested surface loading rates (Table 1).

Table 1. Removal efficiencies (%) based on modified mass balance results at specified surface loading rates.

Flow rate	**(L/s)**	0.24	0.48	1.20	2.40	6.00	8.40
Surface loading rate	**(L/min/m²)**	40	80	200	400	1000	1400
Total mass added	**(kg)**	1.217	2.302	5.072	5.150	4.921	4.812
Total mass captured	**(kg)**	0.778	1.378	2.659	2.196	1.238	1.287
Removal efficiency	**(%)**	64.0	59.9	52.4	42.6	25.2	26.7

Table 2 shows the results of the sediment scour and re-suspension test. This test involved preloading fresh test sediment into the sedimentation area of two catch basins with and without the CB Shield technology, as described in Performance Conditions section above. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC). The mean sediment scour load of the catch basin with the CB shield insert was shown to be only 5% that of the control catch basin.

Table 2. Scour test effluent sediment concentration and loads.

Run	Flow rates (L/sec)	Surface loading rate (L/min/m²)	CB Shield			Control		
			Run time (min)	Effluent suspended sediment concentration (mg/L)	Sediment load (g)	Run time (min)	Effluent suspended sediment concentration (mg/L)	Sediment load (g)
			1:00	17.7	1.3	1:00	129.2	9.7
			2:00	6.5	0.47	2:00	185.3	13.9
			3:00	2.7	0.19	3:00	206.0	15.5
			4:00	3.1	0.22	4:00	176.0	13.2
			5:00	4.6	0.33	5:00	523.6	39.4
			6:00	0.6	0.04	6:00	495.7	41.8
1	1.2	200	**Sum**		**2.6**	**Sum**		**133.5**
			7:00	8.2	2.4	7:00	7164.0	2069.0
			8:00	4	1.2	8:00	8094.0	2338.0
			9:00	0.6	0.2	9:00	6762.0	1950.0
			10:00	0.6	0.2	10:00	4842.0	1393.0
			11:00	1.7	0.5	11:00	5266.0	1517.0
			12:00	0.6	0.2	12:00	4768.0	1457.0
2	4.8	800	**Sum**		**4.7**	**Sum**		**10724.0**
			13:00	5.4	2.7	13:00	5429.0	2725.0
			14:00	10.0	5.0	14:00	6648.0	3332.0
			15:00	9.5	4.8	15:00	5025.0	2528.0
			16:00	10.0	5.0	16:00	5859.0	2939.0
			17:00	8.4	4.2	17:00	5019.0	2515.0
			18:00	8.2	4.1	18:00	3249.0	1628.0
3	8.4	1400	**Sum**		**25.8**	**Sum**		**15667.0**
			19:00	38.4	27.6	25:30	1886.0	1347.0
			20:00	79.4	57.2	26:30	1432.0	1027.0
			21:00	113.0	81.3	27:30	1167.0	844.0
			22:00	103.0	74.2	28:30	1508.0	1089.0
			23:00	114.0	82.1	29:30	1100.0	795.0
			24:00	92.3	66.5	30:30	708.0	512.0
4	12	2000	**Sum**		**388.9**	**Sum**		**5614.0**
			25:00	117.4	166.0	52:30	386.9	364.8
			26:00	211.6	198.1	53:30	252.7	237.8
			27:00	220.3	206.2	54:30	372.5	349.6
			28:00	187.8	175.8	55:30	332.4	311.7
			29:00	224.4	210.0	56:30	279.8	262.6
			30:00	199.2	186.5	57:30	310.2	290.9
5	15.6	2600	**Sum**		**1142.6**	**Sum**		**1817.4**
Total load					**1564.6**			**33956.0**

Potential sources of error

1. Background concentrations during the scour test were measured to be generally under 5 mg/L for both CB Shield and Control treatments. However, background concentrations for the Control treatment at flow rates of 12.0 L/s and 15.6 L/s were substantially higher than the expected threshold of 20 mg/L as a result of inefficient recycling of water in the laboratory. Effluent samples were corrected based on the measured background concentrations since it was assumed that background sediments consisted of fine particles that were not captured in the device and flowed through as effluent concentration. If instead, some of the background sediments settled, the correction for all background sediments would bias against the relative performance of the CB Shield and therefore result in a more conservative evaluation of the CB Shield technology performance.

2. The reduction in scour at higher flow rates for the Control treatment suggested that the amount of preloaded sediment (10.2 cm depth) may have been insufficient to provide a continuous supply of fine particles for scour throughout the test. A similar decrease in scour at high flow rates was not observed for the CB Shield treatment. This interpretation of the data implies that preloading both catch basins with additional sediment would likely have shown increased relative scour for the Control treatment, particularly at high flow rates. Although further testing would be required to verify this interpretation, it is reasonable to suggest that the test as conducted may have produced a smaller relative difference, resulting in a more conservative claim for the CB Shield technology.

Verification

The verification was completed by Toronto and Region Conservation Authority, using the Canadian ETV Program's General Verification Protocol (March, 2000) and taking into account ISO/FDIS 14034:2015(E). Data and information provided by CB Shield Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories of Mississauga, Ontario, dated 24 August 2016; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is Canadian ETV?

Canadian Environmental Technology Verification (ETV) is delivered by GLOBE Performance Solutions under a license agreement from Environment Canada. Canadian ETV is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

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APPENDIX D- SANITARY ANALYSIS REPORT

SANITARY CAPACITY ANALYSIS REPROT

5800 YONGE STREET

CITY OF TORONTO
Project: 2018-4685 **JULY 2019**

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.	First Submission	P.R.	July, 2019	K.S.	July, 2019

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive
Concord, Ontario L4K 4R3

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Appendices

1.0 INTRODUCTION

Schaeffer and Associates Ltd. has been retained by Times 5800 Inc. to prepare site plans for the property located at 5800 Yonge Street in the City of Toronto. In support of the site plan, an FSR will be prepared by Schaeffer and Associates Ltd.. The analysis presented in this report is in support of the FSR to assess the downstream sanitary sewer system capacity.

The main purpose of this analysis is to assess proposed service connection locations to determine the most feasible location, and if required, propose any upgrades to reduce flooding risk associated with the sanitary sewer.

The subject site is approximately 3.28 ha. The site is bounded by commercial and residential lots to the north, a vacant lot and an industrial lot to the south, Fairchild Avenue to the west, and Yonge Street to the east as illustrated in **Figure 1-1**. The proposed development consists of mixed-use high-rise buildings with underground parking. The subject site will consist of 3 podiums, 4 towers, and 3 levels of underground parking. Part of the property to the west will be designated as a park.

The subject site is located in the basement flooding area number 28. This report addresses the Sanitary Capacity Analysis for the sanitary sewer network downstream of proposed development under Dry Weather Flow (DWF) and Wet Weather Flow (WWF) conditions. The analysis is completed using InfoWorks for dynamic modeling of the sewer network considering both WWF and DWF. The WWF conditions considered for this report are based on the May 12, 2000 storm event as gauged by Oriole Yard.

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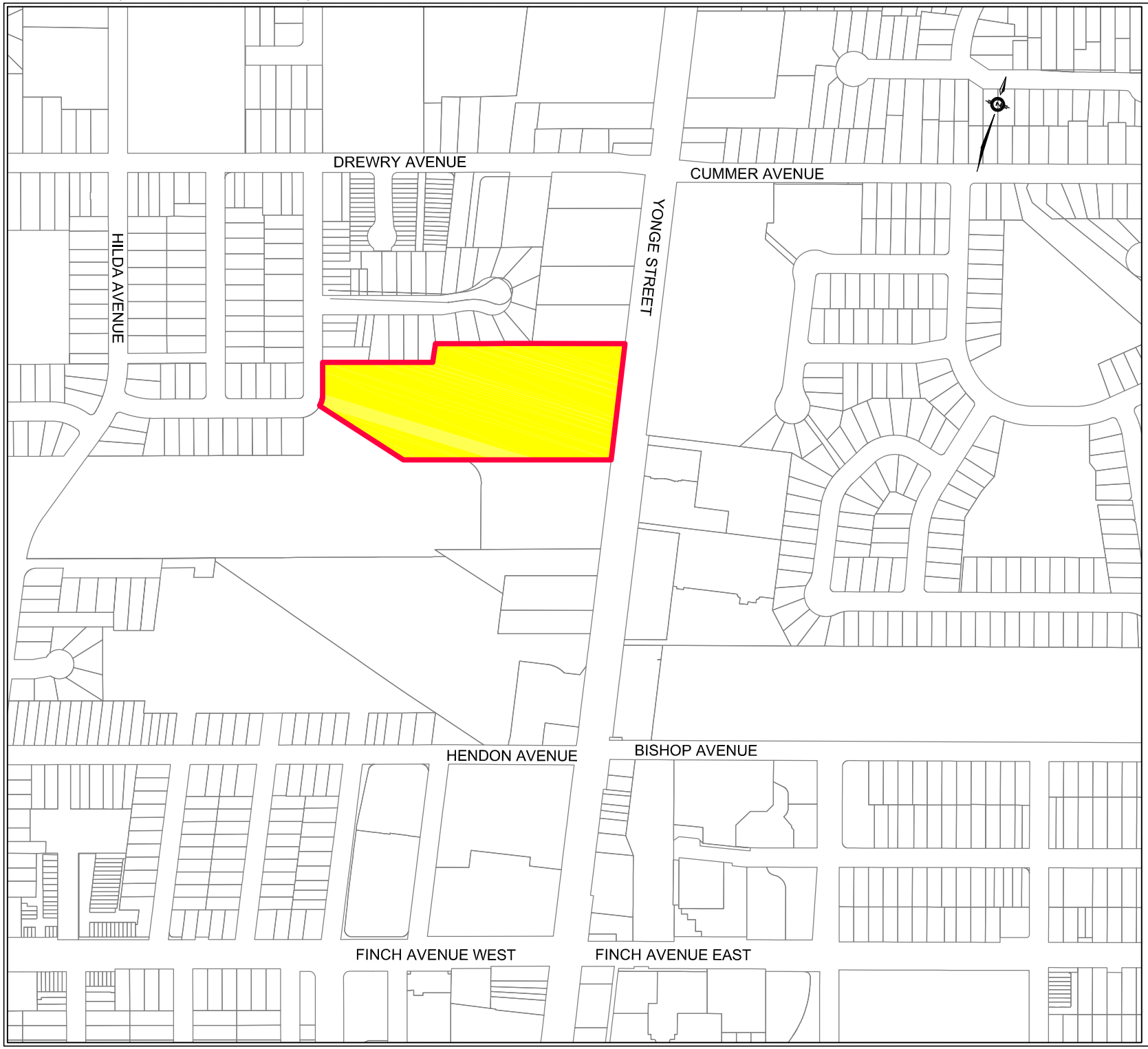
Pavel Recnik



5800 YONGE STREET
MIX-USE HIGH-RISE DEVELOPMENT

LEGEND

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
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FIGURE 1-1
LOCATION PLAN

2018-4685	APRIL 2019	SCALE: N.T.S.

2.0 SANITARY CAPACITY ANALYSIS

2.1 Sanitary Servicing Design Criteria

As per the City of Toronto's Design Criteria for Sewers and Watermains (2009) the following is a summary of the guidelines that were used in this analysis:

Table 2-1 – City of Toronto Design Parameters

Single family dwelling	3.5	pp/unit
Semi-detached	2.7	pp/unit
Townhouses	2.7	pp/unit
Duplex	2.3	pp/unit
Triplex	3.7	pp/unit
Apartments or condominium		
Bachelor	1.4	pp/unit
1 bedroom	1.4	pp/unit
2 bedroom	2.1	pp/unit
3 bedroom	3.1	pp/unit
Apartments <148 units/ha	400	persons/ha
Apartments >148 units/ha	2.7	persons/suite
Commercial or retail	1.1	persons/100 m^2
Offices	3.3	persons/100 m^2
Schools, churches lot area unknown	0.0258	persons/m^2
Schools, churches lot area known	86	persons/ha
Maximum velocity	3.0	m/s
Minimum velocity	0.6	m/s
Existing Residential Generation Rate	240	litres/capita/day
Industrial/commercial/institutional Generation Rate	250	litres/capita/day
New Residential Generation Rate	450	litre/capita/day
Infiltration Allowance	0.26	litre/second/ha

In addition to the above design parameters, the minimum Hydraulic Grade Line (HGL) freeboard of 1.8 m from ground elevation shall be considered under a storm event equivalent to the May 12, 2000 storm as gauged by the city's Oriole Yard to reduce the risk of basement flooding associated with the sanitary sewer.

2.2 Existing Condition

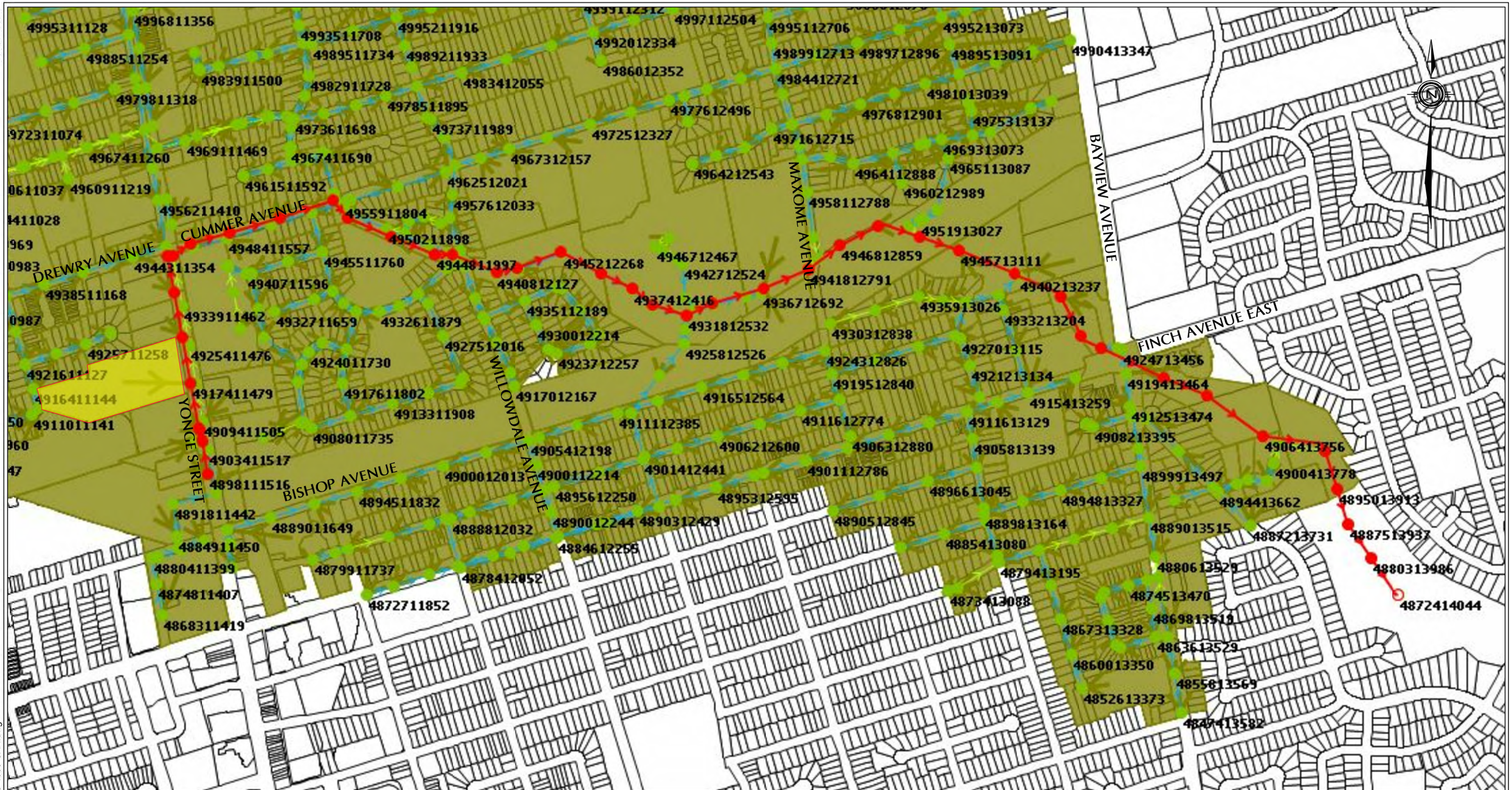
2.2.1 Existing Sanitary Network

The existing sanitary sewer network was characterized from plan and profiles as well as an InfoWorks model provided by the city. The sanitary servicing for the existing site is provided by an existing 250 mm diameter sewer on Yonge Street that drains to the north. There is also a 675 mm along Yonge street that drains to the north, however, this sewer exists further from the subject site than the 250mm sewer within the Yonge Street Right-of-Way (ROW). The sanitary sewers that flow north along Yonge street join into a 675 sewer that flows east along Cummer Avenue, joining with additional flow from the north and west. The flow enters a sub-trunk sanitary sewer at an easement after the intersection of Cummer Avenue and Silverview Drive. The sub-trunk sanitary sewer passes through easements along a tributary of the Don River. The layout of this branch of the sanitary sewer network is illustrated in **Figure 2-1**.

2.2.2 Existing Buildings

The site has an existing two storey office building with associated parking lots. The existing building has a floor area of approximately 8200 m^2. Utilizing the City of Toronto Design Criteria for office buildings, (3.3 persons/ 100 m^2), the existing population equivalent is approximately 271 persons. The sanitary servicing of the existing building, as characterized from the InfoWorks model, is provided by the 250 mm sanitary sewer along Yonge Street.

Pavel Recnik



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LEGEND

- FOUL SEWER PIPE
- SANITARY SEWER PIPE
- SANITARY SEWER NODE/MANHOLE
- DOWNSTREAM NETWORK SANITARY SEWER PIPE
- DOWNSTREAM NETWORK SANITARY SEWER NODE/MANHOLE
- SUBJECT SITE

FIGURE 2-1
SANITARY ROUTING TO
TRUNK SEWER

2018-4685	JUNE 2019	SCALE: N.T.S.

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2.3 Proposed Development

The proposed development spans a single property. The proposed development has been characterized from the architectural plans by "Wallman Architects" and the associated calculations have been provided in **Appendix A**. It is proposed to construct mixed-use high-rise buildings in two phases with an ultimate total of 1,558 residential units, 1,956 m^2 of retail space, 3,739 m^2 of office space, and 741 m^2 of daycare space. The residential unit breakdown has 865 single bedroom units, 536 two-bedroom units, and 157 three-bedroom units. The population estimate is outlined in Table 2.2. Please see **Appendix B** for the full calculation details based on the unit mix, phasing, and assumptions.

Table 2-2 – Population Estimate

Unit Type	Unit Count/Area	People per unit/ people per 100m²	Population Estimate
One-bedroom	865 units	1.4 pp/ unit	1211
Two-bedroom	536 units	2.1 pp/unit	1127
Three-bedroom	157 units	3.1 pp/unit	487
Retail	1,956 m²	1.1 pp/100m^2	22
Office	3,739 m²	3.3 pp/100m^2	124
Daycare (school)	741 m²	2.58 pp/100m^2	20
Total			2991

2.4 Proposed Servicing

The subject site is proposed to be serviced by the sanitary sewer under the eastern side of Yonge Street (far sewer). If required by the city, the subject site could be serviced by the western sewer along Yonge Street (near sewer). Refer to the Functional Servicing Report for the subject development for a description of the proposed servicing scheme and service connection analysis. It is proposed to discharge permanent dewatering flows to the sanitary sewer. The hydrogeological report for the area indicates a permanent dewater rate of 5,000 L/day (0.058 L/s). The actual pumping rate for the sump has not been determined at the time of this analysis.

2.5 Method of Analysis

The city has provided the InfoWorks model of the sanitary network for this analysis. This model was provided to the city as part of the EA study for basement flooding area No. 28. The model was created by another consultant.

The model was updated to reflect current conditions within the vicinity of the subject site as of June 20, 2019. **Table 2-3** outlines the updates to the model. These updates were used to establish

the pre-development model conditions. Detailed calculations for the presented changes are included in **Appendix A**.

Table 2-3 Updated Subcatchments for Pre-development Conditions

Subcatchment Name	Development Address	Previous Population	Updated Population
4941011250-2	43 Drewry Ave	159	281
4927211462	5840-5870 Yonge Street	0	833
4898111516	5740 Yonge Street	0	646
4894211533	5775 Yonge Street	414	837
4917411479	5800 Yonge Street	0	271
4909411505	5791-5793 Yonge Street	313	1361
4868311419	5650-5700 Yonge Street	46	3664
5799 Yonge*	5915-5799 Yonge Street	0	1591

* New Dummy subcatchment, directed to node 4947211479 in the model

The received model only contained a WWF scenario, as such a DWF scenario was created for the purpose of this analysis. Baseflow was added considering the infiltration allowance of 0.26 L/s/ha for all catchments. In this analysis for conservative purposes, long-term dewatering has been considered for the subject site to discharge into the sanitary sewer. This has been modeled by increasing the baseflow of the subject site by 2 L/s to conservatively account for the maximum pumping rate in lieu of detailed pump information. The actual pumping rate for long term discharge should be determined at a later stage by a mechanical engineer. It should be noted that if treatment is provided, this flow can be directed to the storm sewer; however, for the reasoning provided above, this flow has been conservatively considered as discharging to the sanitary sewer for this analysis.

The subject site is represented in the model with its own subcatchment. The estimated population for the site in post-development conditions replaced the population estimate for the sub-catchment in pre-development conditions in the model to preserve existing sanitary generation trends while simulating an increased population. The existing sanitary generation trend is presented in **Figure 2-2**.

