FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

91 EGLINTON AVENUE EAST & 5055 HURONTARIO STREET

CITY OF MISSISSAUGA
REGION OF PEEL

PREPARED FOR:

91 EGLINTON LTD. PARTNERSHIP

PREPARED BY:

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CROZIER
CONSULTING ENGINEERS

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by 91 Eglinton Ltd. Partnership (the Owner) to prepare a Functional Servicing and Stormwater Management Report. The report will support the applications for an official plan amendment, rezoning, and draft plan of subdivision required to permit the residential development at 91 Eglinton Avenue East and 5055 Hurontario Street in the City of Mississauga, Region of Peel (the Site).

The purpose of this report is to demonstrate that the proposed development can be implemented in accordance with the Region of Peel's servicing guidelines and the City of Mississauga's stormwater management (SWM) guidelines.

The following reports and design standards were referenced during the preparation of this report:

- Region of Peel 2013 Water and Wastewater Master Plan for the Lake-Based Systems, dated March 31, 2014 (Master Plan, March 2014)
- Region of Peel Public Works Design, Specifications & Procedures Manual – Sanitary Design Criteria, dated March 2017 (Sanitary Design Criteria, March 2017)
- Region of Peel Public Works Design, Specifications & Procedures Manual – Watermain Design Criteria, dated June 2010 (Watermain Design Criteria, June 2010)
- City of Mississauga Development Requirements Manual, dated September 2016 (Development Requirements Manual, September 2016)
- Analysis in Support of the Growth-Related Water and Wastewater Servicing Plan for 91 Eglinton Avenue East prepared by the Region of Peel, dated June 11, 2018 (Servicing Analysis, June 2018)
- Master Plan for 91 Eglinton Avenue East prepared by Dialog, dated August 31, 2018 (Master Plan, August 2018)
- Storm Area Drainage Plan and Storm Sewer Design Sheet prepared by Urbantech, dated February 2014 and July 2014 respectively

2.0 General Site Description

The subject site covers an area of approximately 4.4 ha and is located in a primarily residential area in the City of Mississauga. The property, currently occupied by a greenfield, is bounded by the future extension of Armdale Road to the north, existing townhouses to the east, Eglinton Avenue East to the south, and a low-rise commercial complex to the west.

The proposed development includes six high-rise-residential towers complete with underground parking (Master Plan, August 2018). The development is proposed to be constructed in four phases.

- **Phase 1** (10,443 m^2): A 45-storey and 40-storey residential tower connected by a podium varying in height from 2-storeys to 8-storeys, containing a total of 921 units, and underground parking. A central amenity area containing a 1-storey building with underground parking is also included.

- **Phase 2** (5,800 m^2): A 33-storey, 434-unit residential tower with a podium varying in height from 4-storeys to 16-storeys, and underground parking.

- **Phase 3** (7,094 m^2): A 40-storey and a 35-storey residential tower containing 740-units, connected by a podium gradually increasing from 2-storeys to 4-storeys, complete with underground parking.

- **Phase 4** (8,082 m^2): A 30-storey, 485-unit residential tower complete with a podium varying in height from 4-storeys to 16-storeys, and underground parking. This phase includes the vacant lot to the east which has a conceptual unit count of 220 units.

The Site also includes a 3,241 m^2 (0.8 acre) public park and two municipal road extensions. The park is located at the north of the Site, east of Phase 3. The road extensions include:

- Extending the existing 22.0 m right-of-way known as Armdale Road west to intersect with the proposed extension of Thornwood Drive (this will form the north border of the site).

- Extending the existing Thornwood Drive south, with right-of-way widths ranging from 24.0 m to 27.50 m, to intersect with Eglinton Avenue East. The proposed Thornwood Drive extension cuts through the site between Phase 2 and Phase 4.

This report will consider the proposed development in its entirety to ensure adequate sizing and locations of the required civil services (i.e. storm, water and sanitary) for the complete build-out.

The vacant lot east of the Site must be serviced independently with individual sanitary, storm, and water connections from Eglinton Avenue East. In the scenario that 91 Eglinton Ltd. Partnership acquires the vacant lot, the property will be serviced through the subdivision. To account for the later scenario the vacant lot has been accounted for within Phase 4 of the subdivision with respect to the water and sanitary demand calculations. The Region's Analysis in Support of the Growth-Related Water and Wastewater Servicing Plan (Servicing Analysis, June 2018) accounts for residential development on the vacant lot. Therefore, the total number of units envisioned for the subject development, including the vacant lot, is 2800.

3.0 Water Servicing

The Region of Peel is responsible for the operation and maintenance of the public water and treatment system in the City of Mississauga, and any local system will have to connect to this public system. The existing and proposed water servicing is discussed in the following sections.

3.1 Existing Water Servicing

The development falls within water pressure Zone 4. The pressure zone changes to Zone 3 directly south of the Site on Eglinton Avenue East, and east of Forum Drive. A review as-constructed drawings from the City and the Region the following watermains in proximity to the Site and within the same pressure zone (Zone 4):

- Existing 300 mm and 400 mm diameter parallel watermains on Hurontario Street that loop through the local road network. Stubs for the proposed development are provided from the existing 300 mm diameter watermain at the intersections of Future Armdale Road extension & Kencourt Drive and Future Armdale Road Extension & Thornwood Drive.

- Existing 300 mm diameter watermain on the north side of Eglinton Avenue East. This watermain is stubbed at the Future Thornwood Drive extension entrance and extends east. The watermain is constructed but not currently in use.