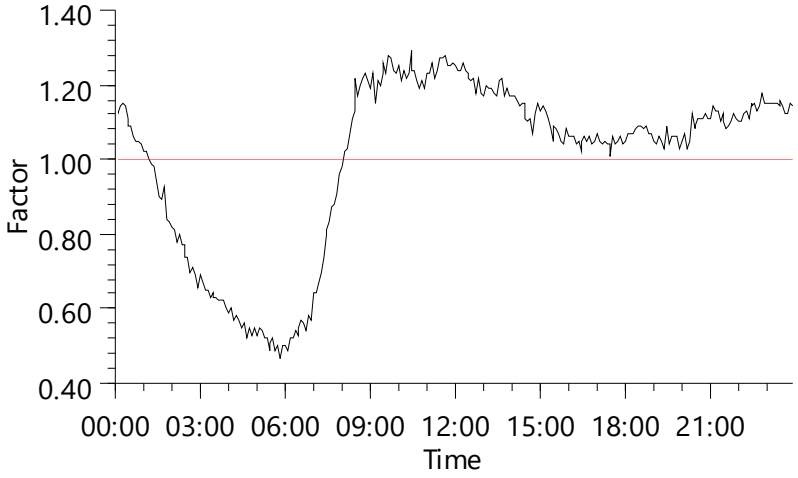


Figure 2-2 - Sanitary Generation Trend

2.6 Dry Weather Flow Analysis

The subject site and associated sewer network have been simulated in InfoWorks during DWF conditions. The model considered three scenarios:

- Pre-development;
- post-development serviced by the 250 mm sewer along Yonge Street; and
- post-development serviced by the 675 mm sewer along Yonge Street.

The pre-development scenario will be used as a baseline for the analysis of the two post-development scenarios.

2.6.1 Post-Development, Serviced by 250 mm Sewer (sewer pipe nearer to the site plan)

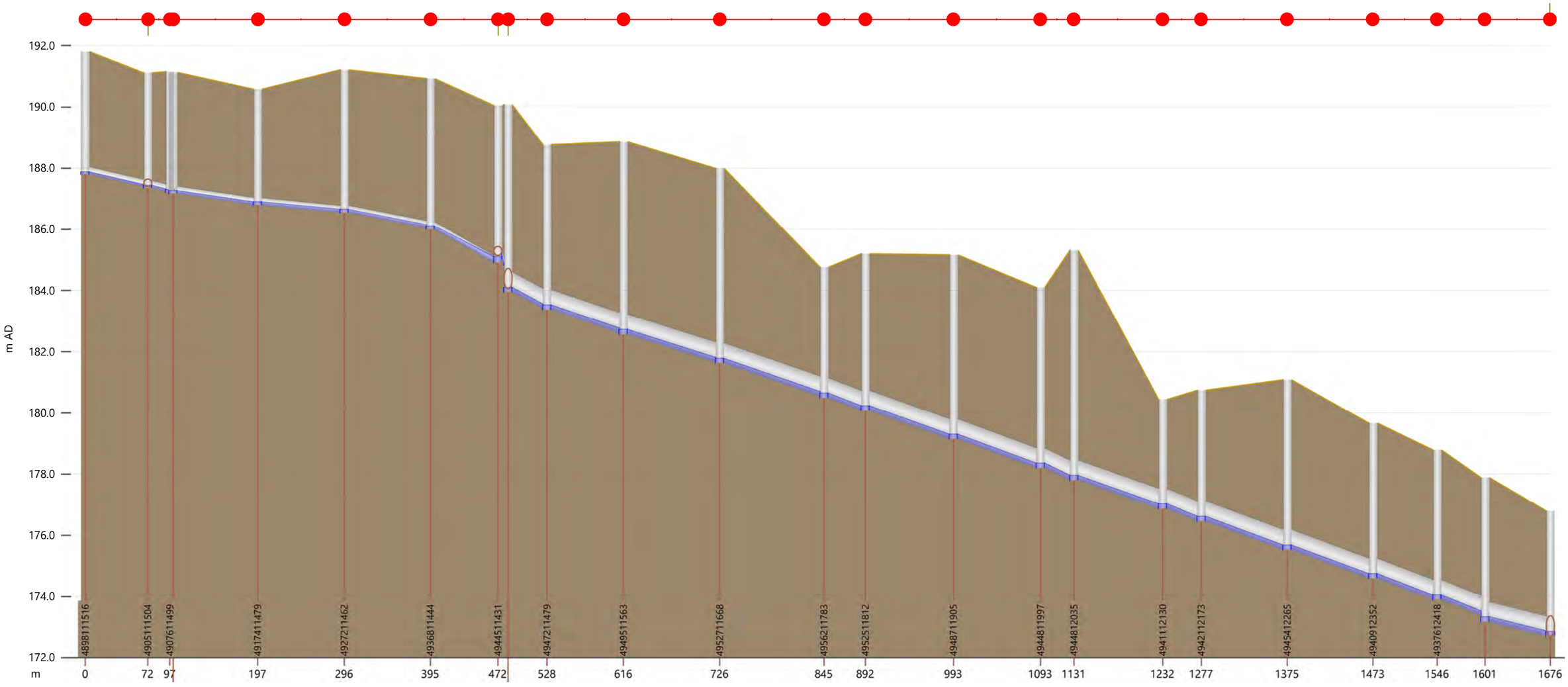
The flow and depth of flow within the sewers are presented in **Table 2-4** to compare pre-development to post-development conditions, serviced by the 250 mm sewer. Please note that the table presenting the DWF HGL results for the downstream sanitary sewer network are presented in Appendix B. **Figure 2-3** and **Figure 2-4** present the sanitary sewer HGL profiles of the simulation for pre-development, broken along node 4894211533 for presentation. **Figure 2-5** and **Figure 2-6** present the sanitary sewer HGL profiles of the simulation for post-development serviced by the 250 mm sewer, broken along node 4894211533 for presentation.

Table 2-4 – DWF Sewer Pipe Flow and Depth, Serviced by the 250 mm Sewer

Location	Manhole		Pipe			Q_{full} (m^3/s)	Flow (q) (m^3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	D/S	Size (m)	Length (m)	Slope (%)		Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Eastern 675mm Sanitary Sewer on Yonge Street														
Yonge Street	4894211533	4903411517	0.675	93.60	0.29	0.452	0.0361	0.0361	0.080	0.080	0.134	0.134	0.199	0.199
Yonge Street	4903411517	4909411505	0.675	61.30	0.46	0.568	0.0360	0.0360	0.063	0.063	0.135	0.135	0.200	0.200
Yonge Street	4909411505	4917611490	0.675	83.00	0.49	0.587	0.0476	0.0476	0.081	0.081	0.135	0.135	0.200	0.200
Yonge Street	4917611490	4925411476	0.675	79.40	0.47	0.576	0.0476	0.0476	0.083	0.083	0.136	0.136	0.201	0.201
Yonge Street	4925411476	4933911462	0.675	85.60	0.44	0.559	0.0476	0.0476	0.085	0.085	0.138	0.138	0.204	0.204
Yonge Street	4933911462	4944611442	0.675	109.40	1.32	0.967	0.0476	0.0476	0.049	0.049	0.122	0.122	0.181	0.181
Western 250mm Sanitary Sewer on Yonge Street														
Yonge Street	4898111516	4905111504	0.250	71.60	0.57	0.045	0.0056	0.0056	0.124	0.124	0.063	0.063	0.252	0.252
Yonge Street	4905111504	4907611499	0.250	25.20	0.44	0.039	0.0075	0.0075	0.192	0.192	0.076	0.076	0.304	0.304
Yonge Street	4907611499	4907911496	0.250	3.80	1.33	0.068	0.0079	0.0079	0.116	0.116	0.081	0.082	0.324	0.328
Yonge Street	4907911496	4917411479	0.250	96.70	0.38	0.037	0.0079	0.0084	0.213	0.226	0.085	0.282	0.340	1.128
Yonge Street [(1)]	4917411479	4927211462	0.250	99.10	0.25	0.030	0.0088	0.0336	0.293	1.119	0.108	0.289	0.432	1.156
Yonge Street	4927211462	4936811444	0.250	98.50	0.51	0.042	0.0158	0.0405	0.376	0.965	0.108	0.201	0.432	0.804
Yonge Street	4936811444	4944511431	0.250	77.30	1.42	0.071	0.0197	0.0444	0.278	0.626	0.191	0.231	0.764	0.924
Cummer Avenue	4944511431	4944611442	0.300	11.60	1.63	0.123	0.0231	0.0478	0.188	0.389	0.092	0.133	0.307	0.443
Downstream of confluence of Yonge Street Sanitary Sewers														
Cummer Avenue	4944611442	4947211479	0.675	44.50	1.22	0.927	0.0706	0.0953	0.076	0.103	0.142	0.160	0.210	0.237
Cummer Avenue	4947211479	4944511431	0.675	87.50	0.87	0.782	0.0836	0.1083	0.107	0.139	0.151	0.174	0.224	0.258
Cummer Avenue	4949511563	4952711668	0.675	110.10	0.82	0.763	0.0836	0.1083	0.110	0.142	0.153	0.176	0.227	0.261
Cummer Avenue	4952711668	4956211783	0.675	119.20	0.90	0.798	0.0835	0.1083	0.105	0.136	0.150	0.172	0.222	0.255
Easement	4956211783	4952511812	0.675	47.30	0.87	0.783	0.0835	0.1083	0.107	0.138	0.151	0.173	0.224	0.256
Easement	4952511812	4948711905	0.675	100.70	0.92	0.808	0.0835	0.1083	0.103	0.134	0.149	0.171	0.221	0.253
Easement	4948711905	4944811997	0.675	99.50	0.96	0.821	0.0837	0.1085	0.102	0.132	0.156	0.176	0.231	0.261
Easement	4944811997	4944812035	0.675	38.20	1.05	0.860	0.0837	0.1085	0.097	0.126	0.156	0.176	0.231	0.261
Easement	4944812035	4941112130	0.675	101.60	0.92	0.804	0.0837	0.1085	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4941112130	4942112173	0.675	44.20	0.93	0.810	0.0837	0.1085	0.103	0.134	0.149	0.170	0.221	0.252
Easement	4942112173	4945412265	0.675	98.30	0.95	0.818	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4945412265	4940912352	0.675	98.00	0.95	0.819	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4940912352	4937612418	0.675	73.50	0.95	0.821	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4937612418	4934212460	0.675	54.60	0.95	0.820	0.0843	0.1091	0.103	0.133	0.148	0.170	0.219	0.252
Easement	4934212460	4932012532	0.675	74.70	0.62	0.662	0.0843	0.1091	0.127	0.165	0.166	0.189	0.246	0.280
Easement	4932012532	4934412588	0.675	61.20	0.93	0.809	0.0843	0.1091	0.104	0.135	0.149	0.171	0.221	0.253

Location	Manhole		Pipe			Q_{full} (m^3/s)	Flow (q) (m^3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	D/S	Size (m)	Length (m)	Slope (%)		Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Easement	4934412588	4937512696	0.750	112.00	1.16	1.200	0.0843	0.1091	0.070	0.091	0.154	0.168	0.205	0.224
Easement	4937512696	4941812791	0.750	104.20	1.44	1.336	0.2806	0.3053	0.210	0.228	0.374	0.382	0.499	0.509
Easement	4941812791	4946812859	0.675	84.70	1.38	0.988	0.3405	0.3652	0.345	0.370	0.284	0.292	0.421	0.433
Easement	4946812859	4950912938	0.675	89.00	1.44	1.008	0.3405	0.3652	0.338	0.362	0.288	0.296	0.427	0.439
Easement	4950912938	4948513028	0.675	95.00	1.32	0.964	0.3430	0.3677	0.356	0.381	0.288	0.296	0.427	0.439
Easement	4948513028	4945713111	0.675	87.90	1.35	0.978	0.3452	0.3698	0.353	0.378	0.287	0.295	0.425	0.437
Easement	4945713111	4940713229	0.675	127.60	1.40	0.996	0.3458	0.3705	0.347	0.372	0.300	0.313	0.444	0.464
Easement	4940713229	4935913328	0.675	111.50	1.33	0.969	0.3781	0.4027	0.390	0.416	0.300	0.312	0.444	0.462
Easement	4935913328	4927513370	0.675	93.70	1.34	0.971	0.3782	0.4028	0.390	0.415	0.299	0.312	0.443	0.462
Easement	4927513370	4924913415	0.675	52.60	1.43	1.004	0.3782	0.4028	0.377	0.401	0.294	0.305	0.436	0.452
Easement	4924913415	4918613545	0.675	144.50	1.28	0.951	0.3921	0.4167	0.412	0.438	0.310	0.324	0.459	0.480
Easement	4918613545	4915013638	0.675	99.90	1.27	0.948	0.3937	0.4183	0.415	0.441	0.312	0.325	0.462	0.481
Easement	4915013638	4906413756	0.675	146.90	1.36	0.979	0.3937	0.4183	0.402	0.427	0.305	0.319	0.452	0.473
Easement	4906413756	4903113889	0.675	143.40	1.40	0.995	0.3937	0.4183	0.396	0.420	0.303	0.316	0.449	0.468
Easement	4903113889	4895013913	0.675	84.20	1.41	0.999	0.3961	0.4207	0.397	0.421	0.313	0.326	0.464	0.483
Easement	4895013913	4887513937	0.675	79.10	1.28	0.950	0.3961	0.4207	0.417	0.443	0.313	0.326	0.464	0.483
Easement	4887513937	4880313986	0.675	87.00	1.50	1.028	0.3961	0.4207	0.385	0.409	0.312	0.325	0.462	0.481
Easement	4880313986	4872414044	0.675	98.80	1.30	0.957	0.3961	0.4207	0.414	0.440	0.311	0.324	0.461	0.480

(1) Flow from the subject site is released at this location in pre-development and post-development conditions.



Link	-	-	4907911496.1	4917411479.1	4927211462.1	-	-	4947211479.1	4949511563.1	4952711668.1	-	4952511812.1	4948711905.1	-	4944812035.1	-	4942112173.1	4945412265.1	-	-	-
length (m)	71.6	-	96.7	99.1	98.5	77.3	44.5	87.5	110.1	119.2	47.3	100.7	99.5	38.2	101.6	44.2	98.3	98.0	73.5	54.6	74.7
width (mm)	250	-	250	250	250	250	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00573	-	0.00383	0.00252	0.00508	0.01421	-	0.00865	0.00824	0.00901	-	0.00923	0.00955	-	0.00916	-	0.00946	0.00949	0.00953	0.00952	0.00620
pfc (m3/s)	0.045	-	0.037	0.030	0.042	0.071	0.927	0.782	0.763	0.798	0.783	0.808	0.821	0.860	0.804	0.810	0.818	0.819	0.821	0.820	0.662
surc	0.25	-	0.34	0.43	0.43	0.76	0.21	0.22	0.23	0.22	0.22	0.22	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.25
US flow (m3/s)	0.00557	-	0.00787	0.00880	0.01579	0.01971	-	0.08356	0.08355	0.08354	-	0.08353	0.08373	-	0.08373	-	0.08433	0.08433	0.08433	0.08432	0.08432
DS flow (m3/s)	0.00556	-	0.00786	0.00879	0.01579	0.01971	-	0.08355	0.08354	0.08354	-	0.08353	0.08373	-	0.08372	-	0.08433	0.08433	0.08432	0.08432	0.08432
Node	-	-	-	4917411479	4927211462	4936811444	-	-	-	4949511563	4952711668	-	-	4948711905	-	-	-	-	4945412265	4940912352	-	-	-
flood dep (m)	-	-	-2.069	-1.889	-2.755	-3.028	-	-	-3.453	-4.352	-4.424	-2.317	-3.171	-4.063	-3.941	-5.561	-1.626	-2.338	-3.606	-3.121	-2.941	-2.752	-

Figure 2-3 - DWF Sanitary Sewer Profile - Pre-development (Between node 4898111516 and node 4932012532)

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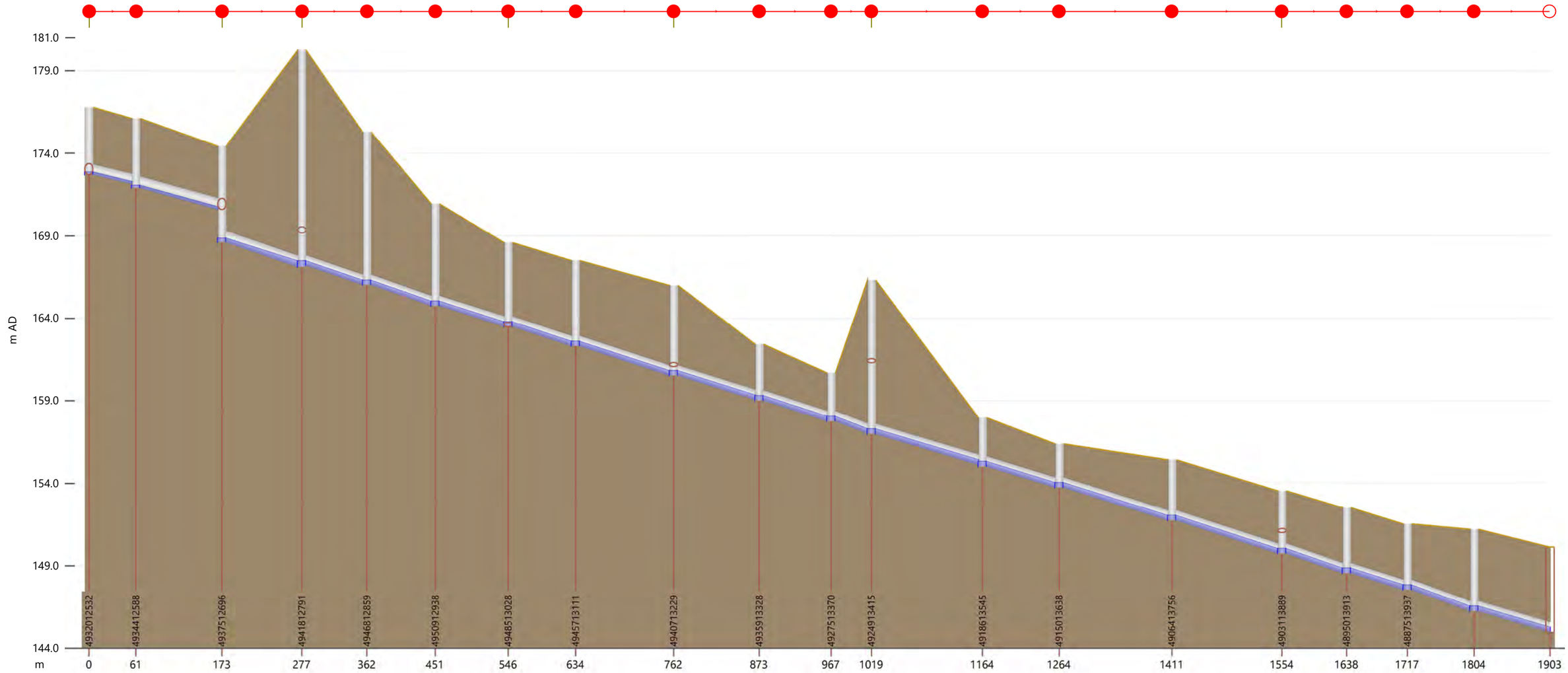

Link	-	4934412588.1	4937512696.1	-	-	-	-	4945713111.1	4940713229.1	-	-	4924913415.1	4918613545.1	4915013638.1	4906413756.1	-	-	-	4880313986.1
length (m)	61.2	112.0	104.2	84.7	89.0	95.0	87.9	127.6	111.5	93.7	52.6	144.5	99.9	146.9	143.4	84.2	79.1	87.0	98.8
width (mm)	675	750	750	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00927	0.01161	0.01440	0.01382	0.01438	0.01316	0.01354	0.01403	0.01328	0.01335	-	0.01280	0.01271	0.01355	0.01402	0.01413	0.01277	0.01495	0.01296
pfc (m3/s)	0.809	1.200	1.336	0.988	1.008	0.964	0.978	0.996	0.969	0.971	1.004	0.951	0.948	0.979	0.995	0.999	0.950	1.028	0.957
surc	0.22	0.21	0.50	0.42	0.43	0.43	0.42	0.44	0.44	0.44	0.44	0.46	0.46	0.45	0.45	0.46	0.46	0.46	0.46
US flow (m3/s)	0.08432	0.08431	0.28061	0.34051	0.34051	0.34304	0.34518	0.34581	0.37810	0.37822	-	0.39208	0.39372	0.39371	0.39371	0.39612	0.39611	0.39611	0.39611
DS flow (m3/s)	0.08431	0.08431	0.28060	0.34051	0.34051	0.34303	0.34518	0.34581	0.37810	0.37822	-	0.39207	0.39371	0.39371	0.39371	0.39611	0.39611	0.39611	0.39610

Node	-	-	4937512696	-	-	-	-	4945713111	4940713229	4935913328	-	4924913415	4918613545	4915013638	4906413756	4903113889	-	-	-	-
flood dep (m)	-	-2.260	-3.773	-10.970	-7.166	-4.108	-3.021	-3.119	-3.386	-1.325	-0.841	-7.243	-0.849	-0.546	-1.576	-1.714	-1.876	-1.915	-2.874	

Figure 2-4 - DWF Sanitary Sewer Profile - Pre-development (Between node 4932012532 and node 4872414044)

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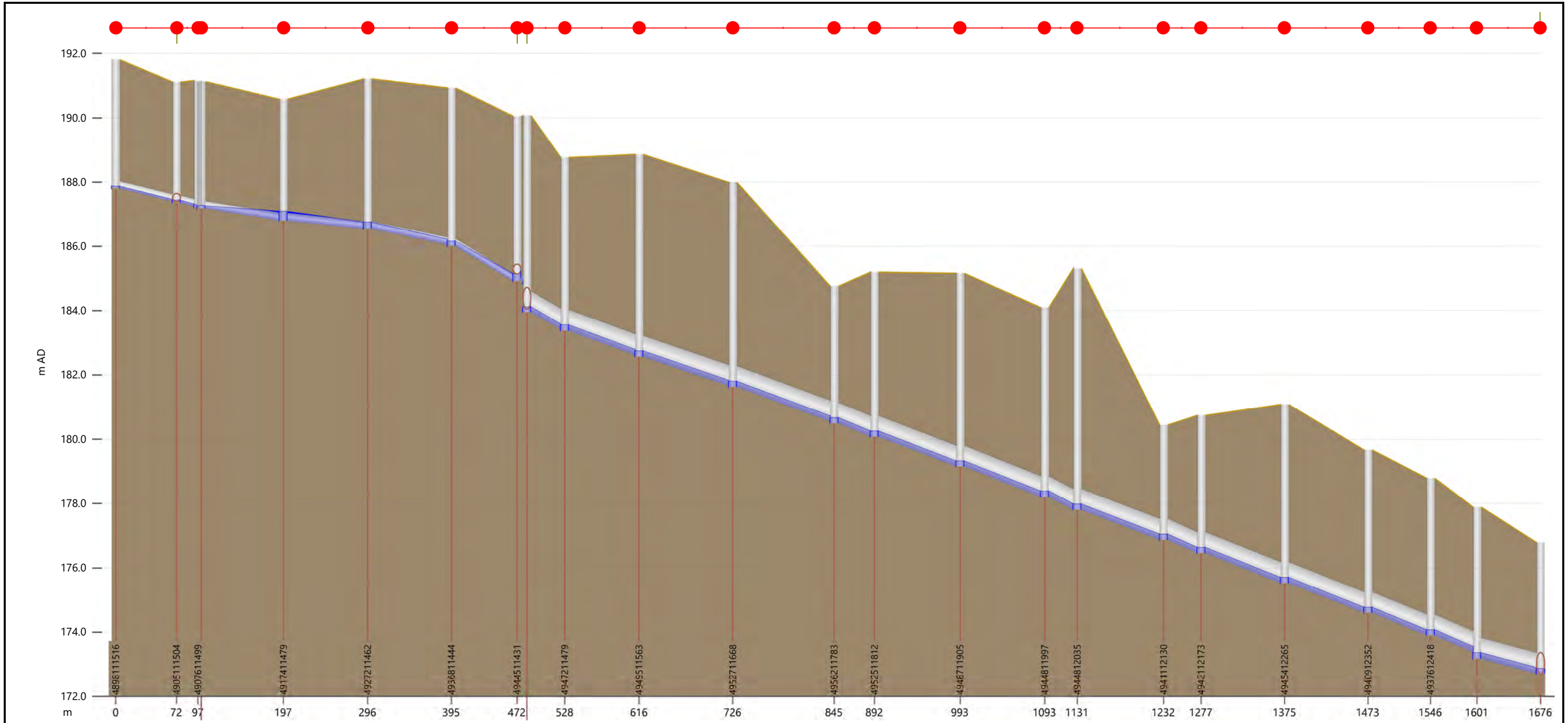

Link	-	-	4907911496.1	4917411479.1	4927211462.1	-	-	4947211479.1	4949511563.1	4952711668.1	-	4952511812.1	4948711905.1	-	4944812035.1	-	4942112173.1	4945412265.1	-	-	-
width (mm)	250	-	250	250	250	250	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
pfc (m3/s)	0.045	-	0.037	0.030	0.042	0.071	0.927	0.782	0.763	0.798	0.783	0.808	0.821	0.860	0.804	0.810	0.818	0.819	0.821	0.820	0.662
surc	0.25	-	1.00	2.00	0.80	0.92	0.24	0.26	0.26	0.25	0.26	0.25	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.28
DS flow (m3/s)	0.00556	-	0.00838	0.03355	0.04052	0.04443	-	0.10830	0.10829	0.10829	-	0.10828	0.10848	-	0.10847	-	0.10908	0.10907	0.10907	0.10907	0.10906

Node	-	-	-	4917411479	4927211462	4936811444	-	-	-	4949511563	4952711668	-	-	4948711905	-	-	-	-	4945412265	4940912352	-	-	-
flood dep (m)	-	-	-2.068	-1.692	-2.659	-2.973	-	-	-3.430	-4.329	-4.402	-2.294	-3.149	-4.042	-3.921	-5.539	-1.604	-2.317	-3.585	-3.100	-2.920	-2.729	-

Figure 2-5 - DWF Sanitary Sewer Profile - Post-development - 250 mm (Between Node 4898111516 and node 4932012532)

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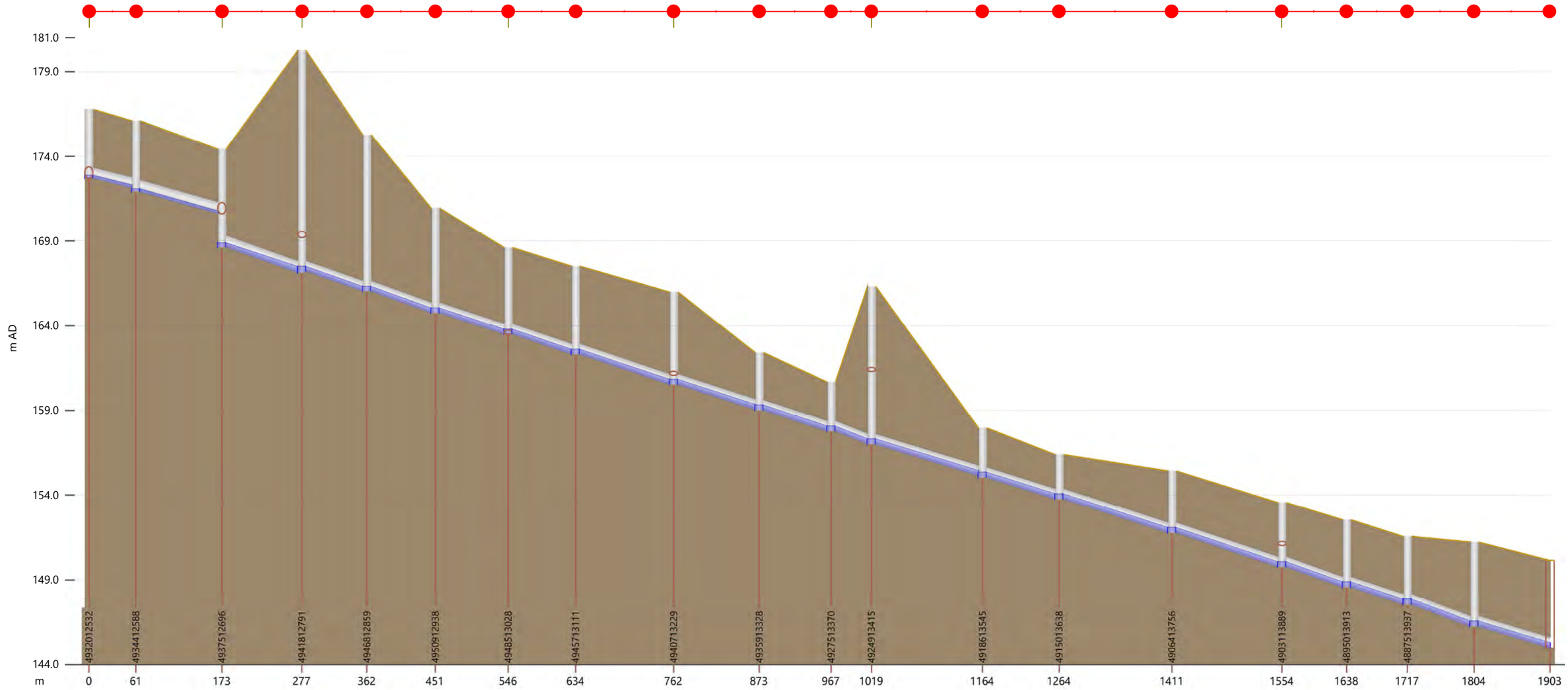

Link	-	4934412588.1	4937512696.1	-	-	-	-	4945713111.1	4940713229.1	-	-	4924913415.1	4918613545.1	4915013638.1	4906413756.1	-	-	-	4880313986.1
length (m)	61.2	112.0	104.2	84.7	89.0	95.0	87.9	127.6	111.5	93.7	52.6	144.5	99.9	146.9	143.4	84.2	79.1	87.0	98.8
width (mm)	675	750	750	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00927	0.01161	0.01440	0.01382	0.01438	0.01316	0.01354	0.01403	0.01328	0.01335	-	0.01280	0.01271	0.01355	0.01402	0.01413	0.01277	0.01495	0.01296
pfc (m3/s)	0.809	1.200	1.336	0.988	1.008	0.964	0.978	0.996	0.969	0.971	1.004	0.951	0.948	0.979	0.995	0.999	0.950	1.028	0.957
surc	0.25	0.22	0.51	0.43	0.44	0.44	0.44	0.46	0.46	0.46	0.45	0.48	0.48	0.47	0.47	0.48	0.48	0.48	0.48
DS flow (m3/s)	0.10906	0.10906	0.30526	0.36515	0.36515	0.36768	0.36982	0.37045	0.40272	0.40284	-	0.41666	0.41831	0.41830	0.41830	0.42070	0.42070	0.42070	0.42069

Node	-	-	4937512696	-	-	-	-	4945713111	4940713229	4935913328	-	4924913415	4918613545	4915013638	4906413756	4903113889	-	-	-	-
flood dep (m)	-	-2.246	-3.763	-10.962	-7.158	-4.100	-3.013	-3.111	-3.373	-1.313	-0.831	-7.230	-0.836	-0.533	-1.563	-1.701	-1.863	-1.904	-2.862	

Figure 2-6 - DWF Sanitary Sewer Profile - Post-development - 250 mm (Between node 4932012532 and node 4872414044)

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In pre-development conditions the downstream network has a maximum q/Q_{full} ratio of 0.417 which occurs in a sanitary sewer pipe within an easement between Bayview Avenue and Forest Grove Drive (between nodes 4918613545 and 4915013638) and a maximum d/D ratio is 0.764 and occurs in a sanitary sewer pipe along Yonge Street (between nodes 4936811444 and 4944511431). It should be noted that the d/D ratio of 0.764 occurs at the downstream end of the referenced pipe and is due to the invert of the next downstream pipe existing 98 mm higher in the model. This condition, however, does not cause either pipe to surcharge. Based on the results of the model, the subject sanitary sewer network has no pipes in surcharge during pre-development conditions.

In post-development conditions, when the subject site is serviced by the 250mm sewer along Yonge Street, the network has a maximum q/Q_{full} ratio of 1.119 which occurs in a sanitary sewer pipe along Yonge Street (between nodes 4917411479 and 4927211462) and a maximum d/D ratio of 1.156 which occurs in the same pipe. In the model, the subject development is set to discharge at the upstream node within this pipe. As such, the results of the model indicate that there is a surcharge at the service connection of the subject site. It should be noted that the pipe upstream of this surcharge condition (between nodes 4907911496 and 4917411479) also shows surcharge conditions, however, they are due to backwater and as such the surcharge will be eliminated if the downstream issue is resolved. The remainder of the downstream sanitary sewer network does not have any apparent DWF issues.

Upgrades to the sewer network shall be considered if the service connection for the subject development is connected to the 250 mm sanitary sewer. Upgrades have been preliminarily sized as follows.

Upgrade for sewer between 4917411479 and 4927211462

As discussed, during the post-development DWF conditions, the pipe between 4917411479 and 4927211462 is surcharging. It is suggested to upsize this pipe to eliminate the surcharge condition. Using standard pipe sizes, the minimum size that provides a q/Q_{full} ratio less than 80% was determined and shall be considered as the minimum required upgrade size. Population and area used for the upgrade sizing was extracted from the updated InfoWorks model, post-development scenario. For this pipe, the minimum required size is 375mm up from 250mm based on the following calculation:

Sewer Conditions:

Population = 3856

Area = 6.24 ha

Peaking Factor = 3.34

DWG generation rate = 450 L/p/d

Sanitary peak flow = q = 450 × 3.34 × 3856 / (24 × 60 × 60) + 6.24 × 0.26 L/s/ha = 68.85 L/s

Sewer Sizing:

Diameter = 375mm

Slope = 0.252% (existing slope)

$Q_{full} = ((0.375/2)^2 \times 3.14159) \times (0.375/4)^{(2/3)} \times (0.00252^{(1/2)}))/0.013 = 88.05$ *L/s*

Thus, $q/Q_{full} = 68.85/88.05 = 78\%$

2.6.2 Post-Development, Serviced by 675 mm Sewer (Sewer pipe further from the site plan)

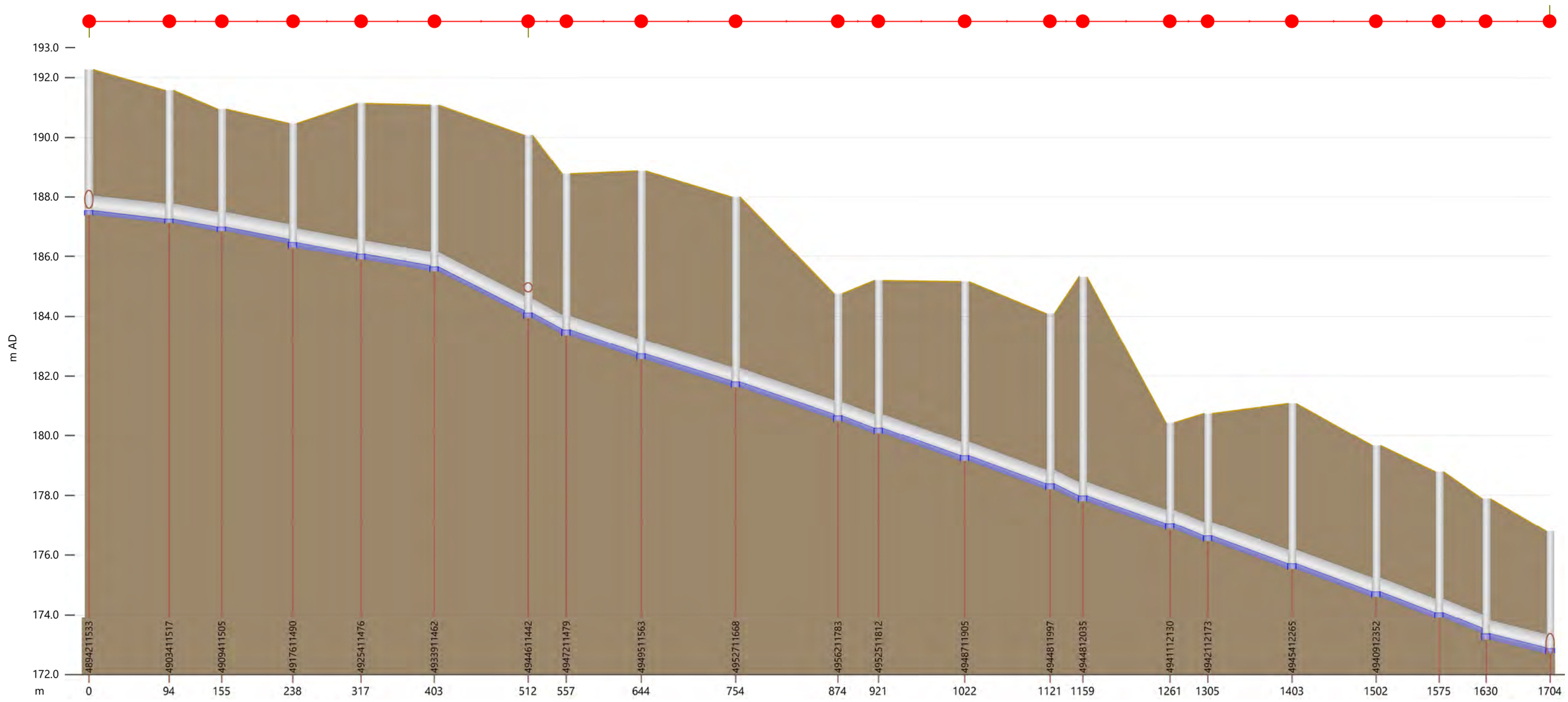
Table 2-5 compares the pre-development to post-development flow and depth within the downstream sanitary sewer network, serviced by the 675 mm sewer, similar to **Table 2-4**. Pre-development conditions have been discussed in section 2.6.1. Pre-development results have been included in **Table 2-5** for comparison purposes. **Figure 2-7** and **Figure 2-8** present the sanitary sewer and HGL profiles of the simulation for post-development serviced by the 675 mm sewer, split along node 4894211533 for illustration.

Table 2-5 – DWF Sewer Pipe Flow and Depth, Serviced by the 675 mm Sewer

Location	Manhole		Pipe			Q_{full} (m^3/s)	Flow (q) (m^3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	D/S	Size (m)	Length (m)	Slope (%)		Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Eastern 675mm Sanitary Sewer on Yonge Street														
Yonge Street	4894211533	4903411517	0.675	93.60	0.29	0.452	0.0361	0.0361	0.080	0.080	0.134	0.134	0.199	0.199
Yonge Street	4903411517	4909411505	0.675	61.30	0.46	0.568	0.0360	0.0360	0.063	0.063	0.135	0.135	0.200	0.200
Yonge Street	4909411505	4917611490	0.675	83.00	0.49	0.587	0.0476	0.0476	0.081	0.081	0.135	0.135	0.200	0.200
Yonge Street [(1)]	4917611490	4925411476	0.675	79.40	0.47	0.576	0.0476	0.0733	0.083	0.127	0.136	0.166	0.201	0.246
Yonge Street	4925411476	4933911462	0.675	85.60	0.44	0.559	0.0476	0.0733	0.085	0.131	0.138	0.168	0.204	0.249
Yonge Street	4933911462	4944611442	0.675	109.40	1.32	0.967	0.0476	0.0732	0.049	0.076	0.122	0.142	0.181	0.210
Western 250mm Sanitary Sewer on Yonge Street														
Yonge Street	4898111516	4905111504	0.250	71.60	0.57	0.045	0.0056	0.0056	0.124	0.124	0.063	0.063	0.252	0.252
Yonge Street	4905111504	4907611499	0.250	25.20	0.44	0.039	0.0075	0.0075	0.192	0.192	0.076	0.076	0.304	0.304
Yonge Street	4907611499	4907911496	0.250	3.80	1.33	0.068	0.0079	0.0079	0.116	0.116	0.081	0.081	0.324	0.324
Yonge Street	4907911496	4917411479	0.250	96.70	0.38	0.037	0.0079	0.0079	0.213	0.213	0.085	0.081	0.340	0.324
Yonge Street [(2)]	4917411479	4927211462	0.250	99.10	0.25	0.030	0.0088	0.0079	0.293	0.262	0.108	0.105	0.432	0.420
Yonge Street	4927211462	4936811444	0.250	98.50	0.51	0.042	0.0158	0.0149	0.376	0.354	0.108	0.105	0.432	0.420
Yonge Street	4936811444	4944511431	0.250	77.30	1.42	0.071	0.0197	0.0188	0.278	0.265	0.191	0.189	0.764	0.756
Cummer Avenue	4944511431	4944611442	0.300	11.60	1.63	0.123	0.0231	0.0221	0.188	0.180	0.092	0.090	0.307	0.300
Downstream of confluence of Yonge Street Sanitary Sewers														
Cummer Avenue	4944611442	4947211479	0.675	44.50	1.22	0.927	0.0706	0.0953	0.076	0.103	0.142	0.160	0.210	0.237
Cummer Avenue	4947211479	4944511431	0.675	87.50	0.87	0.782	0.0836	0.1084	0.107	0.139	0.151	0.174	0.224	0.258
Cummer Avenue	4949511563	4952711668	0.675	110.10	0.82	0.763	0.0836	0.1083	0.110	0.142	0.153	0.176	0.227	0.261
Cummer Avenue	4952711668	4956211783	0.675	119.20	0.90	0.798	0.0835	0.1083	0.105	0.136	0.150	0.172	0.222	0.255
Easement	4956211783	4952511812	0.675	47.30	0.87	0.783	0.0835	0.1083	0.107	0.138	0.151	0.174	0.224	0.258
Easement	4952511812	4948711905	0.675	100.70	0.92	0.808	0.0835	0.1083	0.103	0.134	0.149	0.171	0.221	0.253
Easement	4948711905	4944811997	0.675	99.50	0.96	0.821	0.0837	0.1085	0.102	0.132	0.156	0.176	0.231	0.261
Easement	4944811997	4944812035	0.675	38.20	1.05	0.860	0.0837	0.1085	0.097	0.126	0.156	0.176	0.231	0.261
Easement	4944812035	4941112130	0.675	101.60	0.92	0.804	0.0837	0.1085	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4941112130	4942112173	0.675	44.20	0.93	0.810	0.0837	0.1085	0.103	0.134	0.149	0.170	0.221	0.252
Easement	4942112173	4945412265	0.675	98.30	0.95	0.818	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4945412265	4940912352	0.675	98.00	0.95	0.819	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4940912352	4937612418	0.675	73.50	0.95	0.821	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4937612418	4934212460	0.675	54.60	0.95	0.820	0.0843	0.1091	0.103	0.133	0.148	0.170	0.219	0.252
Easement	4934212460	4932012532	0.675	74.70	0.62	0.662	0.0843	0.1091	0.127	0.165	0.166	0.189	0.246	0.280