Multiple hydrants are located near the site for fire protection:

- One on the east side of Preston Meadow Avenue near Armdale Road.
- One on the east side of Kencourt Drive near Future Armdale Road.
- One on the north side of Armdale Road midway between Hurontario Street and Preston Meadow Avenue.
- One in front of the Site on Eglinton Avenue East, between Future Thornwood Drive and Forum Drive.

3.2 Design Water Demand

The Region of Peel Linear Infrastructure Sanitary Sewer Manual (March 2017) was used to determine the equivalent population estimate for each phase of the proposed residential development. The results are provided in **Table 1** and detailed calculations are provided in **Appendix A**.

Table 1: Equivalent Population Estimate

Standard	Phase	Number of Units	Person per Unit	Total Persons
Region of Peel Public Works Design, Specification & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017)	1	921	2.7	2487
	2	434		1172
	3	740		1998
	4 (incl. vacant lot)	705		1904
	Site Total	**2800**	**--**	**7560**

With an occupancy density of 2.7 person/unit, a total number of 7560 persons are in the proposed development.

The Region of Peel Linear Infrastructure Watermain Design Criteria (June 2010) was used to determine the maximum domestic water demand generated by the proposed development based on the equivalent population estimate for each phase. An average daily water demand of 280 L/cap/day was used. **Table 2** summarizes the estimated design water demand. **Appendix A** contains detailed water demand calculations.

Table 2: Estimated Design Water Demand

Standard	Phase	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual – Linear Infrastructure Watermain Design Criteria (June 2010)	1	8.2	16.4	24.5
	2	3.8	7.7	11.5
	3	6.5	13.0	19.5
	4 (incl. vacant lot)	6.2	12.4	18.6
	Site Total	**24.7**	**49.4**	**74.1**

For this application, the domestic water service for each phase will be designed to convey a water demand equivalent to the peak hourly demand shown in **Table 2**.

3.3 Fire Flow Demand

The Fire Underwriters Survey method was used to estimate the fire flow demand for the proposed development. This calculation is used to estimate the size of incoming fire lines and does not provide a recommendation for fire protection. According to the letter received from Dialog Architects dated July 5, 2018, the towers have non-combustible construction and therefore, a construction coefficient of 0.8 was applied to the fire flow calculations (Water Supply for Public Fire Protection by Fire Underwriters Survey, 1999). The proposed residential buildings will be equipped with automatic sprinkler systems which reduces the initial fire flow demand of each building by up to 50%. Each automated sprinkler system is to be designed by the mechanical engineer, therefore, the detailed design of the system is not included in this report. **Table 3** summarizes the required fire flow demand and duration of flow required for each phase.

Table 3: Estimated Fire Demand Flows

Standard	Phase	Floor Area[1] (m^2)	Demand Flow		Duration (h)
			(L/s)	(USGPM)	
Water Supply for Public Fire Protection by Fire Underwriters Survey (1999)	1	3,498	133.3	2,113	2.0
	2	3,460	133.3	2,113	2.0
	3	2,831	116.7	1,849	2.0
	4	4,441	150.0	2,378	2.0

Note: 1. Floor area was determined by the largest floor plus 25% of each of the two immediately adjoining floors

The proposed fire service for each phase is required to accommodate fire flows according to the calculated demand flows and for durations as indicated above. **Appendix A** contains the Fire Underwriters Survey calculations.

3.4 Proposed Water Servicing

Municipal watermains are required to support the proposed development. A 300 mm diameter watermain is proposed on Armdale Road extending west from the existing watermain on Armdale Road, to a proposed 300 mm diameter watermain, located on the east side of Future Thornwood Drive. The existing stubs from Kencourt and Beblin Street will connect to the proposed watermain on Armdale Road to create a loop. The proposed watermain on Future Thornwood Drive will connect to the existing 300 mm diameter watermain on Eglinton Avenue East.

The proposed residential towers are higher than 84 m high and therefore, require at least two sources of water from a public water system (OBC 3.2.9.7.4). The required water services are proposed as follows:

- **Phase 1** is proposed to connect to the proposed 300 mm watermain on the Thornwood Drive, near Eglinton Avenue East.
- **Phase 2** is proposed to connect to the proposed 300 mm watermain on the Thornwood Drive, near Armdale Road.
- **Phase 3** is proposed to connect to the existing 300 mm watermain on Armdale Road, between Hurontario Street and Preston Meadow Avenue.
- **Phase 4** is proposed to connect to the existing 300 mm watermain on Eglinton Avenue East.

A 100mm diameter PVC domestic water service and a 200mm diameter PVC fire line is proposed for each phase. The mechanical engineer will design the internal private water system including the internal sprinkler system within the building and underground parking structure. The proposed municipal watermains and water services are shown on **Figure 1.**

Based on the Analysis in Support of the Growth-Related Water and Wastewater Servicing Plan for 91 Eglinton Avenue East, dated June 11, 2018, the Region concluded that the existing water infrastructure is sufficient to service the proposed development and no upgrades are required. They indicate that "Treatment, pumping and transmission are assumed to be sufficient to service the proposed development based on future planned infrastructure". Based on the Region's analysis no further water system analyses are required for this development (such as hydrant flow tests).

4.0 Sanitary Servicing

The Region of Peel is responsible for the operation and maintenance of the sanitary sewer network in the City of Mississauga. The area is serviced by the East Trunk (Etobicoke Creek West) system and the G.E. Booth Wastewater Treatment Facility (Servicing Analysis, June 2018). The existing and proposed sanitary servicing is outlined in the following sections.