Location	Manhole		Pipe			Q_{full} (m^3/s)	Flow (q) (m^3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	D/S	Size (m)	Length (m)	Slope (%)		Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Easement	4932012532	4934412588	0.675	61.20	0.93	0.809	0.0843	0.1091	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4934412588	4937512696	0.750	112.00	1.16	1.200	0.0843	0.1091	0.070	0.091	0.154	0.168	0.205	0.224
Easement	4937512696	4941812791	0.750	104.20	1.44	1.336	0.2806	0.3054	0.210	0.229	0.374	0.382	0.499	0.509
Easement	4941812791	4946812859	0.675	84.70	1.38	0.988	0.3405	0.3653	0.345	0.370	0.284	0.292	0.421	0.433
Easement	4946812859	4950912938	0.675	89.00	1.44	1.008	0.3405	0.3653	0.338	0.362	0.288	0.296	0.427	0.439
Easement	4950912938	4948513028	0.675	95.00	1.32	0.964	0.3430	0.3678	0.356	0.382	0.288	0.296	0.427	0.439
Easement	4948513028	4945713111	0.675	87.90	1.35	0.978	0.3452	0.3699	0.353	0.378	0.287	0.295	0.425	0.437
Easement	4945713111	4940713229	0.675	127.60	1.40	0.996	0.3458	0.3706	0.347	0.372	0.300	0.313	0.444	0.464
Easement	4940713229	4935913328	0.675	111.50	1.33	0.969	0.3781	0.4029	0.390	0.416	0.300	0.312	0.444	0.462
Easement	4935913328	4927513370	0.675	93.70	1.34	0.971	0.3782	0.4030	0.390	0.415	0.299	0.312	0.443	0.462
Easement	4927513370	4924913415	0.675	52.60	1.43	1.004	0.3782	0.4030	0.377	0.401	0.294	0.305	0.436	0.452
Easement	4924913415	4918613545	0.675	144.50	1.28	0.951	0.3921	0.4168	0.412	0.438	0.310	0.324	0.459	0.480
Easement	4918613545	4915013638	0.675	99.90	1.27	0.948	0.3937	0.4184	0.415	0.441	0.312	0.325	0.462	0.481
Easement	4915013638	4906413756	0.675	146.90	1.36	0.979	0.3937	0.4184	0.402	0.427	0.305	0.319	0.452	0.473
Easement	4906413756	4903113889	0.675	143.40	1.40	0.995	0.3937	0.4184	0.396	0.421	0.303	0.316	0.449	0.468
Easement	4903113889	4895013913	0.675	84.20	1.41	0.999	0.3961	0.4208	0.397	0.421	0.313	0.326	0.464	0.483
Easement	4895013913	4887513937	0.675	79.10	1.28	0.950	0.3961	0.4208	0.417	0.443	0.313	0.326	0.464	0.483
Easement	4887513937	4880313986	0.675	87.00	1.50	1.028	0.3961	0.4208	0.385	0.409	0.312	0.325	0.462	0.481
Easement	4880313986	4872414044	0.675	98.80	1.30	0.957	0.3961	0.4208	0.414	0.440	0.311	0.324	0.461	0.480

(1) Flow from the subject site is released at this location in post-development conditions.
(2) Flow from the subject site is released at this location in pre-development conditions.



Link	4894211533.1	-	-	-	-	4933911462.1	-	4947211479.1	4949511563.1	4952711668.1	-	4952511812.1	4948711905.1	-	4944812035.1	-	4942112173.1	4945412265.1	-	-	-
length (m)	93.6	61.3	83.0	79.4	85.6	109.4	44.5	87.5	110.1	119.2	47.3	100.7	99.5	38.2	101.6	44.2	98.3	98.0	73.5	54.6	74.7
width (mm)	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00289	0.00457	0.00488	0.00470	0.00443	0.01324	-	0.00865	0.00824	0.00901	-	0.00923	0.00955	-	0.00916	-	0.00946	0.00949	0.00953	0.00952	0.00620
pfc (m3/s)	0.452	0.568	0.587	0.576	0.559	0.967	0.927	0.782	0.763	0.798	0.783	0.808	0.821	0.860	0.804	0.810	0.818	0.819	0.821	0.820	0.662
surc	0.20	0.20	0.20	0.25	0.25	0.21	0.24	0.26	0.26	0.25	0.26	0.25	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.28
DS flow (m3/s)	0.03603	0.03602	0.04758	0.07326	0.07324	0.07324	-	0.10834	0.10834	0.10833	-	0.10832	0.10851	-	0.10851	-	0.10911	0.10910	0.10910	0.10910	0.10910

Node	-	-	-	-	-	4933911462	-	-	4949511563	4952711668	-	-	4948711905	-	-	-	-	4945412265	4940912352	-	-	-
flood dep (m)	-	-2.523	-2.163	-2.210	-3.274	-3.642	-4.168	-3.430	-4.329	-4.402	-2.294	-3.149	-4.042	-3.921	-5.539	-1.604	-2.317	-3.585	-3.100	-2.920	-2.729	-

Figure 2-7 - DWF Sanitary Sewer Profile - Post-development - 675 mm (Between Node 4894211533 and node 4932012532)

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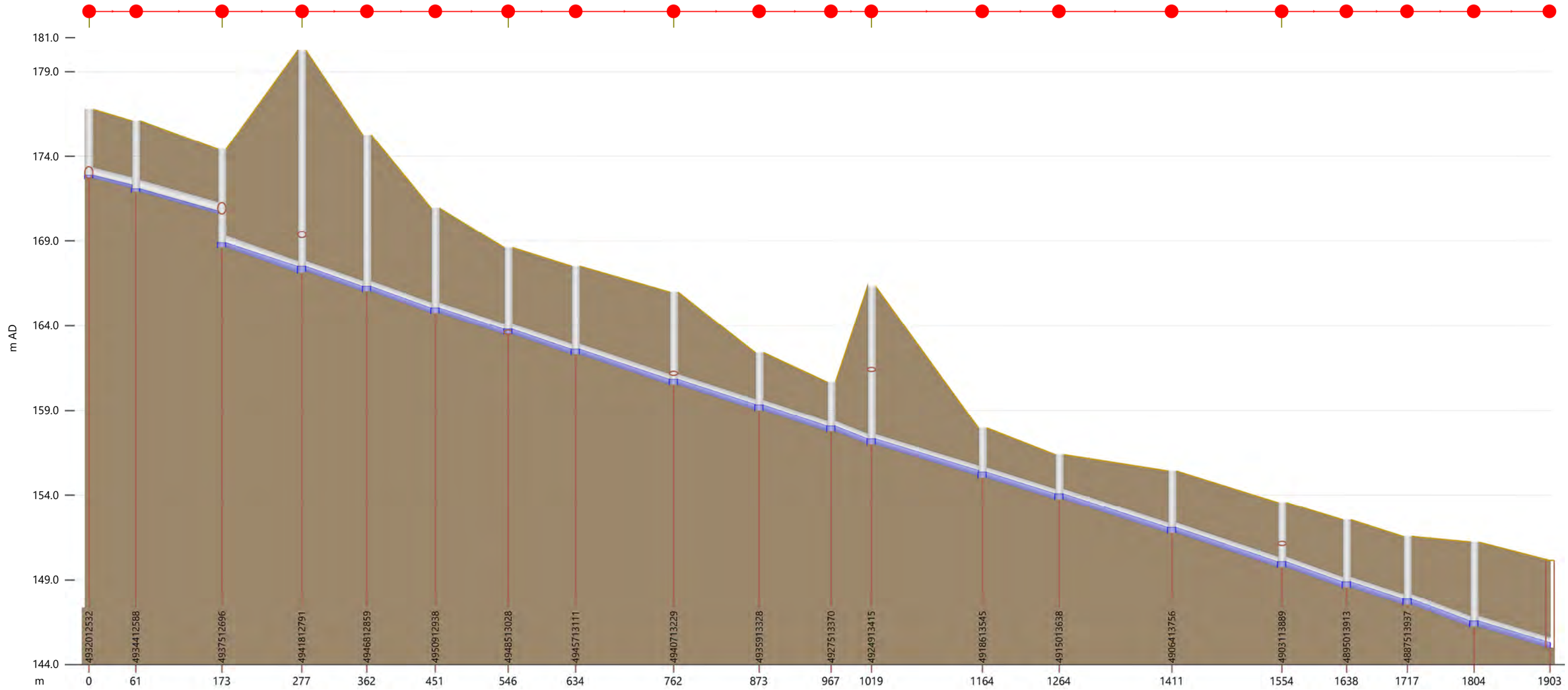

Link	-	4934412588.1	4937512696.1	-	-	-	-	4945713111.1	4940713229.1	-	-	4924913415.1	4918613545.1	4915013638.1	4906413756.1	-	-	-	4880313986.1
length (m)	61.2	112.0	104.2	84.7	89.0	95.0	87.9	127.6	111.5	93.7	52.6	144.5	99.9	146.9	143.4	84.2	79.1	87.0	98.8
width (mm)	675	750	750	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00927	0.01161	0.01440	0.01382	0.01438	0.01316	0.01354	0.01403	0.01328	0.01335	-	0.01280	0.01271	0.01355	0.01402	0.01413	0.01277	0.01495	0.01296
pfc (m3/s)	0.809	1.200	1.336	0.988	1.008	0.964	0.978	0.996	0.969	0.971	1.004	0.951	0.948	0.979	0.995	0.999	0.950	1.028	0.957
surc	0.25	0.22	0.51	0.43	0.44	0.44	0.44	0.46	0.46	0.46	0.45	0.48	0.48	0.47	0.47	0.48	0.48	0.48	0.48
DS flow (m3/s)	0.10909	0.10909	0.30536	0.36526	0.36526	0.36779	0.36993	0.37056	0.40284	0.40296	-	0.41680	0.41844	0.41843	0.41842	0.42082	0.42082	0.42082	0.42081

Node	-	-	4937512696	-	-	-	-	4945713111	4940713229	4935913328	-	4924913415	4918613545	4915013638	4906413756	4903113889	-	-	-	-
flood dep (m)	-	-2.246	-3.763	-10.962	-7.158	-4.100	-3.013	-3.111	-3.373	-1.313	-0.831	-7.230	-0.836	-0.533	-1.563	-1.701	-1.863	-1.904	-2.861	

Figure 2-8 - DWF Sanitary Sewer Profile - Post-development - 675 mm (Between node 4932012532 and node 4872414044)

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Pre-development conditions for the sewer network are the same between the two post-development scenarios. Refer to **Section 2.6.1** for discussion on pre-development conditions.

In post-development conditions the downstream network has a maximum q/Q_{full} ratio of 0.443 between Bayview Avenue and Forest Grove Drive (between nodes 4918613545 and 4915013638) which is the same location as the maximum q/Q_{full} ratio in pre-development. The downstream network exhibits a maximum d/D ratio of 0.756 and occurs in a sanitary sewer pipe along Yonge Street (between nodes 4936811444 and 4944511431) which is the location of the maximum d/D ratio in pre-development. It should be noted that the maximum d/D ratio decreased between pre-development and post-development since the servicing location of the subject site changed and no longer contributes to the flow within the 250 mm sewer along Yonge Street. With the exception of the noted maximum d/D ratio, all pipes within the downstream network have d/D ratios of 0.509 or less. As such, the results of the model indicate that there will be no surcharge condition within the downstream sanitary sewer network in post-development when the subject site is serviced via the 675 mm sanitary sewer along Yonge Street. Therefore, there will be sufficient capacity in the downstream sanitary sewer network to provide sanitary servicing for the subject site during DWF conditions if the subject site is serviced by the 675 mm sanitary sewer along Yonge Street.

2.7 Wet Weather Flow Analysis (All scenarios)

Pre-development and post-development conditions for the subject site and the associated sanitary sewer network have been simulated in InfoWorks for WWF by using the May 12th, 2000 rain event as gauged at the City's Oriole Yard.

Table 2-6 presents the HGL and Freeboard for each sanitary manhole in pre-development and both post-development conditions. **Figure 2-9** and **Figure 2-10** illustrate the sanitary sewer HGL profile of the downstream sewer network in pre-development conditions during WWF, split along node 4894211533 for illustration. **Figure 2-11** and **Figure 2-12** illustrate the sanitary sewer HGL profile of the downstream network in post-development conditions, serviced by the 250 mm sewer along Yonge Street, during WWF, split along node 4894211533 for illustration. **Figure 2-13** and **Figure 2-14** illustrate the sanitary sewer HGL profile of the downstream network in post-development conditions, serviced by the 675 mm sewer along Yonge Street, during WWF, split along node 4894211533 for illustration. Please note that the "Flood Dep" parameter shown on the profile indicates the depth above the 1.8m freeboard criteria (with a negative value indicating that the depth is below 1.8 m).

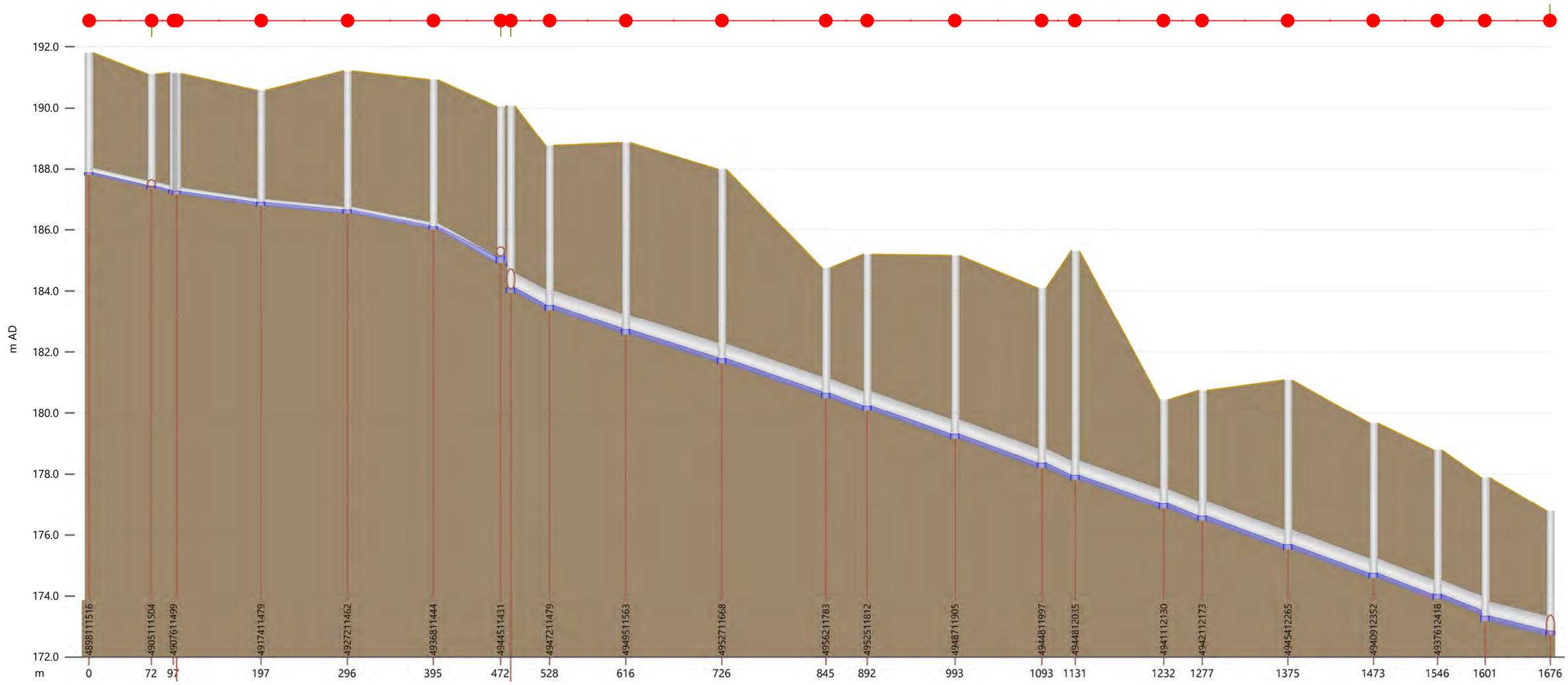
Table 2-6 – WWF Maximum HGL, Minimum Freeboard (May 12, 2000)

Location	MH	Asset ID	T/G (m)	Max Allowable HGL (m)	Pre-Development		Post Development – 250 mm		Post Development – 675 mm	
					Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Eastern 675 mm Sanitary Sewer on Yonge Street										
Yonge Street	4894211533	2739	192.266	190.466	187.534	4.732	187.534	4.732	187.534	4.732
Yonge Street	4903411517	2885	191.573	189.773	187.250	4.323	187.250	4.323	187.250	4.323
Yonge Street	4909411505	2991	190.948	189.148	186.985	3.963	186.985	3.963	186.985	3.963
Yonge Street	4917611490	3103	190.476	188.676	186.436	4.040	186.436	4.040	186.465	4.011
Yonge Street [(1)]	4925411476	3230	191.139	189.339	186.034	5.105	186.034	5.105	186.065	5.074
Yonge Street	4933911462	3378	191.082	189.282	185.619	5.463	185.619	5.463	185.640	5.442
Western 250 mm Sanitary Sewer on Yonge Street										
Yonge Street	4898111516	2805	191.803	190.003	187.873	3.930	187.873	3.930	187.873	3.930
Yonge Street	4905111504	2910	191.116	189.316	187.436	3.680	187.436	3.680	187.436	3.680
Yonge Street	4907611499	2949	191.154	189.354	187.296	3.858	187.296	3.858	187.296	3.858
Yonge Street	4907911496	2952	191.130	189.330	187.262	3.868	187.262	3.868	187.262	3.868
Yonge Street [(2)]	4917411479	3100	190.584	188.784	186.908	3.676	187.090	3.494	186.890	3.694
Yonge Street	4927211462	3256	191.213	189.413	186.663	4.550	186.752	4.461	186.655	4.558
Yonge Street	4936811444	3431	190.931	189.131	186.108	4.823	186.157	4.774	186.101	4.830
Yonge Street	4944511431	3549	190.056	188.256	185.110	4.946	185.142	4.914	185.103	4.953
Downstream of confluence of Yonge Street Sanitary Sewers										
Cummer Avenue	4944611442	3551	190.078	188.278	184.093	5.985	184.109	5.969	184.109	5.969
Cummer Avenue	4947211479	3600	188.773	186.973	183.520	5.253	183.542	5.231	183.542	5.231
Cummer Avenue	4949511563	3633	188.867	187.067	182.715	6.152	182.738	6.129	182.738	6.129
Cummer Avenue	4952711668	3682	187.999	186.199	181.774	6.225	181.796	6.203	181.797	6.202
Cummer Avenue	4956211783	3732	184.759	182.959	180.642	4.117	180.664	4.095	180.664	4.095
Cummer Avenue	4952511812	3677	185.200	183.400	180.229	4.971	180.250	4.950	180.250	4.950
Easement	4948711905	3619	185.161	183.361	179.298	5.863	179.319	5.842	179.319	5.842
Easement	4944811997	3554	184.097	182.297	178.355	5.742	178.376	5.721	178.376	5.721
Easement	4944812035	3555	185.310	183.510	177.949	7.361	177.971	7.339	177.971	7.339
Easement	4941112130	3498	180.445	178.645	177.019	3.426	177.040	3.405	177.040	3.405
Easement	4942112173	3511	180.747	178.947	176.609	4.138	176.630	4.117	176.630	4.117
Easement	4945412265	3570	181.085	179.285	175.678	5.407	175.700	5.385	175.700	5.385
Easement	4940912352	3495	179.670	177.870	174.748	4.922	174.769	4.901	174.769	4.901
Easement	4937612418	3447	178.790	176.990	174.048	4.742	174.069	4.721	174.070	4.720
Easement	4934212460	3386	177.889	176.089	173.337	4.552	173.360	4.529	173.360	4.529
Easement	4932012532	3339	176.796	174.996	172.847	3.949	172.869	3.927	172.869	3.927
Easement	4934412588	3391	176.115	174.315	172.055	4.060	172.069	4.046	172.069	4.046

Location	MH	Asset ID	T/G (m)	Max Allowable HGL (m)	Pre-Development		Post Development – 250 mm		Post Development – 675 mm	
					Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Easement	4937512696	3444	174.430	172.630	168.998	5.432	169.006	5.424	169.006	5.424
Easement	4941812791	3504	180.254	178.454	167.700	12.554	167.706	12.548	167.706	12.548
Easement	4946812859	3597	175.278	173.478	166.525	8.753	166.532	8.746	166.532	8.746
Easement	4950912938	3649	170.946	169.146	165.258	5.688	165.266	5.680	165.266	5.680
Easement	4948513028	3616	168.608	166.808	164.006	4.602	164.013	4.595	164.013	4.595
Easement	4945713111	3580	167.514	165.714	162.814	4.700	162.819	4.695	162.819	4.695
Easement	4940713229	3488	166.006	164.206	161.078	4.928	161.145	4.861	161.144	4.862
Easement	4935913328	3417	162.425	160.625	159.566	2.859	159.680	2.745	159.677	2.748
Easement	4927513370	3264	160.686	158.886	158.340	2.346	158.477	2.209	158.474	2.212
Easement	4924913415	3221	166.324	164.524	157.647	8.677	157.779	8.545	157.776	8.548

[1]) Flow from the subject site is released at this location in the post-development 250 mm scenario and in pre-development scenario

[2] Flow from the subject site is release at this location in the post-development 675 mm scenario.



Link	-	-	4907911496.1	4917411479.1	4927211462.1	-	-	4947211479.1	4949511563.1	4952711668.1	-	4952511812.1	4948711905.1	-	4944812035.1	-	4942112173.1	4945412265.1	-	-	-
length (m)	71.6	-	96.7	99.1	98.5	77.3	44.5	87.5	110.1	119.2	47.3	100.7	99.5	38.2	101.6	44.2	98.3	98.0	73.5	54.6	74.7
width (mm)	250	-	250	250	250	250	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00573	-	0.00383	0.00252	0.00508	0.01421	-	0.00865	0.00824	0.00901	-	0.00923	0.00955	-	0.00916	-	0.00946	0.00949	0.00953	0.00952	0.00620
pfc (m3/s)	0.045	-	0.037	0.030	0.042	0.071	0.927	0.782	0.763	0.798	0.783	0.808	0.821	0.860	0.804	0.810	0.818	0.819	0.821	0.820	0.662
surc	0.25	-	0.39	0.45	0.45	0.79	0.21	0.22	0.23	0.22	0.22	0.22	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.25
US flow (m3/s)	0.00556	-	0.00800	0.01111	0.01741	0.02134	-	0.08313	0.08313	0.08312	-	0.08311	0.08329	-	0.08328	-	0.08413	0.08412	0.08412	0.08411	0.08411
DS flow (m3/s)	0.00555	-	0.00800	0.01111	0.01741	0.02134	-	0.08313	0.08312	0.08311	-	0.08311	0.08329	-	0.08328	-	0.08412	0.08412	0.08411	0.08411	0.08411
Node	-	-	-	4917411479	4927211462	4936811444	-	-	-	4949511563	4952711668	-	-	4948711905	-	-	-	-	4945412265	4940912352	-	-	-
flood dep (m)	-	-	-2.068	-1.876	-2.750	-3.023	-	-	-3.453	-4.352	-4.425	-2.317	-3.171	-4.063	-3.942	-5.561	-1.626	-2.338	-3.607	-3.122	-2.942	-2.752	-

Figure 2-9 - WWF Sanitary Sewer Profile - Pre-development (Between Node 4898111516 and node 4932012532)

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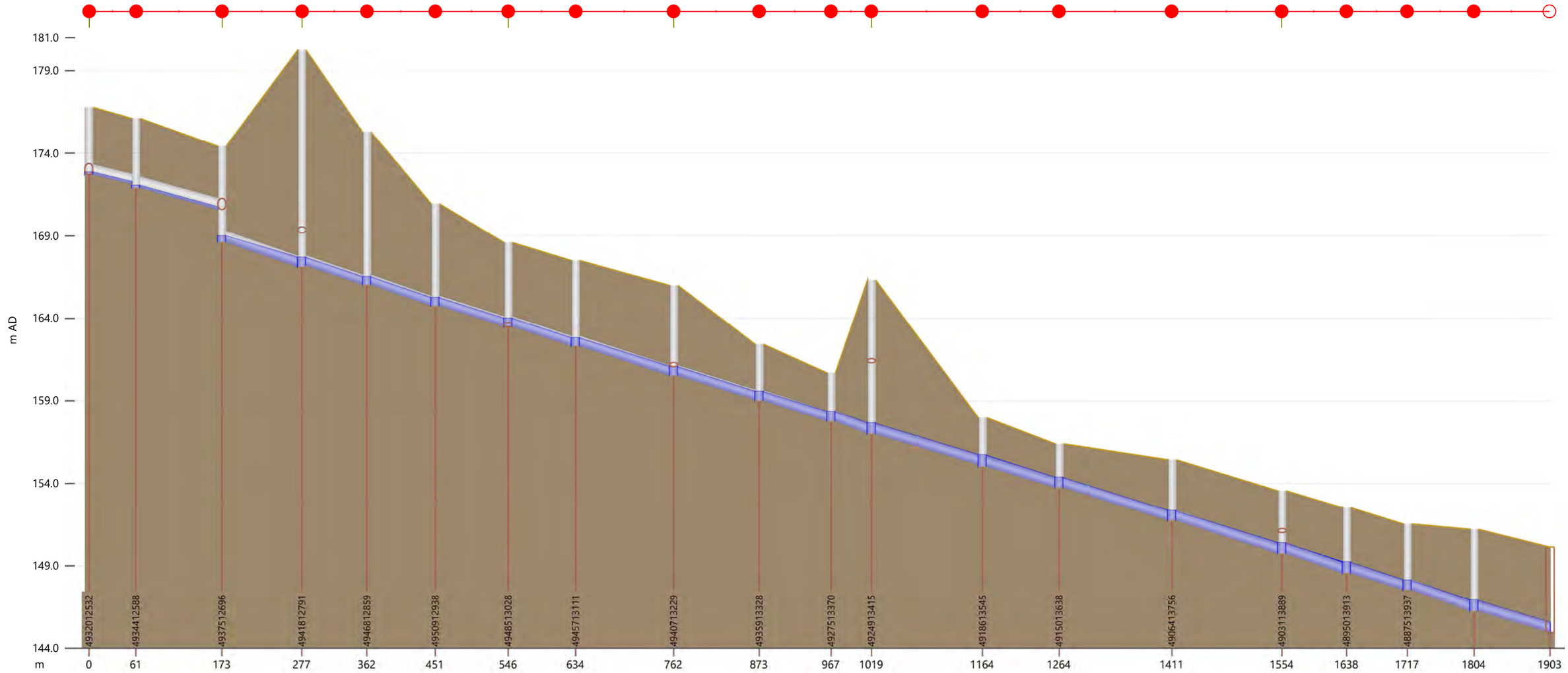

Link	-	4934412588.1	4937512696.1	-	-	-	-	4945713111.1	4940713229.1	-	-	4924913415.1	4918613545.1	4915013638.1	4906413756.1	-	-	-	4880313986.1
length (m)	61.2	112.0	104.2	84.7	89.0	95.0	87.9	127.6	111.5	93.7	52.6	144.5	99.9	146.9	143.4	84.2	79.1	87.0	98.8
width (mm)	675	750	750	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00927	0.01161	0.01440	0.01382	0.01438	0.01316	0.01354	0.01403	0.01328	0.01335	-	0.01280	0.01271	0.01355	0.01402	0.01413	0.01277	0.01495	0.01296
pfc (m3/s)	0.809	1.200	1.336	0.988	1.008	0.964	0.978	0.996	0.969	0.971	1.004	0.951	0.948	0.979	0.995	0.999	0.950	1.028	0.957
surc	0.22	0.21	0.79	0.74	0.76	0.75	0.75	0.83	0.78	0.88	0.96	0.95	0.98	0.90	0.97	1.00	0.96	1.00	0.95
US flow (m3/s)	0.08411	0.08410	0.68077	0.81243	0.81242	0.82100	0.82528	0.82744	0.89960	0.90001	-	0.92870	0.93426	0.93414	0.93389	0.93963	0.93961	0.93960	0.93956
DS flow (m3/s)	0.08410	0.08410	0.68078	0.81243	0.81243	0.82100	0.82529	0.82744	0.89960	0.89995	-	0.92869	0.93414	0.93389	0.93377	0.93961	0.93961	0.93957	0.93956

Node	-	-	4937512696	-	-	-	-	4945713111	4940713229	4935913328	-	4924913415	4918613545	4915013638	4906413756	4903113889	-	-	-	-
flood dep (m)	-	-2.260	-3.632	-10.754	-6.953	-3.888	-2.802	-2.900	-3.128	-1.059	-0.546	-6.877	-0.460	-0.225	-1.274	-1.365	-1.502	-1.616	-2.505	

Figure 2-10 - WWF Sanitary Sewer Profile - Pre-development (Between node 4932012532 and node 4872414044)

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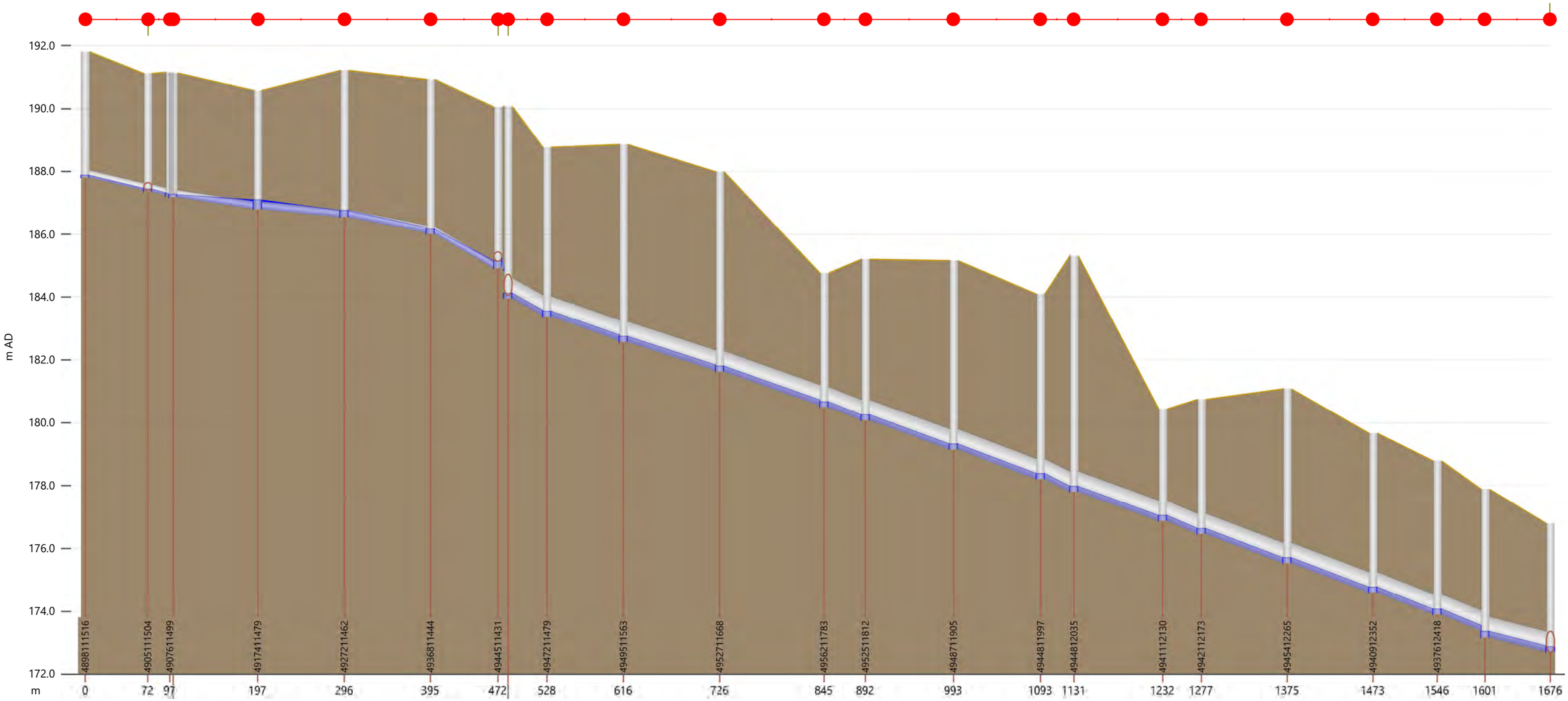

Link	-	-	4907911496.1	4917411479.1	4927211462.1	-	-	4947211479.1	4949511563.1	4952711668.1	-	4952511812.1	4948711905.1	-	4944812035.1	-	4942112173.1	4945412265.1	-	-	-
length (m)	71.6	-	96.7	99.1	98.5	77.3	44.5	87.5	110.1	119.2	47.3	100.7	99.5	38.2	101.6	44.2	98.3	98.0	73.5	54.6	74.7
width (mm)	250	-	250	250	250	250	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00573	-	0.00383	0.00252	0.00508	0.01421	-	0.00865	0.00824	0.00901	-	0.00923	0.00955	-	0.00916	-	0.00946	0.00949	0.00953	0.00952	0.00620
pfc (m3/s)	0.045	-	0.037	0.030	0.042	0.071	0.927	0.782	0.763	0.798	0.783	0.808	0.821	0.860	0.804	0.810	0.818	0.819	0.821	0.820	0.662
surc	0.25	-	1.00	2.00	0.80	0.92	0.24	0.26	0.26	0.25	0.26	0.25	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.28
DS flow (m3/s)	0.00555	-	0.00831	0.03345	0.04041	0.04430	-	0.10790	0.10790	0.10789	-	0.10788	0.10806	-	0.10805	-	0.10860	0.10859	0.10859	0.10858	0.10858

Node	-	-	-	4917411479	4927211462	4936811444	-	-	-	4949511563	4952711668	-	-	4948711905	-	-	-	-	4945412265	4940912352	-	-	-
flood dep (m)	-	-	-2.068	-1.694	-2.661	-2.974	-	-	-3.431	-4.329	-4.403	-2.295	-3.150	-4.042	-3.921	-5.539	-1.605	-2.317	-3.585	-3.101	-2.921	-2.729	-

Figure 2-11 - WWF Sanitary Sewer Profile - Post-development - 250 mm (Between Node 4898111516 and node 4932012532)

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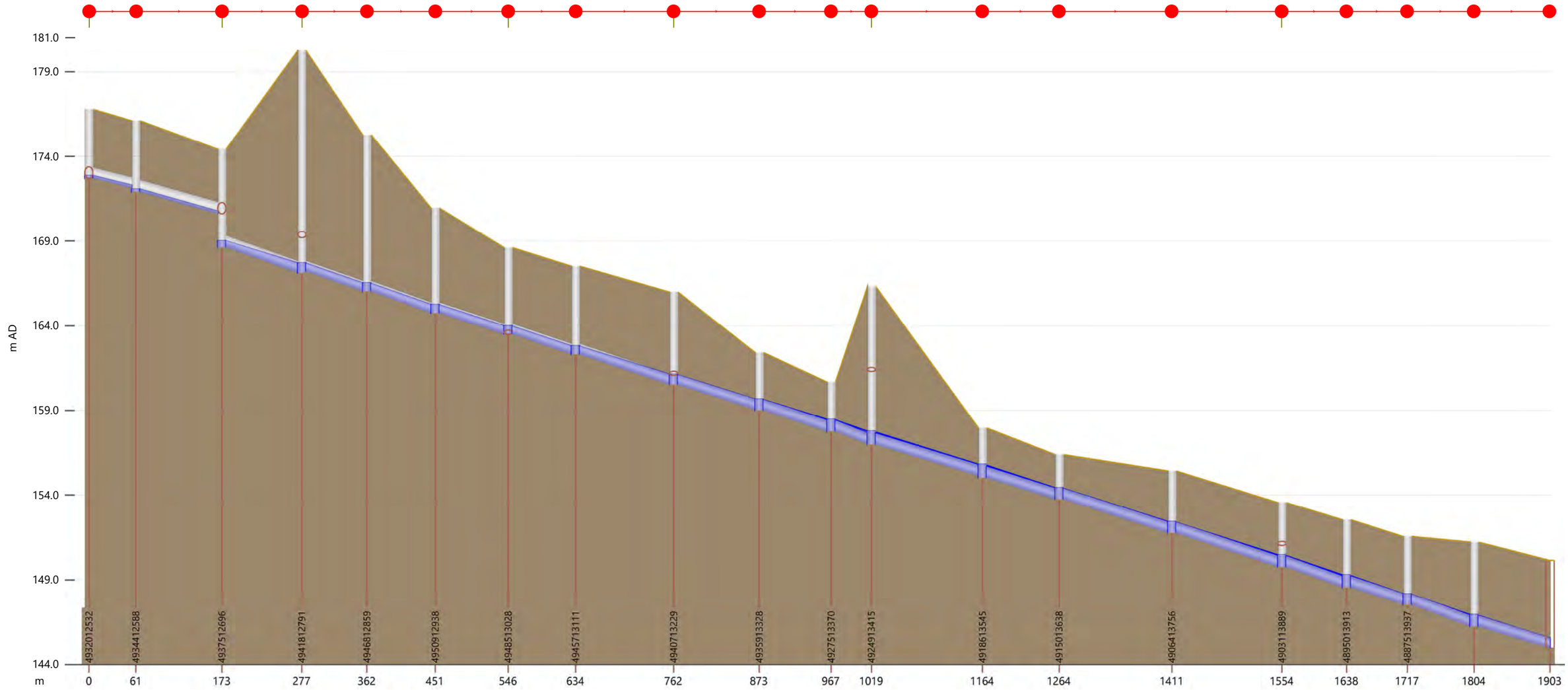

Link	-	4934412588.1	4937512696.1	-	-	-	-	4945713111.1	4940713229.1	-	-	4924913415.1	4918613545.1	4915013638.1	4906413756.1	-	-	-	4880313986.1
length (m)	61.2	112.0	104.2	84.7	89.0	95.0	87.9	127.6	111.5	93.7	52.6	144.5	99.9	146.9	143.4	84.2	79.1	87.0	98.8
width (mm)	675	750	750	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00927	0.01161	0.01440	0.01382	0.01438	0.01316	0.01354	0.01403	0.01328	0.01335	-	0.01280	0.01271	0.01355	0.01402	0.01413	0.01277	0.01495	0.01296
pfc (m3/s)	0.809	1.200	1.336	0.988	1.008	0.964	0.978	0.996	0.969	0.971	1.004	0.951	0.948	0.979	0.995	0.999	0.950	1.028	0.957
surc	0.25	0.22	0.80	0.75	0.77	0.76	0.76	0.93	0.95	1.00	1.00	1.00	2.00	1.00	1.00	1.00	2.00	1.00	0.99
DS flow (m3/s)	0.10858	0.10858	0.69825	0.82993	0.82993	0.83852	0.84281	0.84465	0.91574	0.91535	-	0.94345	0.94878	0.94826	0.94805	0.95373	0.95371	0.95369	0.95369

Node	-	-	4937512696	-	-	-	-	4945713111	4940713229	4935913328	-	4924913415	4918613545	4915013638	4906413756	4903113889	-	-	-	-
flood dep (m)	-	-2.246	-3.624	-10.748	-6.946	-3.880	-2.795	-2.895	-3.061	-0.945	-0.409	-6.745	-0.351	-0.160	-1.195	-1.275	-1.442	-1.570	-2.472	

Figure 2-12 - WWF Sanitary Sewer Profile - Post-development - 250 mm (Between node 4932012532 and node 4872414044)

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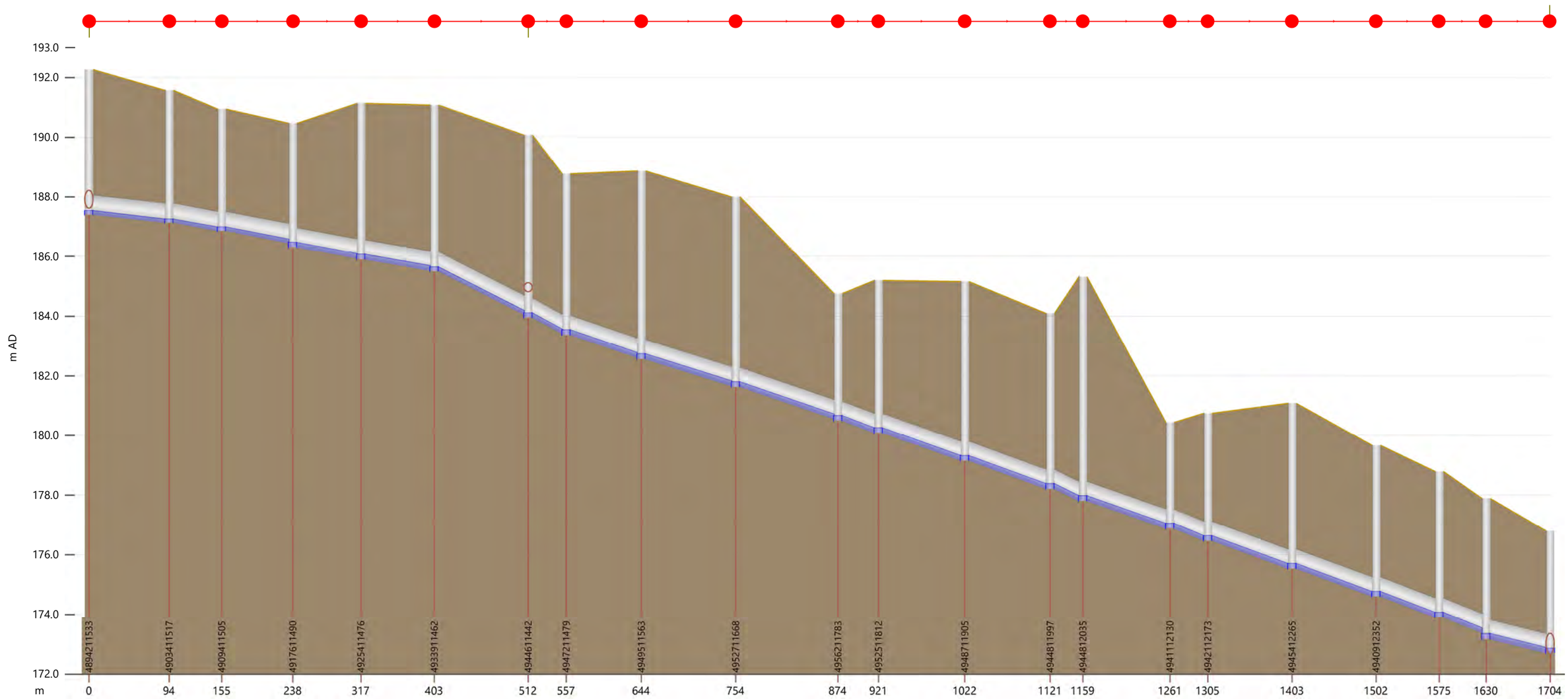