4.1 Existing Sanitary Servicing

According to the Water and Wastewater Analysis Report prepared by the Region, the following infrastructure exists in proximity to the site:

- Existing 450 mm diameter sanitary sewer on Eglinton Avenue East conveys flows east from a stub in front of the property. It connects to the existing 525 mm diameter sewer on Tailfeather Crescent. The sewer on Tailfeather Crescent runs south along the creek and conveys flow to the Central Park Way trunk sewer.
- Existing 250 mm diameter sanitary sewer along Sorrento Drive, directly south of the site, conveys flows to the 300/375 mm diameter sewer on Ella Avenue. The sewer on Ella Avenue conveys flows west, across Hurontario Street, and into the Upper Cooksville Creek Trunk sewer.

4.2 Design Sanitary Flow

The sanitary design flow for the subject property was calculated using the Region of Peel Public Works Design, Specifications & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017) and the equivalent population estimate described in **Section 3.2.** A unit sewage flow of 302.8 L/cap/d was used, and infiltration flow and a peaking factor were applied to the unit sewage flow to obtain the total estimated design sewage flow.

A summary of the results is presented in **Table 4** and detailed calculations are provided in **Appendix B**.

Table 4: Estimated Sanitary Design Flows

Standard	Phase	Average Daily Flow (L/s)	Peaking Factor	Infiltration Flow (L/s)	Total Flow (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017)	1	8.8	3.5	0.2	31.3
	2	4.1	3.8	0.1	15.7
	3	7.0	3.6	0.1	25.4
	4 (incl. vacant lot)	6.7	3.6	0.2	24.3
				Site Total	**96.6**

The proposed sanitary services must convey a total design sanitary demand for each phase according to the total flows indicated in **Table 4**.

4.3 Proposed Sanitary Servicing

Municipal sanitary sewers are required to support the proposed development. A series of 300 mm and 375 mm diameter sanitary sewers are proposed on the extension of Armdale Road and Thornwood Drive respectively. The required sizing for the sewers and the minimum sloping was specified by the Region in an email dated July 9, 2018 (**Appendix B**). The proposed sanitary sewers will extend from the existing 450 mm diameter sanitary sewer on Eglinton Avenue East and stub at the intersection of Armdale Road and Belbin Street.

The proposed sanitary laterals are 200 mm diameter PVC pipes. The pipe capacity for 200 mm diameter laterals sloping at 2% is 46 L/s, which is greater than the total sanitary design flow for each phase. Each phase will have an individual connection to the proposed sanitary sewers. The *Preliminary Overall Servicing Plan:* **Figure 1**, illustrates the location of the sanitary sewers and all connections. The internal sanitary system of the buildings will be designed according to the mechanical engineer's details and specifications.

4.4 Downstream Sanitary Capacity

The Region of Peel Public Works completed the *Analysis in Support of the Growth-Related Water and Wastewater Servicing Plan for 91 Eglinton Avenue East*, dated June 11, 2018. Based on the analysis, which included sanitary demand calculations, the Region concluded the treatment capacity of the existing G.E. Booth Wastewater Treatment Facility is sufficient to support the new development. However, limitations were found regarding the conveyance capacity of the downstream system. Sewers downstream of the Site require upgrades before the occupancy of Phase 1 in order to support the projected sanitary demand.

Three Servicing Alternatives were presented in the report to upgrade the system to support 2041 flows with allowance for growth beyond 2041. The Region and the Owner will collaborate on a suitable option and the Region will design and construct the preferred alternative to meet the proposal timelines of the development. As per the meeting on June 4, 2018 with the Region, it was stated that the work completed by the Region will be funded through Development Charges. Based on previous discussions, the preferred solution is Wastewater Servicing Alternative A as outlined in Section 4.4.3.1 of the Region's report. Refer to **Appendix D** for details of each scenario.

5.0 Drainage Conditions

5.1 Existing Drainage Conditions

According to the topographic survey that was completed by Schaeffer Dzaldov Bennett Ltd. (June 21, 2018), existing topography conveys stormwater drainage overland to Eglinton Avenue East. The east portion of the site drains from the north-east corner to roughly the middle of the site where it is then conveyed south to the municipal right-of-way. A berm with a contour of 173 m, on the west portion of the site, splits drainage between the middle outlet and a low point in the south-west corner. The far west portion of the site demonstrates imperfect drainage. A portion of the stormwater drainage in this area is conveyed overland to the municipal right-of-way through the south-west corner and a portion is conveyed overland to the adjacent property across the west property line.

There is no existing internal storm system on the site.

Three existing storm sewers are located near the subject property:

- A 900 mm diameter storm sewer conveys stormwater flow west on Eglinton Avenue East.
- A 375 mm diameter storm sewer conveys stormwater flow south on Hurontario Street, connecting into the 900 mm storm sewer on Eglinton Avenue East.
- A series of 575/600/675 mm diameter storm sewers convey stormwater flow through an easement in the center of the commercial property directly west of the Site, from existing MH7 on Armdale Road to existing MH6 on Eglinton Avenue East.

5.2 Proposed Drainage Conditions

The proposed development consists of six residential towers with podiums and a central amenity area, which includes a 1-storey building. The development includes underground parking, a public park, and two road extensions.