Link	4894211533.1	-	-	-	-	4933911462.1	-	4947211479.1	4949511563.1	4952711668.1	-	4952511812.1	4948711905.1	-	4944812035.1	-	4942112173.1	4945412265.1	-	-	-
length (m)	93.6	61.3	83.0	79.4	85.6	109.4	44.5	87.5	110.1	119.2	47.3	100.7	99.5	38.2	101.6	44.2	98.3	98.0	73.5	54.6	74.7
width (mm)	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00289	0.00457	0.00488	0.00470	0.00443	0.01324	-	0.00865	0.00824	0.00901	-	0.00923	0.00955	-	0.00916	-	0.00946	0.00949	0.00953	0.00952	0.00620
pfc (m3/s)	0.452	0.568	0.587	0.576	0.559	0.967	0.927	0.782	0.763	0.798	0.783	0.808	0.821	0.860	0.804	0.810	0.818	0.819	0.821	0.820	0.662
surc	0.20	0.20	0.20	0.25	0.25	0.21	0.24	0.26	0.26	0.25	0.26	0.25	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.28
DS flow (m3/s)	0.03603	0.03602	0.04758	0.07326	0.07324	0.07324	-	0.10834	0.10834	0.10833	-	0.10832	0.10851	-	0.10851	-	0.10911	0.10910	0.10910	0.10910	0.10910

Node	-	-	-	-	-	4933911462	-	-	4949511563	4952711668	-	-	4948711905	-	-	-	-	4945412265	4940912352	-	-	-
flood dep (m)	-	-2.523	-2.163	-2.210	-3.274	-3.642	-4.168	-3.430	-4.329	-4.402	-2.294	-3.149	-4.042	-3.921	-5.539	-1.604	-2.317	-3.585	-3.100	-2.920	-2.729	-

Figure 2-13 - WWF Sanitary Sewer Profile - Post-development - 675 mm (Between Node 4894211533 and node 4932012532)

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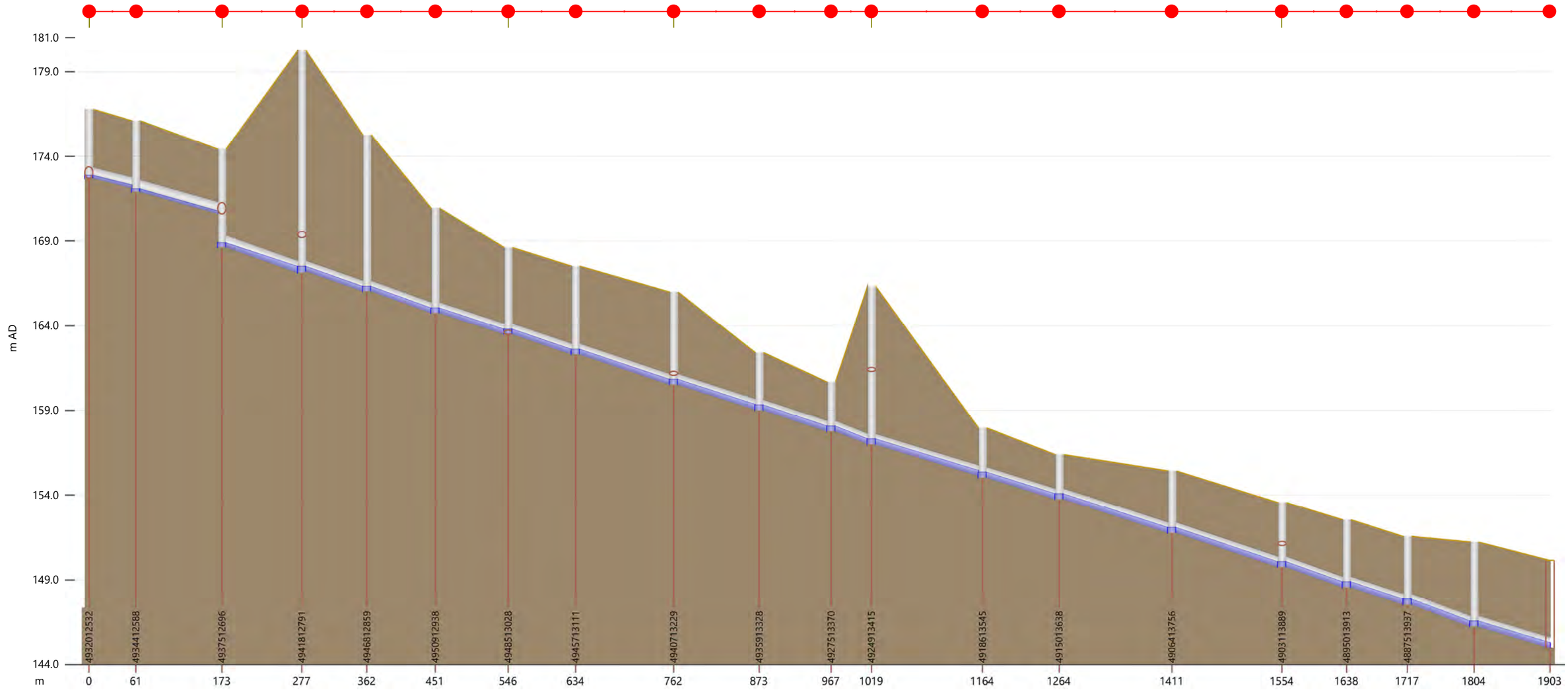

Link	-	4934412588.1	4937512696.1	-	-	-	-	4945713111.1	4940713229.1	-	-	4924913415.1	4918613545.1	4915013638.1	4906413756.1	-	-	-	4880313986.1
length (m)	61.2	112.0	104.2	84.7	89.0	95.0	87.9	127.6	111.5	93.7	52.6	144.5	99.9	146.9	143.4	84.2	79.1	87.0	98.8
width (mm)	675	750	750	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675
grad (m/m)	0.00927	0.01161	0.01440	0.01382	0.01438	0.01316	0.01354	0.01403	0.01328	0.01335	-	0.01280	0.01271	0.01355	0.01402	0.01413	0.01277	0.01495	0.01296
pfc (m3/s)	0.809	1.200	1.336	0.988	1.008	0.964	0.978	0.996	0.969	0.971	1.004	0.951	0.948	0.979	0.995	0.999	0.950	1.028	0.957
surc	0.25	0.22	0.51	0.43	0.44	0.44	0.44	0.46	0.46	0.46	0.45	0.48	0.48	0.47	0.47	0.48	0.48	0.48	0.48
DS flow (m3/s)	0.10909	0.10909	0.30536	0.36526	0.36526	0.36779	0.36993	0.37056	0.40284	0.40296	-	0.41680	0.41844	0.41843	0.41842	0.42082	0.42082	0.42082	0.42081

Node	-	-	4937512696	-	-	-	-	4945713111	4940713229	4935913328	-	4924913415	4918613545	4915013638	4906413756	4903113889	-	-	-	-
flood dep (m)	-	-2.246	-3.763	-10.962	-7.158	-4.100	-3.013	-3.111	-3.373	-1.313	-0.831	-7.230	-0.836	-0.533	-1.563	-1.701	-1.863	-1.904	-2.861	

Figure 2-14 - WWF Sanitary Sewer Profile - Post-development - 675 mm (Between node 4932012532 and node 4872414044)

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This analysis reveals that the HGL freeboard will be greater than 1.8 m during the WWF in pre-development and post-development conditions for the entire downstream network. Considering the freeboard conditions within the downstream network, there is sufficient capacity in the downstream sanitary sewer network to accept flow from the subject site during WWF conditions equivalent to the May 12, 2000 storm as gauged by Oriole Yard.

3.0 CONCLUSIONS

This sanitary analysis report presents the impact of the proposed development on the existing sanitary sewer network and compares two separate servicing schemes for WWF and DWF using a dynamic model.

The dynamic analysis of WWF and DWF conditions utilized an InfoWorks model provided by the city. The model was updated based on developments proposed, approved, and constructed since the model was developed to simulate pre-development conditions. To simulate post-development conditions, two scenarios were considered to characterize the effects on the subject sanitary sewer network. The scenarios considered servicing the subject site via either the 250 mm (near) sewer along Yonge Street or the 675 mm (far) sewer on Yonge Street. The City of Toronto Design Criteria for Sewers and Watermains was used to estimate all updated and proposed populations in the model. Assignment of population estimates into the model is discussed in detail in the report.

The subject downstream sanitary network in WWF conditions, based on the May 12, 2000 rain event as gauged by Oriole Yard, has all nodes with an HGL freeboard greater than 1.8 m in post-development conditions for pre-development and both post-development servicing scenarios. These results indicate that the existing downstream network has adequate capacity to accept flow from the subject development during WWF conditions equivalent to the May 12, 2000 rain event as gauged by Oriole Yard when serviced by either the 250 mm (near) sewer or the 675 mm (far) sewer.

The DWF simulation results indicate that there are no pipes with surcharge conditions during pre-development conditions within the downstream sanitary sewer network. During post-development DWF, when the subject site is serviced by the 250mm (near) sanitary sewer along Yonge Street, it is indicated that there will be a surcharge condition along Yonge Street. It was shown that the surcharge condition within Yonge street would be eliminated by upsizing the pipe between nodes 4917411479 and 4927211462 from a 250 mm pipe to a 375 mm pipe. In the other post-development scenario, when considering servicing the subject site via the 675 mm (far) sewer along Yonge Street, there were no surcharge conditions within the downstream sanitary sewer

network. Considering that in the 675 mm (far) servicing scenario, there are no DWF issues, and that in the 250 mm servicing scenario there is one upgrade required, it can be recommended that the subject site be serviced by the 675 mm (far) sewer along Yonge Street. However, if the city requires that the subject site is serviced by the 250 mm (near) sewer, then the upgrade as discussed in this report will be required to provide capacity within the subject downstream sanitary sewer network for DWF.

We trust that you will find the contents of this report satisfactory. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

Pavel Recnik, B.A.Sc.
Water Resources Analyst

Koryun Shahbikian, LLM, M.Eng., P.Eng.
Associate

APPENDIX A

Population Estimates

Population Estimate Calculation

Project: 5800 Yonge Street

Project No: 4685

Municipality: City of Toronto

Proposed Mixed-Use Development Phase 1 (Tower 1 & 2)

Site/Unit Type	Units/Area	Pop. Density (Person/unit) [1]	Pop. Density (Person/100m^2) [1]	Population [2]
1-Bedroom	440 units	1.4		616
2-Bedroom	254 units	2.1		534
3-Bedroom	77 units	3.1		239
Commercial	0 m²		1.1	0
Office	1082 m²		3.3	36
Daycare (school) [3]	741 m²		2.58	20
Total				1445

Proposed Mixed-Use Development Phase 2 (Tower 3 and 4)

Site/Unit Type	Units/Area	Pop. Density (Person/unit) [1]	Pop. Density (Person/100m^2) [1]	Population [2]
1-Bedroom	425 units	1.4		595
2-Bedroom	282 units	2.1		593
3-Bedroom	80 units	3.1		248
Commercial	1956 m²		1.1	22
Office	2656 m²		3.3	88
Daycare (school) [3]	0 m²		2.58	0
Total				1546
			Total Post-Population	2991

Pre-Development Conditions (Subject Site)

Site/Unit Type	Units/Area	Pop. Density (Person/unit) [1]	Pop. Density (Person/100m^2) [1]	Population [2]
Commercial	0 m²		1.1	0
Residential (unit mix unknown)	0 units	2.7		0
Office	8200 m²		3.3	271
Daycare (school) [3]	0 m²		2.58	0
Total				271

Notes:

(1) - Populations Densities based on City of Toronto Design Criteria for Sewers and Watermains

(2) - Population rounded up for each site/unit type before being carried forward for additional calculations

(3) - Assumed Daycare has equivalent population to school

APPENDIX B

InfoWorks Outputs

City of Toronto

Population Change Estimate

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Fax: (905) 738-6875
design@schaeffers.com

PROJECT No.: 4685
PROJECT NAME: 5800 Yonge Street
LOCATION: 5800 Yonge Street
DATE: 20-Jun-19
DESIGNED BY: P.R
CHECKED BY: K.S.

Location			Population			Infiltration
	Floor Area [ha]	Units	Rate	Unit	Total Pop	L/s
43 Drewry Avenue						
Open Space	0.00		0	pp/ha	-	-
Residential - Townhouse	0.00	45	2.7	pp/unit	122	-
Highrise residential - 2 bed	0.00		2.1	pp/unit	-	-
Highrise residential - 3 bed	0.00		3.1	pp/unit	-	-
Commercial	0.00		1.1	pp/ha	-	-
Hotel/motel			0.5	pp/bed	-	-
Sub Total - Area	-	45			122	-
5840 YONGE ST						
Open Space	0.00		0	pp/ha	-	-
Highrise residential - 1 bed	0.00	152.00	1.4	pp/unit	213	-
Highrise residential - 2 bed	0.00	216.00	2.1	pp/unit	454	-
Highrise residential - 3 bed	0.00	40.00	3.1	pp/unit	124	-
Commercial	0.38	-	1.1	pp/100m2	42	0.10
Hotel/motel			0.5	pp/bed	-	-
Sub Total - Area	0.38	408			833	0.10
5799-5915 YONGE ST						
Highrise residential - 1 bed	0.00	284.00	1.4	pp/unit	398	-
Highrise residential - 2 bed	0.00	454.00	2.1	pp/unit	954	-
Highrise residential - 3 bed	0.00	72.00	3.1	pp/unit	224	-
Office	0.39	-	3.3	pp/100m2	130	0.10
Retail	0.37	-	1.1	pp/100m2	41	0.10
Sub Total - Area	0.76	810			1,747	0.20
5740 YONGE ST						
Highrise residential - 1 bed	0.00	0.00	1.4	pp/unit	-	-
Highrise residential - 2 bed	0.00	212.00	2.1	pp/unit	446	-
Highrise residential - 3 bed	0.00	2.00	3.1	pp/unit	7	-
Sub Total - Area	-	214			453	-
5791-5793 YONGE ST						
Residential - Unit Mix Unknown	0.00	388.00	2.7	pp/unit	1,048	-
Sub Total - Area	-	388			1,048	-
5775 Yonge Street						
Office	2.53	-	3.3	pp/100m2	837	0.66
Sub Total - Area	2.53	-			837	0.66
5650-5700 Yonge Street						
Office	10.96	-	3.3	pp/100m2	3,618	2.85
Sub Total - Area	10.96	-			3,618	2.85
5734 Yonge Street						
Office	0.58	-	3.3	pp/100m2	193	0.15
Sub Total - Area	0.58	-			193	0.15

Subcatchment Changes

subcatchment ID	Existing Population	Removals	Removal Rate	Removed Population	Additional Population	New Population	Additional Population Source
4941011250-2	159	0	0	0	122	281	43 Drewry Avenue
4927211462	0	0.16 ha	110	18	833	833 ***	5840 YONGE ST
5799 Yonge**	0	1.415	110	156	1747	1591	5799-5915 YONGE ST
4909411505	313	0	0	0	1048	1361	5791-5793 YONGE ST
4898111516*	0	0	0	0	646	646	5740 YONGE ST, 5734 Yonge Street
4894211533*	414	0	0	0	837	1251	5775 Yonge Street
4868311419*	46	0	0	0	3618	3664	5650-5700 Yonge Street

*Some or all of the additional population is from office space
** New subcatchment
*** No Removal since original model has zero population for the subject site.

Flow and depth results

Printed on: 2019-07-24

Dry Weather Flow - Pre-development to Post-Development Comparison: Serviced by 250mm sewer

Location	Manhole		Pipe				Flow (q) (m3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	D/S	Size (m)	Length (m)	Slope (%)	Q_{full} (m3/s)	Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Eastern 675mm Sanitary Sewer on Yonge Street														
Yonge Street	4894211533	4903411517	0.675	93.60	0.29	0.452	0.0361	0.0361	0.080	0.080	0.134	0.134	0.199	0.199
Yonge Street	4903411517	4909411505	0.675	61.30	0.46	0.568	0.0360	0.0360	0.063	0.063	0.135	0.135	0.200	0.200
Yonge Street	4909411505	4917611490	0.675	83.00	0.49	0.587	0.0476	0.0476	0.081	0.081	0.135	0.135	0.200	0.200
Yonge Street	4917611490	4925411476	0.675	79.40	0.47	0.576	0.0476	0.0476	0.083	0.083	0.136	0.136	0.201	0.201
Yonge Street	4925411476	4933911462	0.675	85.60	0.44	0.559	0.0476	0.0476	0.085	0.085	0.138	0.138	0.204	0.204
Yonge Street	4933911462	4944611442	0.675	109.40	1.32	0.967	0.0476	0.0476	0.049	0.049	0.122	0.122	0.181	0.181
Western 250mm Sanitary Sewer on Yonge Street														
Yonge Street	4898111516	4905111504	0.250	71.60	0.57	0.045	0.0056	0.0056	0.124	0.124	0.063	0.063	0.252	0.252
Yonge Street	4905111504	4907611499	0.250	25.20	0.44	0.039	0.0075	0.0075	0.192	0.192	0.076	0.076	0.304	0.304
Yonge Street	4907611499	4907911496	0.250	3.80	1.33	0.068	0.0079	0.0079	0.116	0.116	0.081	0.082	0.324	0.328
Yonge Street	4907911496	4917411479	0.250	96.70	0.38	0.037	0.0079	0.0084	0.213	0.226	0.085	0.282	0.340	1.128
Yonge Street [1]	4917411479	4927211462	0.250	99.10	0.25	0.030	0.0088	0.0336	0.293	1.119	0.108	0.289	0.432	1.156
Yonge Street	4927211462	4936811444	0.250	98.50	0.51	0.042	0.0158	0.0405	0.376	0.965	0.108	0.201	0.432	0.804
Yonge Street	4936811444	4944511431	0.250	77.30	1.42	0.071	0.0197	0.0444	0.278	0.626	0.191	0.231	0.764	0.924
Cummer Avenue	4944511431	4944611442	0.300	11.60	1.63	0.123	0.0231	0.0478	0.188	0.389	0.092	0.133	0.307	0.443
Downstream of confluence of Yonge Street Sanitary Sewers														
Cummer Avenue	4944611442	4947211479	0.675	44.50	1.22	0.927	0.0706	0.0953	0.076	0.103	0.142	0.160	0.210	0.237
Cummer Avenue	4947211479	4944511431	0.675	87.50	0.87	0.782	0.0836	0.1083	0.107	0.139	0.151	0.174	0.224	0.258
Cummer Avenue	4949511563	4952711668	0.675	110.10	0.82	0.763	0.0836	0.1083	0.110	0.142	0.153	0.176	0.227	0.261
Cummer Avenue	4952711668	4956211783	0.675	119.20	0.90	0.798	0.0835	0.1083	0.105	0.136	0.150	0.172	0.222	0.255
Easement	4956211783	4952511812	0.675	47.30	0.87	0.783	0.0835	0.1083	0.107	0.138	0.151	0.173	0.224	0.256
Easement	4952511812	4948711905	0.675	100.70	0.92	0.808	0.0835	0.1083	0.103	0.134	0.149	0.171	0.221	0.253
Easement	4948711905	4944811997	0.675	99.50	0.96	0.821	0.0837	0.1085	0.102	0.132	0.156	0.176	0.231	0.261
Easement	4944811997	4944812035	0.675	38.20	1.05	0.860	0.0837	0.1085	0.097	0.126	0.156	0.176	0.231	0.261
Easement	4944812035	4941112130	0.675	101.60	0.92	0.804	0.0837	0.1085	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4941112130	4942112173	0.675	44.20	0.93	0.810	0.0837	0.1085	0.103	0.134	0.149	0.170	0.221	0.252
Easement	4942112173	4945412265	0.675	98.30	0.95	0.818	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4945412265	4940912352	0.675	98.00	0.95	0.819	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4940912352	4937612418	0.675	73.50	0.95	0.821	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4937612418	4934212460	0.675	54.60	0.95	0.820	0.0843	0.1091	0.103	0.133	0.148	0.170	0.219	0.252
Easement	4934212460	4932012532	0.675	74.70	0.62	0.662	0.0843	0.1091	0.127	0.165	0.166	0.189	0.246	0.280
Easement	4932012532	4934412588	0.675	61.20	0.93	0.809	0.0843	0.1091	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4934412588	4937512696	0.750	112.00	1.16	1.200	0.0843	0.1091	0.070	0.091	0.154	0.168	0.205	0.224
Easement	4937512696	4941812791	0.750	104.20	1.44	1.336	0.2806	0.3053	0.210	0.228	0.374	0.382	0.499	0.509
Easement	4941812791	4946812859	0.675	84.70	1.38	0.988	0.3405	0.3652	0.345	0.370	0.284	0.292	0.421	0.433
Easement	4946812859	4950912938	0.675	89.00	1.44	1.008	0.3405	0.3652	0.338	0.362	0.288	0.296	0.427	0.439
Easement	4950912938	4948513028	0.675	95.00	1.32	0.964	0.3430	0.3677	0.356	0.381	0.288	0.296	0.427	0.439
Easement	4948513028	4945713111	0.675	87.90	1.35	0.978	0.3452	0.3698	0.353	0.378	0.287	0.295	0.425	0.437
Easement	4945713111	4940713229	0.675	127.60	1.40	0.996	0.3458	0.3705	0.347	0.372	0.300	0.313	0.444	0.464
Easement	4940713229	4935913328	0.675	111.50	1.33	0.969	0.3781	0.4027	0.390	0.416	0.300	0.312	0.444	0.462
Easement	4935913328	4927513370	0.675	93.70	1.34	0.971	0.3782	0.4028	0.390	0.415	0.299	0.312	0.443	0.462
Easement	4927513370	4924913415	0.675	52.60	1.43	1.004	0.3782	0.4028	0.377	0.401	0.294	0.305	0.436	0.452
Easement	4924913415	4918613545	0.675	144.50	1.28	0.951	0.3921	0.4167	0.412	0.438	0.310	0.324	0.459	0.480
Easement	4918613545	4915013638	0.675	99.90	1.27	0.948	0.3937	0.4183	0.415	0.441	0.312	0.325	0.462	0.481
Easement	4915013638	4906413756	0.675	146.90	1.36	0.979	0.3937	0.4183	0.402	0.427	0.305	0.319	0.452	0.473
Easement	4906413756	4903113889	0.675	143.40	1.40	0.995	0.3937	0.4183	0.396	0.420	0.303	0.316	0.449	0.468
Easement	4903113889	4895013913	0.675	84.20	1.41	0.999	0.3961	0.4207	0.397	0.421	0.313	0.326	0.464	0.483
Easement	4895013913	4887513937	0.675	79.10	1.28	0.950	0.3961	0.4207	0.417	0.443	0.313	0.326	0.464	0.483
Easement	4887513937	4880313986	0.675	87.00	1.50	1.028	0.3961	0.4207	0.385	0.409	0.312	0.325	0.462	0.481
Easement	4880313986	4872414044	0.675	98.80	1.30	0.957	0.3961	0.4207	0.414	0.440	0.311	0.324	0.461	0.480

(1) - Flow from the subject site is released at this location.