The subject property has been divided into four phases, each of them analyzed separately to form the stormwater catchment areas. A storm sewer network internal to the Site will convey minor system flows generated within each phase towards the existing 900 mm diameter storm sewer on Eglinton Avenue East. The drainage will be controlled from the 100-year post-development storm event to the 2-year pre-development storm event using underground storage tanks complete with orifice controls. Drainage in each of the phases will be overcontrolled to meet the target flow rate and facilitate uncontrolled catchments in each phase.

The proposed grading, demonstrated in **Figure 2**, will convey the major system flows overland towards the municipal right-of-way. Major system flows from Phase 1 and Phase 4 will be conveyed to the existing Eglinton Avenue East right-of-way. Major system flows from Phase 2 and Phase 3 will be conveyed to the rights-of-way of the proposed municipal road extensions, either Thornwood Drive or Armdale Road.

The public park and road extensions are not included within the phases and are not subject to stormwater quantity or quality controls. This was confirmed in a meeting with City staff on June 11, 2018. These areas will ultimately drain to the existing storm sewer on Eglinton Avenue East. The proposed storm sewers along Future Armdale Road and Future Thornwood Drive will collect and convey runoff from the road extensions and the public park.

6.0 Stormwater Management

Stormwater management design criteria were established using the City of Mississauga standards. The stormwater management criteria include:

Water Quantity Control

Provide control for the private storm system to control the post-development peak flow for the 100-year storm event to the pre-development peak flow for the 2-year storm event, according to City requirements for developments within the Cooksville Creek watershed. No quantity control is required for the municipal park or roads within the development limit.

Water Quality Control

Private stormwater discharging from the proposed development must achieve Ontario Ministry of the Environment, Conservation and Parks (MOECP) Enhanced Level of protection (80% total suspended solids (TSS) removal) for water quality control prior to discharging to the City's storm sewer network. The water quality criteria must be achieved for each phase. No quality control is required for the municipal park or roads within the development limit.

Water Balance

Retention of the first 5 mm of rainfall for private development areas is required by the City of Mississauga Development Requirements Manual (September 2016) to achieve the water balance criteria. The retained water may be reused as grey water throughout the development or for irrigation purposes as discussed in the meeting with City staff on June 11, 2018.

Minor System Design

For less than 100 ha of land, the minor storm sewer system shall be designed to accommodate a 10-year design storm according to the City of Mississauga Development Requirements Manual (September 2016).

6.1 Stormwater Quantity Control

The Modified Rational Method was used to determine the pre-development and post-development flow rates for each phase using the City of Mississauga standard IDF rainfall curve. The peak flow rates were then used to determine any stormwater quantity control required for the proposed development.

As discussed during a meeting with the City on June 11, 2018, areas such as the park and the road extensions, which are not included in any of the private development phases, will discharge stormwater uncontrolled to the municipal right-of-way. No quantity control will be provided for these areas.

The frontage of each phase will discharge stormwater uncontrolled to the municipal right-of-way to reduce the number of area drains required and facilitate a smooth transition from the right-of-way to the developments. These areas are accounted for by over controlling the rest of the phase. **Figure 3** and **Figure 4** show the delineation of catchment areas of the pre- and post-development, respectively. **Appendix C** contains detailed stormwater management calculations.

Stormwater from the Site will outlet into the municipal storm system. On-site storage, including underground storage, will be used to control the peak flow from the 100-year post-development storm to the allowable stormwater peak flow which is based on the 2-year storm event under pre-development conditions. A runoff coefficient of 0.25 was assumed for existing conditions.

A summary of the peak flow rates and storage volumes for each phase are presented in **Table 5.** Detailed calculations are in **Appendix C**.

Table 5: Summary of Peak Flow Rates and Storage Volumes

Standard	Criteria	Phase	Catchment Area	Peak Flow Rate (L/s)				Req. Storage (m^3)
				Pre-Development (2-year)	Post-Development			
					Uncontrolled (100-year)	Controlled (100-year)	Total (100-year)	
City of Mississauga Development Requirements Manual (September 2016)	Cooksville Creek: 100-year post- to 2-year pre-development	1	201	43	20	24	44	582
		2	202	24	20	5	25	412
		3	203	30	7	22	29	375
		4	204	34	27	7	34	567
		4 (incl. vacant lot)	204+205	50	27	23	50	691

As shown in **Table 5**, each phase requires a particular volume of on-site storage to meet quantity control criteria. To achieve the quantity control requirement, each phase will have an orifice tube downstream of an underground tank. The orifice tube will restrict the peak flows to achieve the post-to-pre-development control. Underground storage tanks, built into the underground parking structure, will be sized to hold the required storage volume. The post-development controlled and uncontrolled flow will meet the 2-year pre-development flow.

6.2 Stormwater Quality Control

Stormwater quality controls for the site must incorporate measures to provide an Enhanced Level of Protection (Level 1) according to the MOECP (March 2003) guidelines. Enhanced water quality protection involved the removal of at least 80% of TSS from 90% of the annual runoff volume. Water quality control will be provided for each phase separately through oil/grit separator (OGS).

A Stormceptor EF6 will be provided downstream of the underground tank and orifice tube, to provide quality control for Phases 1 to 3 prior to discharging to the City's storm sewer network. A Stormceptor EF8 will be provided to meet the water quality objective for Phase 4.