Maximum Hydraulic Gradeline

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Dry Weather Flow - Pre-development to Post-Development Comparison: Serviced by 250mm sewer

Location	MH	T/G (m)	Max Allowable HGL (m)	Pre-Development		Post Development	
				Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Eastern 675mm Sanitary Sewer on Yonge Street							
Yonge Street	4894211533	192.266	190.466	187.534	4.732	187.534	4.732
Yonge Street	4903411517	191.573	189.773	187.250	4.323	187.250	4.323
Yonge Street	4909411505	190.948	189.148	186.985	3.963	186.985	3.963
Yonge Street	4917611490	190.476	188.676	186.436	4.040	186.436	4.040
Yonge Street	4925411476	191.139	189.339	186.035	5.104	186.035	5.104
Yonge Street	4933911462	191.082	189.282	185.620	5.462	185.620	5.462
Western 250mm Sanitary Sewer on Yonge Street							
Yonge Street	4898111516	191.803	190.003	187.873	3.930	187.873	3.930
Yonge Street	4905111504	191.116	189.316	187.436	3.680	187.436	3.680
Yonge Street	4907611499	191.154	189.354	187.295	3.859	187.295	3.859
Yonge Street	4907911496	191.130	189.330	187.261	3.869	187.262	3.868
Yonge Street [(1)]	4917411479	190.584	188.784	186.895	3.689	187.092	3.492
Yonge Street	4927211462	191.213	189.413	186.658	4.555	186.754	4.459
Yonge Street	4936811444	190.931	189.131	186.103	4.828	186.158	4.773
Cummer Avenue	4944511431	190.056	188.256	185.102	4.954	185.143	4.913
Downstream of confluence of Yonge Street Sanitary Sewers							
Cummer Avenue	4944611442	190.078	188.278	184.092	5.986	184.110	5.968
Cummer Avenue	4947211479	188.773	186.973	183.520	5.253	183.543	5.230
Cummer Avenue	4949511563	188.867	187.067	182.715	6.152	182.738	6.129
Cummer Avenue	4952711668	187.999	186.199	181.775	6.224	181.797	6.202
Easement	4956211783	184.759	182.959	180.642	4.117	180.665	4.094
Easement	4952511812	185.200	183.400	180.229	4.971	180.251	4.949
Easement	4948711905	185.161	183.361	179.298	5.863	179.319	5.842
Easement	4944811997	184.097	182.297	178.356	5.741	178.376	5.721
Easement	4944812035	185.310	183.510	177.949	7.361	177.971	7.339
Easement	4941112130	180.445	178.645	177.019	3.426	177.041	3.404
Easement	4942112173	180.747	178.947	176.609	4.138	176.630	4.117
Easement	4945412265	181.085	179.285	175.679	5.406	175.700	5.385
Easement	4940912352	179.670	177.870	174.749	4.921	174.770	4.900
Easement	4937612418	178.790	176.990	174.049	4.741	174.070	4.720
Easement	4934212460	177.889	176.089	173.337	4.552	173.360	4.529
Easement	4932012532	176.796	174.996	172.847	3.949	172.869	3.927
Easement	4934412588	176.115	174.315	172.055	4.060	172.069	4.046
Easement	4937512696	174.430	172.630	168.857	5.573	168.867	5.563
Easement	4941812791	180.254	178.454	167.484	12.770	167.492	12.762
Easement	4946812859	175.278	173.478	166.312	8.966	166.320	8.958
Easement	4950912938	170.946	169.146	165.038	5.908	165.046	5.900
Easement	4948513028	168.608	166.808	163.787	4.821	163.795	4.813
Easement	4945713111	167.514	165.714	162.595	4.919	162.603	4.911
Easement	4940713229	166.006	164.206	160.820	5.186	160.833	5.173
Easement	4935913328	162.425	160.625	159.300	3.125	159.312	3.113
Easement	4927513370	160.686	158.886	158.045	2.641	158.055	2.631
Easement	4924913415	166.324	164.524	157.281	9.043	157.294	9.030

Flow and depth resutls

Printed on: 2019-07-24

Dry Weather Flow - Pre-development to Post-Development Comparison: Serviced by 675mm sewer

Location	Manhole		Pipe			Q_{full} (m3/s)	Flow (q) (m3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	D/S	Size (m)	Length (m)	Slope (%)		Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Eastern 675mm Sanitary Sewer on Yonge Street														
Yonge Street	4894211533	4903411517	0.675	93.60	0.29	0.452	0.0361	0.0361	0.080	0.080	0.134	0.134	0.199	0.199
Yonge Street	4903411517	4909411505	0.675	61.30	0.46	0.568	0.0360	0.0360	0.063	0.063	0.135	0.135	0.200	0.200
Yonge Street	4909411505	4917611490	0.675	83.00	0.49	0.587	0.0476	0.0476	0.081	0.081	0.135	0.135	0.200	0.200
Yonge Street [1]	4917611490	4925411476	0.675	79.40	0.47	0.576	0.0476	0.0733	0.083	0.127	0.136	0.166	0.201	0.246
Yonge Street	4925411476	4933911462	0.675	85.60	0.44	0.559	0.0476	0.0733	0.085	0.131	0.138	0.168	0.204	0.249
Yonge Street	4933911462	4944611442	0.675	109.40	1.32	0.967	0.0476	0.0732	0.049	0.076	0.122	0.142	0.181	0.210
Western 250mm Sanitary Sewer on Yonge Street														
Yonge Street	4898111516	4905111504	0.250	71.60	0.57	0.045	0.0056	0.0056	0.124	0.124	0.063	0.063	0.252	0.252
Yonge Street	4905111504	4907611499	0.250	25.20	0.44	0.039	0.0075	0.0075	0.192	0.192	0.076	0.076	0.304	0.304
Yonge Street	4907611499	4907911496	0.250	3.80	1.33	0.068	0.0079	0.0079	0.116	0.116	0.081	0.081	0.324	0.324
Yonge Street	4907911496	4917411479	0.250	96.70	0.38	0.037	0.0079	0.0079	0.213	0.213	0.085	0.081	0.340	0.324
Yonge Street [2]	4917411479	4927211462	0.250	99.10	0.25	0.030	0.0088	0.0079	0.293	0.262	0.108	0.105	0.432	0.420
Yonge Street	4927211462	4936811444	0.250	98.50	0.51	0.042	0.0158	0.0149	0.376	0.354	0.108	0.105	0.432	0.420
Yonge Street	4936811444	4944511431	0.250	77.30	1.42	0.071	0.0197	0.0188	0.278	0.265	0.191	0.189	0.764	0.756
Cummer Avenue	4944511431	4944611442	0.300	11.60	1.63	0.123	0.0231	0.0221	0.188	0.180	0.092	0.090	0.307	0.300
Downstream of confluence of Yonge Street Sanitary Sewers														
Cummer Avenue	4944611442	4947211479	0.675	44.50	1.22	0.927	0.0706	0.0953	0.076	0.103	0.142	0.160	0.210	0.237
Cummer Avenue	4947211479	4944511431	0.675	87.50	0.87	0.782	0.0836	0.1084	0.107	0.139	0.151	0.174	0.224	0.258
Cummer Avenue	4949511563	4952711668	0.675	110.10	0.82	0.763	0.0836	0.1083	0.110	0.142	0.153	0.176	0.227	0.261
Cummer Avenue	4952711668	4956211783	0.675	119.20	0.90	0.798	0.0835	0.1083	0.105	0.136	0.150	0.172	0.222	0.255
Easement	4956211783	4952511812	0.675	47.30	0.87	0.783	0.0835	0.1083	0.107	0.138	0.151	0.174	0.224	0.258
Easement	4952511812	4948711905	0.675	100.70	0.92	0.808	0.0835	0.1083	0.103	0.134	0.149	0.171	0.221	0.253
Easement	4948711905	4944811997	0.675	99.50	0.96	0.821	0.0837	0.1085	0.102	0.132	0.156	0.176	0.231	0.261
Easement	4944811997	4944812035	0.675	38.20	1.05	0.860	0.0837	0.1085	0.097	0.126	0.156	0.176	0.231	0.261
Easement	4944812035	4941112130	0.675	101.60	0.92	0.804	0.0837	0.1085	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4941112130	4942112173	0.675	44.20	0.93	0.810	0.0837	0.1085	0.103	0.134	0.149	0.170	0.221	0.252
Easement	4942112173	4945412265	0.675	98.30	0.95	0.818	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4945412265	4940912352	0.675	98.00	0.95	0.819	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4940912352	4937612418	0.675	73.50	0.95	0.821	0.0843	0.1091	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4937612418	4934212460	0.675	54.60	0.95	0.820	0.0843	0.1091	0.103	0.133	0.148	0.170	0.219	0.252
Easement	4934212460	4932012532	0.675	74.70	0.62	0.662	0.0843	0.1091	0.127	0.165	0.166	0.189	0.246	0.280
Easement	4932012532	4934412588	0.675	61.20	0.93	0.809	0.0843	0.1091	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4934412588	4937512696	0.750	112.00	1.16	1.200	0.0843	0.1091	0.070	0.091	0.154	0.168	0.205	0.224
Easement	4937512696	4941812791	0.750	104.20	1.44	1.336	0.2806	0.3054	0.210	0.229	0.374	0.382	0.499	0.509
Easement	4941812791	4946812859	0.675	84.70	1.38	0.988	0.3405	0.3653	0.345	0.370	0.284	0.292	0.421	0.433
Easement	4946812859	4950912938	0.675	89.00	1.44	1.008	0.3405	0.3653	0.338	0.362	0.288	0.296	0.427	0.439
Easement	4950912938	4948513028	0.675	95.00	1.32	0.964	0.3430	0.3678	0.356	0.382	0.288	0.296	0.427	0.439
Easement	4948513028	4945713111	0.675	87.90	1.35	0.978	0.3452	0.3699	0.353	0.378	0.287	0.295	0.425	0.437
Easement	4945713111	4940713229	0.675	127.60	1.40	0.996	0.3458	0.3706	0.347	0.372	0.300	0.313	0.444	0.464
Easement	4940713229	4935913328	0.675	111.50	1.33	0.969	0.3781	0.4029	0.390	0.416	0.300	0.312	0.444	0.462
Easement	4935913328	4927513370	0.675	93.70	1.34	0.971	0.3782	0.4030	0.390	0.415	0.299	0.312	0.443	0.462
Easement	4927513370	4924913415	0.675	52.60	1.43	1.004	0.3782	0.4030	0.377	0.401	0.294	0.305	0.436	0.452
Easement	4924913415	4918613545	0.675	144.50	1.28	0.951	0.3921	0.4168	0.412	0.438	0.310	0.324	0.459	0.480
Easement	4918613545	4915013638	0.675	99.90	1.27	0.948	0.3937	0.4184	0.415	0.441	0.312	0.325	0.462	0.481
Easement	4915013638	4906413756	0.675	146.90	1.36	0.979	0.3937	0.4184	0.402	0.427	0.305	0.319	0.452	0.473
Easement	4906413756	4903113889	0.675	143.40	1.40	0.995	0.3937	0.4184	0.396	0.421	0.303	0.316	0.449	0.468
Easement	4903113889	4895013913	0.675	84.20	1.41	0.999	0.3961	0.4208	0.397	0.421	0.313	0.326	0.464	0.483
Easement	4895013913	4887513937	0.675	79.10	1.28	0.950	0.3961	0.4208	0.417	0.443	0.313	0.326	0.464	0.483
Easement	4887513937	4880313986	0.675	87.00	1.50	1.028	0.3961	0.4208	0.385	0.409	0.312	0.325	0.462	0.481
Easement	4880313986	4872414044	0.675	98.80	1.30	0.957	0.3961	0.4208	0.414	0.440	0.311	0.324	0.461	0.480

(1) - Flow from the subject site is released at this location in post-development.

(2) - Flow from the subject site is released at this location in pre-development.

Maximum Hydraulic Gradeline

Printed on: 2019-07-24

Dry Weather Flow - Pre-development to Post-Development Comparison: Serviced by 675mm sewer

Location	MH	T/G (m)	Max Allowable HGL (m)	Pre-Development		Post Development	
				Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Yonge Street	4894211533	192.266	190.466	187.534	4.732	187.534	4.732
Yonge Street	4903411517	191.573	189.773	187.250	4.323	187.250	4.323
Yonge Street	4909411505	190.948	189.148	186.985	3.963	186.985	3.963
Yonge Street	4917611490	190.476	188.676	186.436	4.040	186.466	4.010
Yonge Street*	4925411476	191.139	189.339	186.035	5.104	186.065	5.074
Yonge Street	4933911462	191.082	189.282	185.620	5.462	185.640	5.442
Yonge Street							
Cummer Avenue	4898111516	191.803	190.003	187.873	3.930	187.873	3.930
Cummer Avenue	4905111504	191.116	189.316	187.436	3.680	187.436	3.680
Cummer Avenue	4907611499	191.154	189.354	187.295	3.859	187.295	3.859
Cummer Avenue	4907911496	191.130	189.330	187.261	3.869	187.261	3.869
Cummer Avenue	4917411479	190.584	188.784	186.895	3.689	186.890	3.694
Cummer Avenue	4927211462	191.213	189.413	186.658	4.555	186.655	4.558
Easement	4936811444	190.931	189.131	186.103	4.828	186.101	4.830
Easement	4944511431	190.056	188.256	185.102	4.954	185.101	4.955
Easement							
Easement	4944611442	190.078	188.278	184.092	5.986	184.110	5.968
Easement	4947211479	188.773	186.973	183.520	5.253	183.543	5.230
Easement	4949511563	188.867	187.067	182.715	6.152	182.738	6.129
Easement	4952711668	187.999	186.199	181.775	6.224	181.797	6.202
Easement	4956211783	184.759	182.959	180.642	4.117	180.665	4.094
Easement	4952511812	185.200	183.400	180.229	4.971	180.251	4.949
Easement	4948711905	185.161	183.361	179.298	5.863	179.319	5.842
Easement	4944811997	184.097	182.297	178.356	5.741	178.376	5.721
Easement	4944812035	185.310	183.510	177.949	7.361	177.971	7.339
Easement	4941112130	180.445	178.645	177.019	3.426	177.041	3.404
Easement	4942112173	180.747	178.947	176.609	4.138	176.630	4.117
Easement	4945412265	181.085	179.285	175.679	5.406	175.700	5.385
Easement	4940912352	179.670	177.870	174.749	4.921	174.770	4.900
Easement	4937612418	178.790	176.990	174.049	4.741	174.070	4.720
Easement	4934212460	177.889	176.089	173.337	4.552	173.360	4.529
Easement	4932012532	176.796	174.996	172.847	3.949	172.869	3.927
Easement	4934412588	176.115	174.315	172.055	4.060	172.069	4.046
Easement	4937512696	174.430	172.630	168.857	5.573	168.867	5.563
Easement	4941812791	180.254	178.454	167.484	12.770	167.492	12.762
Easement	4946812859	175.278	173.478	166.312	8.966	166.320	8.958
Easement	4950912938	170.946	169.146	165.038	5.908	165.046	5.900
Easement	4948513028	168.608	166.808	163.787	4.821	163.795	4.813
Easement	4945713111	167.514	165.714	162.595	4.919	162.603	4.911
Easement	4940713229	166.006	164.206	160.820	5.186	160.833	5.173
Easement	4935913328	162.425	160.625	159.300	3.125	159.312	3.113
Easement	4927513370	160.686	158.886	158.045	2.641	158.055	2.631
Easement	4924913415	166.324	164.524	157.281	9.043	157.294	9.030

Flow and depth results

Printed on: 2019-07-24

Wet Weather Flow - Pre-development to Post-Development Comparison: Serviced by 250mm sewer

Location	Manhole			Pipe					Flow (q) (m3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	Link Suffix	D/S	Size (m)	Length (m)	Slope (%)	Asset ID	Q_{full} (m3/s)	Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Yonge Street	4894211533	1	4903411517	0.675	93.60	0.29	4622	0.452	0.0359	0.0359	0.079	0.079	0.134	0.134	0.199	0.199
Yonge Street	4903411517	1	4909411505	0.675	61.30	0.46	4018	0.568	0.0359	0.0359	0.063	0.063	0.135	0.135	0.200	0.200
Yonge Street	4909411505	1	4917611490	0.675	83.00	0.49	4019	0.587	0.0474	0.0474	0.081	0.081	0.135	0.135	0.200	0.200
Yonge Street	4917611490	1	4925411476	0.675	79.40	0.47	4020	0.576	0.0474	0.0474	0.082	0.082	0.136	0.136	0.201	0.201
Yonge Street	4925411476	1	4933911462	0.675	85.60	0.44	3984	0.559	0.0474	0.0474	0.085	0.085	0.137	0.137	0.203	0.203
Yonge Street	4933911462	1	4944611442	0.675	109.40	1.32	3982	0.967	0.0474	0.0474	0.049	0.049	0.121	0.121	0.179	0.179
Yonge Street	4898111516	1	4905111504	0.250	71.60	0.57	4621	0.045	0.0056	0.0056	0.124	0.124	0.063	0.063	0.252	0.252
Yonge Street	4905111504	1	4907611499	0.250	25.20	0.44	4015	0.039	0.0075	0.0075	0.192	0.192	0.076	0.076	0.304	0.304
Yonge Street	4907611499	1	4907911496	0.250	3.80	1.33	4064	0.068	0.0080	0.0080	0.118	0.118	0.082	0.082	0.328	0.328
Yonge Street	4907911496	1	4917411479	0.250	96.70	0.38	4016	0.037	0.0080	0.0083	0.216	0.225	0.098	0.280	0.392	1.120
Yonge Street [1]	4917411479	1	4927211462	0.250	99.10	0.25	4017	0.030	0.0111	0.0335	0.370	1.116	0.113	0.286	0.452	1.144
Yonge Street	4927211462	1	4936811444	0.250	98.50	0.51	3983	0.042	0.0174	0.0404	0.415	0.962	0.113	0.199	0.452	0.796
Yonge Street	4936811444	1	4944511431	0.250	77.30	1.42	3980	0.071	0.0213	0.0443	0.301	0.624	0.198	0.231	0.792	0.924
Cummer Avenue	4944511431	1	4944611442	0.300	11.60	1.63	4050	0.123	0.0264	0.0476	0.215	0.387	0.100	0.132	0.333	0.440
Cummer Avenue	4944611442	1	4947211479	0.675	44.50	1.22	3981	0.927	0.0711	0.0949	0.077	0.102	0.143	0.159	0.212	0.236
Cummer Avenue	4947211479	1	4944511431	0.675	87.50	0.87	3987	0.782	0.0831	0.1079	0.106	0.138	0.151	0.173	0.224	0.256
Cummer Avenue	4949511563	1	4952711668	0.675	110.10	0.82	3969	0.763	0.0831	0.1079	0.109	0.141	0.152	0.176	0.225	0.261
Cummer Avenue	4952711668	1	4956211783	0.675	119.20	0.90	3970	0.798	0.0831	0.1079	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4956211783	1	4952511812	0.675	47.30	0.87	3971	0.783	0.0831	0.1079	0.106	0.138	0.151	0.173	0.224	0.256
Easement	4952511812	1	4948711905	0.675	100.70	0.92	3990	0.808	0.0831	0.1079	0.103	0.134	0.148	0.170	0.219	0.252
Easement	4948711905	1	4944811997	0.675	99.50	0.96	3991	0.821	0.0833	0.1081	0.101	0.132	0.155	0.176	0.230	0.261
Easement	4944811997	1	4944812035	0.675	38.20	1.05	4037	0.860	0.0833	0.1081	0.097	0.126	0.155	0.176	0.230	0.261
Easement	4944812035	1	4941112130	0.675	101.60	0.92	4154	0.804	0.0833	0.1081	0.104	0.134	0.149	0.171	0.221	0.253
Easement	4941112130	1	4942112173	0.675	44.20	0.93	4175	0.810	0.0833	0.1081	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4942112173	1	4945412265	0.675	98.30	0.95	4176	0.818	0.0841	0.1086	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4945412265	1	4940912352	0.675	98.00	0.95	4177	0.819	0.0841	0.1086	0.103	0.133	0.148	0.170	0.219	0.252
Easement	4940912352	1	4937612418	0.675	73.50	0.95	4178	0.821	0.0841	0.1086	0.102	0.132	0.148	0.169	0.219	0.250
Easement	4937612418	1	4934212460	0.675	54.60	0.95	4179	0.820	0.0841	0.1086	0.103	0.132	0.148	0.169	0.219	0.250
Easement	4934212460	1	4932012532	0.675	74.70	0.62	4180	0.662	0.0841	0.1086	0.127	0.164	0.165	0.188	0.244	0.279
Easement	4932012532	1	4934412588	0.675	61.20	0.93	4181	0.809	0.0841	0.1086	0.104	0.134	0.149	0.171	0.221	0.253
Easement	4934412588	1	4937512696	0.750	112.00	1.16	4182	1.200	0.0841	0.1086	0.070	0.090	0.154	0.168	0.205	0.224
Easement	4937512696	1	4941812791	0.750	104.20	1.44	4183	1.336	0.6808	0.6983	0.510	0.523	0.591	0.597	0.788	0.796
Easement	4941812791	1	4946812859	0.675	84.70	1.38	4202	0.988	0.8124	0.8299	0.822	0.840	0.497	0.504	0.736	0.747
Easement	4946812859	1	4950912938	0.675	89.00	1.44	4203	1.008	0.8124	0.8299	0.806	0.823	0.510	0.518	0.756	0.767
Easement	4950912938	1	4948513028	0.675	95.00	1.32	4201	0.964	0.8210	0.8385	0.852	0.870	0.508	0.515	0.753	0.763
Easement	4948513028	1	4945713111	0.675	87.90	1.35	4334	0.978	0.8253	0.8428	0.844	0.862	0.506	0.511	0.750	0.757
Easement	4945713111	1	4940713229	0.675	127.60	1.40	4342	0.996	0.8274	0.8450	0.831	0.848	0.560	0.628	0.830	0.930
Easement	4940713229	1	4935913328	0.675	111.50	1.33	4341	0.969	0.8996	0.9169	0.928	0.946	0.528	0.643	0.782	0.953
Easement	4935913328	1	4927513370	0.675	93.70	1.34	4336	0.971	0.9000	0.9161	0.927	0.943	0.593	0.731	0.879	1.083
Easement	4927513370	1	4924913415	0.675	52.60	1.43	4340	1.004	0.9000	0.9153	0.896	0.912	0.650	0.784	0.963	1.161
Easement	4924913415	1	4918613545	0.675	144.50	1.28	4335	0.951	0.9287	0.9437	0.977	0.992	0.641	0.749	0.950	1.110
Easement	4918613545	1	4915013638	0.675	99.90	1.27	4339	0.948	0.9343	0.9489	0.986	1.001	0.660	0.750	0.978	1.111
Easement	4915013638	1	4906413756	0.675	146.90	1.36	4338	0.979	0.9341	0.9488	0.954	0.969	0.607	0.687	0.899	1.018
Easement	4906413756	1	4903113889	0.675	143.40	1.40	4337	0.995	0.9339	0.9482	0.939	0.953	0.656	0.746	0.972	1.105
Easement	4903113889	1	4895013913	0.675	84.20	1.41	4333	0.999	0.9396	0.9538	0.941	0.955	0.690	0.752	1.022	1.114
Easement	4895013913	1	4887513937	0.675	79.10	1.28	5119	0.950	0.9396	0.9537	0.989	1.004	0.648	0.698	0.960	1.034
Easement	4887513937	1	4880313986	0.675	87.00	1.50	5117	1.028	0.9396	0.9537	0.914	0.928	0.684	0.718	1.013	1.064
Easement	4880313986	1	4872414044	0.675	98.80	1.30	5118	0.957	0.9396	0.9537	0.982	0.997	0.643	0.669	0.953	0.991

(1) - Flow from the subject site is released at this location.

Maximum Hydraulic Gradeline

Printed on: 2019-07-24

Wet Weather Flow - Pre-development to Post-Development Comparison: Serviced by 250mm sewer

Location	MH	Asset ID	T/G (m)	Max Allowable HGL (m)	Pre-Development		Post Development	
					Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Eastern 675mm Sanitary Sewer on Yonge Street								
Yonge Street	4894211533	2739	192.266	190.466	187.534	4.732	187.534	4.732
Yonge Street	4903411517	2885	191.573	189.773	187.250	4.323	187.250	4.323
Yonge Street	4909411505	2991	190.948	189.148	186.985	3.963	186.985	3.963
Yonge Street	4917611490	3103	190.476	188.676	186.436	4.040	186.436	4.040
Yonge Street	4925411476	3230	191.139	189.339	186.034	5.105	186.034	5.105
Yonge Street	4933911462	3378	191.082	189.282	185.619	5.463	185.619	5.463
Western 250mm Sanitary Sewer on Yonge Street								
Yonge Street	4898111516	2805	191.803	190.003	187.873	3.930	187.873	3.930
Yonge Street	4905111504	2910	191.116	189.316	187.436	3.680	187.436	3.680
Yonge Street	4907611499	2949	191.154	189.354	187.296	3.858	187.296	3.858
Yonge Street	4907911496	2952	191.130	189.330	187.262	3.868	187.262	3.868
Yonge Street [(1)]	4917411479	3100	190.584	188.784	186.908	3.676	187.090	3.494
Yonge Street	4927211462	3256	191.213	189.413	186.663	4.550	186.752	4.461
Yonge Street	4936811444	3431	190.931	189.131	186.108	4.823	186.157	4.774
Yonge Street	4944511431	3549	190.056	188.256	185.110	4.946	185.142	4.914
Downstream of confluence of Yonge Street Sanitary Sewers								
Cummer Avenue	4944611442	3551	190.078	188.278	184.093	5.985	184.109	5.969
Cummer Avenue	4947211479	3600	188.773	186.973	183.520	5.253	183.542	5.231
Cummer Avenue	4949511563	3633	188.867	187.067	182.715	6.152	182.738	6.129
Cummer Avenue	4952711668	3682	187.999	186.199	181.774	6.225	181.796	6.203
Cummer Avenue	4956211783	3732	184.759	182.959	180.642	4.117	180.664	4.095
Cummer Avenue	4952511812	3677	185.200	183.400	180.229	4.971	180.250	4.950
Easement	4948711905	3619	185.161	183.361	179.298	5.863	179.319	5.842
Easement	4944811997	3554	184.097	182.297	178.355	5.742	178.376	5.721
Easement	4944812035	3555	185.310	183.510	177.949	7.361	177.971	7.339
Easement	4941112130	3498	180.445	178.645	177.019	3.426	177.040	3.405
Easement	4942112173	3511	180.747	178.947	176.609	4.138	176.630	4.117
Easement	4945412265	3570	181.085	179.285	175.678	5.407	175.700	5.385
Easement	4940912352	3495	179.670	177.870	174.748	4.922	174.769	4.901
Easement	4937612418	3447	178.790	176.990	174.048	4.742	174.069	4.721
Easement	4934212460	3386	177.889	176.089	173.337	4.552	173.360	4.529
Easement	4932012532	3339	176.796	174.996	172.847	3.949	172.869	3.927
Easement	4934412588	3391	176.115	174.315	172.055	4.060	172.069	4.046
Easement	4937512696	3444	174.430	172.630	168.998	5.432	169.006	5.424
Easement	4941812791	3504	180.254	178.454	167.700	12.554	167.706	12.548
Easement	4946812859	3597	175.278	173.478	166.525	8.753	166.532	8.746
Easement	4950912938	3649	170.946	169.146	165.258	5.688	165.266	5.680
Easement	4948513028	3616	168.608	166.808	164.006	4.602	164.013	4.595
Easement	4945713111	3580	167.514	165.714	162.814	4.700	162.819	4.695
Easement	4940713229	3488	166.006	164.206	161.078	4.928	161.145	4.861
Easement	4935913328	3417	162.425	160.625	159.566	2.859	159.680	2.745
Easement	4927513370	3264	160.686	158.886	158.340	2.346	158.477	2.209
Easement	4924913415	3221	166.324	164.524	157.647	8.677	157.779	8.545

Flow and depth results

Printed on: 2019-07-24

Wet Weather Flow - Pre-development to Post-Development Comparison: Serviced by 675mm sewer

Location	Manhole			Pipe					Flow (q) (m3/s)		Flow (q/Q_{full})		Depth (d) (m)		Depth (d/D)	
	U/S	Link Suffix	D/S	Size (m)	Length (m)	Slope (%)	Asset ID	Q_{full} (m3/s)	Pre development	Post development	Pre development	Post development	Pre development	Post development	Pre development	Post development
Yonge Street	4894211533	1	4903411517	0.675	93.60	0.29	4622	0.452	0.0359	0.0359	0.079	0.079	0.134	0.134	0.199	0.199
Yonge Street	4903411517	1	4909411505	0.675	61.30	0.46	4018	0.568	0.0359	0.0359	0.063	0.063	0.135	0.135	0.200	0.200
Yonge Street	4909411505	1	4917611490	0.675	83.00	0.49	4019	0.587	0.0474	0.0474	0.081	0.081	0.135	0.135	0.200	0.200
Yonge Street	4917611490	1	4925411476	0.675	79.40	0.47	4020	0.576	0.0474	0.0730	0.082	0.127	0.136	0.165	0.201	0.244
Yonge Street	4925411476	1	4933911462	0.675	85.60	0.44	3984	0.559	0.0474	0.0730	0.085	0.131	0.137	0.168	0.203	0.249
Yonge Street	4933911462	1	4944611442	0.675	109.40	1.32	3982	0.967	0.0474	0.0730	0.049	0.075	0.121	0.142	0.179	0.210
Yonge Street	4898111516	1	4905111504	0.250	71.60	0.57	4621	0.045	0.0056	0.0056	0.124	0.124	0.063	0.063	0.252	0.252
Yonge Street	4905111504	1	4907611499	0.250	25.20	0.44	4015	0.039	0.0075	0.0075	0.192	0.192	0.076	0.076	0.304	0.304
Yonge Street	4907611499	1	4907911496	0.250	3.80	1.33	4064	0.068	0.0080	0.0080	0.118	0.118	0.082	0.082	0.328	0.328
Yonge Street	4907911496	1	4917411479	0.250	96.70	0.38	4016	0.037	0.0080	0.0080	0.216	0.216	0.098	0.082	0.392	0.328
Yonge Street [1]	4917411479	1	4927211462	0.250	99.10	0.25	4017	0.030	0.0111	0.0080	0.370	0.267	0.113	0.105	0.452	0.420
Yonge Street	4927211462	1	4936811444	0.250	98.50	0.51	3983	0.042	0.0174	0.0148	0.415	0.352	0.113	0.105	0.452	0.420
Yonge Street	4936811444	1	4944511431	0.250	77.30	1.42	3980	0.071	0.0213	0.0187	0.301	0.263	0.198	0.191	0.792	0.764
Cummer Avenue	4944511431	1	4944611442	0.300	11.60	1.63	4050	0.123	0.0264	0.0234	0.215	0.190	0.100	0.093	0.333	0.310
Cummer Avenue	4944611442	1	4947211479	0.675	44.50	1.22	3981	0.927	0.0711	0.0949	0.077	0.102	0.143	0.159	0.212	0.236
Cummer Avenue	4947211479	1	4944511431	0.675	87.50	0.87	3987	0.782	0.0831	0.1079	0.106	0.138	0.151	0.173	0.224	0.256
Cummer Avenue	4949511563	1	4952711668	0.675	110.10	0.82	3969	0.763	0.0831	0.1079	0.109	0.141	0.152	0.176	0.225	0.261
Cummer Avenue	4952711668	1	4956211783	0.675	119.20	0.90	3970	0.798	0.0831	0.1079	0.104	0.135	0.149	0.171	0.221	0.253
Easement	4956211783	1	4952511812	0.675	47.30	0.87	3971	0.783	0.0831	0.1079	0.106	0.138	0.151	0.173	0.224	0.256
Easement	4952511812	1	4948711905	0.675	100.70	0.92	3990	0.808	0.0831	0.1079	0.103	0.134	0.148	0.170	0.219	0.252
Easement	4948711905	1	4944811997	0.675	99.50	0.96	3991	0.821	0.0833	0.1081	0.101	0.132	0.155	0.176	0.230	0.261
Easement	4944811997	1	4944812035	0.675	38.20	1.05	4037	0.860	0.0833	0.1081	0.097	0.126	0.155	0.176	0.230	0.261
Easement	4944812035	1	4941112130	0.675	101.60	0.92	4154	0.804	0.0833	0.1081	0.104	0.134	0.149	0.171	0.221	0.253
Easement	4941112130	1	4942112173	0.675	44.20	0.93	4175	0.810	0.0833	0.1081	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4942112173	1	4945412265	0.675	98.30	0.95	4176	0.818	0.0841	0.1086	0.103	0.133	0.149	0.170	0.221	0.252
Easement	4945412265	1	4940912352	0.675	98.00	0.95	4177	0.819	0.0841	0.1086	0.103	0.133	0.148	0.170	0.219	0.252
Easement	4940912352	1	4937612418	0.675	73.50	0.95	4178	0.821	0.0841	0.1086	0.102	0.132	0.148	0.170	0.219	0.252
Easement	4937612418	1	4934212460	0.675	54.60	0.95	4179	0.820	0.0841	0.1086	0.103	0.132	0.148	0.169	0.219	0.250
Easement	4934212460	1	4932012532	0.675	74.70	0.62	4180	0.662	0.0841	0.1086	0.127	0.164	0.165	0.188	0.244	0.279
Easement	4932012532	1	4934412588	0.675	61.20	0.93	4181	0.809	0.0841	0.1086	0.104	0.134	0.149	0.171	0.221	0.253
Easement	4934412588	1	4937512696	0.750	112.00	1.16	4182	1.200	0.0841	0.1086	0.070	0.091	0.154	0.168	0.205	0.224
Easement	4937512696	1	4941812791	0.750	104.20	1.44	4183	1.336	0.6808	0.6981	0.510	0.523	0.591	0.597	0.788	0.796
Easement	4941812791	1	4946812859	0.675	84.70	1.38	4202	0.988	0.8124	0.8297	0.822	0.840	0.497	0.504	0.736	0.747
Easement	4946812859	1	4950912938	0.675	89.00	1.44	4203	1.008	0.8124	0.8297	0.806	0.823	0.510	0.518	0.756	0.767
Easement	4950912938	1	4948513028	0.675	95.00	1.32	4201	0.964	0.8210	0.8383	0.852	0.870	0.508	0.515	0.753	0.763
Easement	4948513028	1	4945713111	0.675	87.90	1.35	4334	0.978	0.8253	0.8426	0.844	0.862	0.506	0.511	0.750	0.757
Easement	4945713111	1	4940713229	0.675	127.60	1.40	4342	0.996	0.8274	0.8447	0.831	0.848	0.560	0.626	0.830	0.927
Easement	4940713229	1	4935913328	0.675	111.50	1.33	4341	0.969	0.8996	0.9168	0.928	0.946	0.528	0.640	0.782	0.948
Easement	4935913328	1	4927513370	0.675	93.70	1.34	4336	0.971	0.9000	0.9160	0.927	0.943	0.593	0.728	0.879	1.079
Easement	4927513370	1	4924913415	0.675	52.60	1.43	4340	1.004	0.9000	0.9152	0.896	0.912	0.650	0.781	0.963	1.157
Easement	4924913415	1	4918613545	0.675	144.50	1.28	4335	0.951	0.9287	0.9436	0.977	0.992	0.641	0.748	0.950	1.108
Easement	4918613545	1	4915013638	0.675	99.90	1.27	4339	0.948	0.9343	0.9488	0.986	1.001	0.660	0.749	0.978	1.110
Easement	4915013638	1	4906413756	0.675	146.90	1.36	4338	0.979	0.9341	0.9487	0.954	0.969	0.607	0.686	0.899	1.016
Easement	4906413756	1	4903113889	0.675	143.40	1.40	4337	0.995	0.9339	0.9482	0.939	0.953	0.656	0.745	0.972	1.104
Easement	4903113889	1	4895013913	0.675	84.20	1.41	4333	0.999	0.9396	0.9537	0.941	0.955	0.690	0.752	1.022	1.114
Easement	4895013913	1	4887513937	0.675	79.10	1.28	5119	0.950	0.9396	0.9536	0.989	1.004	0.648	0.697	0.960	1.033
Easement	4887513937	1	4880313986	0.675	87.00	1.50	5117	1.028	0.9396	0.9536	0.914	0.928	0.684	0.717	1.013	1.062
Easement	4880313986	1	4872414044	0.675	98.80	1.30	5118	0.957	0.9396	0.9536	0.982	0.996	0.643	0.669	0.953	0.991

(1) - Flow from the subject site is released at this location.

Maximum Hydraulic Gradeline

Printed on: 2019-07-24

Wet Weather Flow - Pre-development to Post-Development Comparison: Serviced by 675mm sewer

Location	MH	Asset ID	T/G (m)	Max Allowable HGL (m)	Pre-Development		Post Development	
					Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Eastern 675mm Sanitary Sewer on Yonge Street								
Yonge Street	4894211533	2739	192.266	190.466	187.534	4.732	187.534	4.732
Yonge Street	4903411517	2885	191.573	189.773	187.250	4.323	187.250	4.323
Yonge Street	4909411505	2991	190.948	189.148	186.985	3.963	186.985	3.963
Yonge Street	4917611490	3103	190.476	188.676	186.436	4.040	186.465	4.011
Yonge Street [(1)]	4925411476	3230	191.139	189.339	186.034	5.105	186.065	5.074
Yonge Street	4933911462	3378	191.082	189.282	185.619	5.463	185.640	5.442
Western 250mm Sanitary Sewer on Yonge Street								
Yonge Street	4898111516	2805	191.803	190.003	187.873	3.930	187.873	3.930
Yonge Street	4905111504	2910	191.116	189.316	187.436	3.680	187.436	3.680
Yonge Street	4907611499	2949	191.154	189.354	187.296	3.858	187.296	3.858
Yonge Street	4907911496	2952	191.130	189.330	187.262	3.868	187.262	3.868
Yonge Street	4917411479	3100	190.584	188.784	186.908	3.676	186.890	3.694
Yonge Street	4927211462	3256	191.213	189.413	186.663	4.550	186.655	4.558
Yonge Street	4936811444	3431	190.931	189.131	186.108	4.823	186.101	4.830
Yonge Street	4944511431	3549	190.056	188.256	185.110	4.946	185.103	4.953
Downstream of confluence of Yonge Street Sanitary Sewers								
Cummer Avenue	4944611442	3551	190.078	188.278	184.093	5.985	184.109	5.969
Cummer Avenue	4947211479	3600	188.773	186.973	183.520	5.253	183.542	5.231
Cummer Avenue	4949511563	3633	188.867	187.067	182.715	6.152	182.738	6.129
Cummer Avenue	4952711668	3682	187.999	186.199	181.774	6.225	181.797	6.202
Cummer Avenue	4956211783	3732	184.759	182.959	180.642	4.117	180.664	4.095
Cummer Avenue	4952511812	3677	185.200	183.400	180.229	4.971	180.250	4.950
Easement	4948711905	3619	185.161	183.361	179.298	5.863	179.319	5.842
Easement	4944811997	3554	184.097	182.297	178.355	5.742	178.376	5.721
Easement	4944812035	3555	185.310	183.510	177.949	7.361	177.971	7.339
Easement	4941112130	3498	180.445	178.645	177.019	3.426	177.040	3.405
Easement	4942112173	3511	180.747	178.947	176.609	4.138	176.630	4.117
Easement	4945412265	3570	181.085	179.285	175.678	5.407	175.700	5.385
Easement	4940912352	3495	179.670	177.870	174.748	4.922	174.769	4.901
Easement	4937612418	3447	178.790	176.990	174.048	4.742	174.070	4.720
Easement	4934212460	3386	177.889	176.089	173.337	4.552	173.360	4.529
Easement	4932012532	3339	176.796	174.996	172.847	3.949	172.869	3.927
Easement	4934412588	3391	176.115	174.315	172.055	4.060	172.069	4.046
Easement	4937512696	3444	174.430	172.630	168.998	5.432	169.006	5.424
Easement	4941812791	3504	180.254	178.454	167.700	12.554	167.706	12.548
Easement	4946812859	3597	175.278	173.478	166.525	8.753	166.532	8.746
Easement	4950912938	3649	170.946	169.146	165.258	5.688	165.266	5.680
Easement	4948513028	3616	168.608	166.808	164.006	4.602	164.013	4.595
Easement	4945713111	3580	167.514	165.714	162.814	4.700	162.819	4.695
Easement	4940713229	3488	166.006	164.206	161.078	4.928	161.144	4.862
Easement	4935913328	3417	162.425	160.625	159.566	2.859	159.677	2.748
Easement	4927513370	3264	160.686	158.886	158.340	2.346	158.474	2.212
Easement	4924913415	3221	166.324	164.524	157.647	8.677	157.776	8.548

APPENDIX E - ENGINEERING DRAWINGS

(See Submission Package)