The new Stormceptor EF/EFO model's sized for 60% removal of the ETV PSD is comparable to sizing for 80% removal of the Stormceptor Fine PSD. The sizing results in **Appendix C** reflect this qualification. A technical bulletin explaining the equivalency is included in **Appendix C.**

6.3 Water Balance

As stated by the City of Mississauga Development Requirements Manual (September 2016), the minimum requirement to promote water balance is retention of the 5 mm rainfall event. The water balance retention volume was calculated for each phase considering initial abstraction of runoff based on impervious areas. **Table 6** describes the dead storage volume required below the invert of each underground tank to satisfy the water balance criteria.

Table 6: Water Balance Storage Requirement

Standard	Criteria	Phase	Impervious Area (ha)	Storage Required (m^3)
City of Mississauga Development Requirements Manual (September 2016)	Retention of first 5mm	1	0.78	39
		2	0.44	22
		3	0.53	27
		4	0.62	31
		4 (incl. vacant lot)	0.89	45

Once the final plan area of each underground tank has been established during detailed design, a depth will be indicated to achieve the required volume. Water in dead storage can be reused throughout the development as grey water or for irrigation purposes.

6.4 Minor System Design

A storm sewer design sheet was prepared for the proposed municipal storm sewers surrounding the proposed development. The design sheet accounts for the controlled flow leaving each phase, and the uncontrolled flow from the municipal park and the municipal roads. Using a 10-year design flow the velocity ranges from 0.97 m/s – 1.37 m/s which is within the acceptable range of 0.75 m/s – 4.0 m/s according to the *City of Mississauga Development Requirements Manual,* Section 2.01.01.02. **Appendix C** contains the Storm Sewer Design Sheet.

An approved Storm Sewer Design Sheet for this area was prepared by Urbantech and dated July 28, 2014. We compared flows from our design sheet to the Urbantech design sheet at key nodes. The total peak flow from the Site at Existing MH1 on Eglinton Avenue East is 268 L/s (approx. 0.27 m^3/s), which is less than the Urbantech design peak flow at that node (PR. MH 7) of approximately 59 L/s (0.592 m^3/s). Similarly, the total peak flow from the Site at Existing MH8 on Armdale Road is 63 L/s (0.063 m^3/s), which is less than the Urbantech design peak flow of approximately 76 L/s (0.076 m^3/s) at that location. Therefore, the quantity controls provided control the peak flow to below acceptable design flows for this system. The peak flow at key points match the approved Urbantech Storm Sewer Design (July 28, 2014) as agreed upon at the meeting with City staff on June 11, 2018.

6.5 Sustainable Stormwater Management

Low Impact Development (LID) strategies will be considered for use throughout the proposed development during the detailed design stage for each phase. The following LID strategies may be applicable for this site:

- **Rainwater Harvesting**. With minimal pretreatment, the captured rainwater within the underground storage tanks can be used for outdoor non-potable water uses such as irrigation, or in the buildings as gray water.

- **Green Roofs**. This method is beneficial due to its water quality, water balance, and peak flow control benefits. In addition to water resource management, green roofs improve energy efficiency, reduce urban heat island effects, and create greenspace for passive recreation.

- **Enhanced Grass Swale and Bioretention**. Enhanced grass swales are designed to convey, treat and attenuate stormwater runoff. This feature slows the water to allow sedimentation, filtration through the soil matrix, evapotranspiration, and infiltration into the underlying native soil. Bioretention methods, such as rain gardens and stormwater planters, allow to temporarily store, treat and infiltrate runoff. It is typically designed to capture small storm events. Where underground parking facilities exists, infiltration is not a feasible option.

- **Permeable Pavement**. Porous asphalt, pervious concrete, permeable paver and plastic grid filled with gravel can be used for driveways and walkways to reduce the amount of impervious area throughout the site. This approach encourages infiltration and reduces runoff volumes. Again, where underground parking facilities exists, infiltration is not an option.

- **Enhanced Topsoil**. Enhanced topsoil provides water quality benefits in addition to water balance storage which will reduce the infrastructure required to store the required water balance volume.

LID strategies and an overall treatment train approach, where possible, will be specified during detailed design for each phase.

7.0 Conclusions and Recommendations

The proposed development can be serviced for water, sanitary, and stormwater in accordance with the City of Mississauga and Region of Peel requirements and standards. Our conclusions and recommendations include:

1. The development will be constructed over four phases. A vacant lot east of the site has been accounted for in the water and sanitary demand calculations. The vacant lot will be integrated into the subdivision if acquired. If not, it must be serviced independently.

2. The development includes a municipal park and two municipal road extensions: Armdale Road and Thornwood Drive.

3. Water demand for the proposed development will be provided using two 200 mm diameter fire lines and 100 mm diameter domestic lines for each phase. Each phase with a tower requires two fire line connections to the municipal watermain. Each phase will be serviced individually.

4. Based on the Analysis in Support of the Growth-Related Water and Wastewater Servicing Plan for 91 Eglinton Avenue East, dated June 11, 2018, the Region concluded that the existing water infrastructure is sufficient to service the proposed development and no upgrades are required.

5. Municipal watermains are required to support the development. A series of 300 mm diameter watermains are proposed along the proposed municipal street extensions.

6. Sanitary servicing for each phase of the proposed development will be provided using 200 mm diameter sanitary laterals extending from the proposed municipal sanitary sewer.

7. Municipal sanitary sewers are required to support the development. A series of 300 mm and 375 mm diameter sanitary sewers are proposed on the extension of Armdale Road and Thornwood Drive respectively. The proposed sanitary sewers will extend from the existing 450 mm diameter sanitary sewer on Eglinton Avenue East and stub at the intersection of Armdale Road and Belbin Street.

8. Based on the Analysis in Support of the Growth-Related Water and Wastewater Servicing Plan for 91 Eglinton Avenue East, dated June 11, 2018, the Region concluded the treatment capacity of the existing G.E. Booth Wastewater Treatment Facility is sufficient to support the new development. However, limitations were found regarding the conveyance capacity of the downstream sanitary sewer system. Sanitary sewers downstream of the Site require upgrades before the occupancy of Phase 1 in order to support the projected sanitary demand.

9. The Region and the Owner will collaborate on a suitable option for the sanitary sewer upgrades downstream of the site and the Region will design and construct the preferred alternative. As per the meeting on June 4, 2018 with the Region, it was stated that the work completed will be funded through Development Charges.

10. Stormwater for the Site is ultimately conveyed to the existing 900 mm diameter storm sewer on Eglinton Avenue East. The total peak flow leaving the site is below the design flow on the approved Urbantech Storm Sewer Design Sheet. During preliminary pre-consultation meetings it was confirmed by the City that the existing municipal storm sewers have enough capacity to allow the future development construction.

11. Stormwater runoff from the municipal road extensions and the public park is not subject to stormwater quantity or quality controls.

12. Quantity control has been provided for each phase using an orifice downstream of an underground storage tank. The post-development controlled and uncontrolled flow will meet the 2-year pre-development flow.

13. An oil/grit separator (OGS) Stormceptor Model EF6 (Phases 1 to 3) and EF8 (Phase 4) or approved equivalent was sized for each phase to provide an enhanced level of protection (80% TSS removal) for stormwater quality control.

14. Water balance for the Site will be provided through the retention of the 5 mm rainfall event as dead storage below the invert in each stormwater tank.

Based on the above conclusions, we recommend the approval of the development application for the site from the perspective of functional servicing and stormwater management.

Respectfully submitted,

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APPENDIX A

Water Demand Calculations

Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

WATER DEMAND CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 1

			References
POPULATION ESTIMATE			
Apartment Building			
Region of Peel Population Densi	2.7	person/unit	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Number of Units	921	units	
Total Population	2487	persons	
Amenities			
Region of Peel Population Densi	50	person/hectare	Note: Includes Tower A&B and Amenity Area, both indoor and outdoor
Amenity Area	0.73	hectares	
Total Population	37	persons	
TYPICAL WATER DEMAND			
Average Consumption	280	L/cap * day	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June, 2010) - 2.3 Table #1
Equivalent Population	2523	persons	
Average Daily Demand	706508.6	L/day	
	8.18	**L/s**	
Maximum Day Factor	2.0		
Peak Hour Factor	3.0		
Maximum Daily Flow	1413017.2	L/day	
	16.35	**L/s**	
Peak Hour Flow	2119525.8	L/day	
	24.53	**L/s**	

Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

WATER DEMAND CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 2

POPULATION ESTIMATE				**References**
Apartement Building				
Region of Peel Population Densi	2.7	person/unit		Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Number of Units	434	units		
Total Population	1172	persons		
Amenities				
Region of Peel Population Densi	50	person/hectare		Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Amenity Area	0.18	hectares		
Total Population	9	persons		
TYPICAL WATER DEMAND				
Average Consumption		280	L/cap * day	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June, 2010) - 2.3 Table #1
Equivalent Population		1181	persons	
Average Daily Demand		330659	L/day	
		3.83	**L/s**	
Maximum Day Factor		2.0		
Peak Hour Factor		3.0		
Maximum Daily Flow		661318	L/day	
		7.65	**L/s**	
Peak Hour Flow		991977	L/day	
		11.48	**L/s**	

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Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
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WATER DEMAND CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 3

POPULATION ESTIMATE

Apartment Building

Region of Peel Population Densi	2.7	person/unit	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Number of Units	740	units	
Total Population	1998	persons	

Amenities

Region of Peel Population Densi	50	person/hectare	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Amenity Area	0.22	hectares	
Total Population	11	persons	

TYPICAL WATER DEMAND

Average Consumption	280	L/cap * day	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June, 2010) - 2.3 Table #1
Equivalent Population	2009	persons	
Average Daily Demand	562471	L/day	
	6.51	**L/s**	
Maximum Day Factor	2.0		
Peak Hour Factor	3.0		
Maximum Daily Flow	1124942	L/day	
	13.02	**L/s**	
Peak Hour Flow	1687413	L/day	
	19.53	**L/s**	

References

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Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

WATER DEMAND CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 4 (including vacant lot)

				References
POPULATION ESTIMATE				
Apartment Building				
Region of Peel Population Densi	2.7	person/unit		Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Number of Units	705	units		
Total Population	1904	persons		
Amenities				
Region of Peel Population Densi	50	person/hectare		Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Amenity Area	0.16	hectares		
Total Population	8	persons		
TYPICAL WATER DEMAND				
Average Consumption		280	L/cap * day	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June, 2010) - 2.3 Table #1
Equivalent Population		1912	persons	
Average Daily Demand		535245.2	L/day	
		6.19	**L/s**	
Maximum Day Factor		2.0		
Peak Hour Factor		3.0		
Maximum Daily Flow		1070490.4	L/day	
		12.39	**L/s**	
Peak Hour Flow		1605735.6	L/day	
		18.58	**L/s**	

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Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

WATER DEMAND CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Total

SUMMARY OF WATER DEMAND

Phase	Number of Units	Population	Average Daily Demand (L/s)	Maximum Daily Flow (L/s)	Peak Hour Flow (L/s)
1	921	2487	8.18	16.35	24.53
2	434	1172	3.83	7.65	11.48
3	740	1998	6.51	13.02	19.53
4 (including vacant lo	705	1904	6.19	12.39	18.58
Total	**2800**	**7560**	**24.71**	**49.42**	**74.13**

CROZIER CONSULTING ENGINEERS

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 1

Date: 2018.02.07
Designed By: NRS
Checked By: NC
Updated: 2018.07.23

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

A =	3498.4 sq.m.		2507.72 sq.m	area of largest floor
C =	0.8	ordinary construction	990.71 sq.m	25% of each of the two immediately adjoining floors

Therefore F = 10,410 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Combustible	0%

0 L/min reduction
10,410 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will have automatic sprinklers

5,205 L/min reduction

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 1

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

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

Exposed buildings

Name		**Distance**		
North	Adjacent Dwelling	20.1 to 30 r	10%	1041.00
West	Adjacent Commerc	10.1 to 20 r	15%	1561.49

2,602 L/min Surcharge

Determine Required Fire Flow

No.1	10,410		
No. 2	0	reduction	
No. 3	-5,205	reduction	
No. 4	2,602	surcharge	
Required Flow:	**7,807 L/min**		
Rounded to nearest 1000 L/min:	**8,000 L/min**	or	133.3 L/s
			2,113 USGPM

Required Volume

8,000 L/min
x **120 min**
960,000 L

Required Duration of Fire Flow

Flow Required L/min		Duration (hours)
2,000 or less		1.0
	3,000	1.25
	4,000	1.5
	5,000	1.75
	6,000	2.0
	8,000	**2.0**
	10,000	2.0
	12,000	2.5
	14,000	3.0
	16,000	3.5
	18,000	4.0
	20,000	4.5
	22,000	5.0
	24,000	5.5
	26,000	6.0
	28,000	6.5
	30,000	7.0
	32,000	7.5
	34,000	8.0
	36,000	8.5
	38,000	9.0
40,000 and over		9.5

CROZIER CONSULTING ENGINEERS

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 2

Date: 2018.02.07
Designed By: NRS
Checked By: NC
Updated: 2018.07.23

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

A =	3460 sq.m.		2366.98 sq.m	area of largest floor
C =	0.8	ordinary construction	1093 sq.m	25% of each of the two immediately adjoining floors

Therefore F = 10,352 L/min

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Combustible	0%

0 L/min reduction
10,352 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will have automatic sprinklers

5,176 L/min reduction

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 2

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

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

Exposed buildings

Name		**Distance**		
South	Adjacent Dwelling	20.1 to 30 r	10%	1035.23
West	Adjacent Commerc	20.1 to 30 r	10%	1035.23
East	Adjacent Dwelling	30.1 to 45 r	5%	517.61

2,588 L/min Surcharge

Determine Required Fire Flow

No.1	10,352		
No. 2	0	reduction	
No. 3	-5,176	reduction	
No. 4	2,588	surcharge	
Required Flow:	**7,764 L/min**		
Rounded to nearest 1000 L/min:	**8,000 L/min**	or	133.3 L/s
			2,113 USGPM

Required Volume

8,000 L/min
x **120 min**
960,000 L

Required Duration of Fire Flow

Flow Required L/min		Duration (hours)
2,000 or less		1.0
	3,000	1.25
	4,000	1.5
	5,000	1.75
	6,000	2.0
	8,000	**2.0**
	10,000	2.0
	12,000	2.5
	14,000	3.0
	16,000	3.5
	18,000	4.0
	20,000	4.5
	22,000	5.0
	24,000	5.5
	26,000	6.0
	28,000	6.5
	30,000	7.0
	32,000	7.5
	34,000	8.0
	36,000	8.5
	38,000	9.0
40,000 and over		9.5

CROZIER CONSULTING ENGINEERS

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 3

Date: 2018.02.07
Designed By: NRS
Checked By: NC
Updated: 2018.07.23

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

A =	2831 sq.m.		2153.4 sq.m	area of largest floor
C =	0.8	ordinary construction	678 sq.m	25% of each of the two immediately adjoining floors

Therefore F = 9,365 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Combustible	0%

0 L/min reduction
9,365 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will have automatic sprinklers

4,682 L/min reduction

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 3

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

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

Exposed buildings

Name		**Distance**		
North	Adjacent Dwelling	30.1 to 45 m	5%	468.24
South	Adjacent Dwelling	30.1 to 45 m	5%	468.24
West	Adjacent Commerc	30.1 to 45 m	5%	468.24
East	Adjacent Commerc	20.1 to 30 m	10%	936.48

2,341 L/min Surcharge

Determine Required Fire Flow

No.1	9,365	
No. 2	0	reduction
No. 3	-4,682	reduction
No. 4	2,341	surcharge
Required Flow:	**7,024 L/min**	
Rounded to nearest 1000 L/min:	**7,000 L/min**	or 116.7 L/s
		1,849 USGPM

Required Volume

7,000 L/min
x **120 min**
840,000 L

Required Duration of Fire Flow

Flow Required L/min		Duration (hours)
2,000 or less		1.0
	3,000	1.25
	4,000	1.5
	5,000	1.75
	6,000	2.0
	8,000	**2.0**
	10,000	2.0
	12,000	2.5
	14,000	3.0
	16,000	3.5
	18,000	4.0
	20,000	4.5
	22,000	5.0
	24,000	5.5
	26,000	6.0
	28,000	6.5
	30,000	7.0
	32,000	7.5
	34,000	8.0
	36,000	8.5
	38,000	9.0
40,000 and over		9.5

CROZIER CONSULTING ENGINEERS

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 4

Date: 2018.02.07
Designed By: NRS
Checked By: NC
Updated: 2018.07.23

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

A =	4440.6 sq.m.		2996.98 sq.m	area of largest floor
C =	0.8	ordinary construction	1443.65 sq.m	25% of each of the two immediately adjoining floors

Therefore F = 11,728 L/min

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Combustible	0%

0 L/min reduction
11,728 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will have automatic sprinklers

5,864 L/min reduction

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Phase 4

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

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

Exposed buildings

Name		**Distance**		
North	Adjacent Dwelling	20.1 to 30 r	10%	1172.83
East	Adjacent Dwelling	20.1 to 30 r	10%	1172.83
West	Adjacent Dwelling	30.1 to 45 r	5%	586.41

2,932 L/min Surcharge

Determine Required Fire Flow

No.1	11,728		
No. 2	0	reduction	
No. 3	-5,864	reduction	
No. 4	2,932	surcharge	
Required Flow:	**8,796 L/min**		
Rounded to nearest 1000 L/min:	**9,000 L/min**	or	150.0 L/s
			2,378 USGPM

Required Volume

9,000 L/min
x **120 min**
1,080,000 L

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	**2.0**
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

CROZIER
CONSULTING ENGINEERS

1525-4876 91 Eglinton Ave E.
Fire Protection Volume Calculation - Summary

Date: 2018.02.07
Designed By: NRS
Checked By: NC
Updated: 2018.07.23

Water Supply for Public Fire Protection
Fire Underwriters Survey Results Summary

Phase	Number of Units	Floor Area (m^3)	Demand Flow (L/s)	Demand Flow (USGPM)	Duration
1	953	3498	133.3	2113	2.00
2	434	3460	133.3	2113	2.00
3	625	2831	116.7	1849	2.00
4	451	4441	150.0	2378	2.00

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July 05, 2018

Mr. Nick Constantin, P. Eng.
Crosier and Associates Consulting Engineers
2800 High Point Drive, Suite 100
Milton, ON L9T 6P4
(905) 875-0026
Project No. 11153T

Re: Proposed Residential Development - 91 Eglinton Avenue E, Mississauga ON

Dear Nick:

This Letter serves to confirm that all buildings within this proposed development will be of non-combustible construction and sprinklered. All floor assemblies and vertical openings will have a minimum fire-resistance rating of 2 hours as per Ontario Building Code 3.2.2.42.

We trust that this letter is sufficient to address Development Engineering's request to confirm the type of building construction.

Sincerely,

Simon Ko
Principal

APPENDIX B

Sanitary Sewer Demand Calculations

Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

SANITARY CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 1

POPULATION ESTIMATE

Apartment Building

Region of Peel Population Density	2.7	person/unit
Number of Units	921	units
Total Population	2487	persons
Total Developed Area	1.0	ha

Amenity Area

Region of Peel Population Density	50	person/hectare
Amenity Area	0.73	hectares
Total Population	37	persons

SANITARY DESIGN FLOW - REGION OF PEEL METHOD

Average daily demand	302.8	L/person * day
Equivalent Population	2523	persons
Harmon Peaking Factor (M) M = 1+(14/(4+p^0.5))	3.51	

Average Daily Flow	764024.96	L/day
	8.84	**L/s**
Peak Flow	2681989.6	L/day
	31.04	**L/s**
Infiltration	0.0002	cms/ha
	0.000208	cms
	0.21	**L/s**
Total Sanitary Flow	**31.25**	**L/s**

References

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.2

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.3

Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

SANITARY CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 2

POPULATION ESTIMATE

Apartment Building

Region of Peel Population Density	2.7	person/unit
Number of Units	434	units
Total Population	1172	persons
Total Developed Area	0.6	ha

Amenity Area

Region of Peel Population Density	50	person/hectare
Amenity Area	0.18	hectares
Total Population	9	persons

SANITARY DESIGN FLOW - REGION OF PEEL METHOD

Average daily demand	302.8	L/person * day
Equivalent Population	1181	persons
Harmon Peaking Factor (M)	3.75	
M = 1+(14/(4+p^0.5))		

Average Daily Flow	357546.24	L/day
	4.14	**L/s**
Peak Flow	1342425.8	L/day
	15.54	**L/s**
Infiltration	0.0002	cms/ha
	0.000116	cms
	0.12	**L/s**
Total Sanitary Flow	**15.65**	**L/s**

References

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.2

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.3

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Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

SANITARY CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 3

POPULATION ESTIMATE

Apartment Building

			References
Region of Peel Population Density	2.7	person/unit	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Number of Units	740	units	
Total Population	1998	persons	
Total Developed Area	0.7	ha	

Amenity Area

Region of Peel Population Density	50	person/hectare	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Amenity Area	0.22	hectares	
Total Population	11	persons	

SANITARY DESIGN FLOW - REGION OF PEEL METHOD

Average daily demand	302.8	L/person * day	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.2
Equivalent Population	2009	persons	
Harmon Peaking Factor (M) M = 1+(14/(4+p^0.5))	3.59		
Average Daily Flow	608325.2	L/day	
	7.04	**L/s**	
Peak Flow	2181529.8	L/day	
	25.25	**L/s**	
Infiltration	0.0002	cms/ha	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.3
	0.0001419	cms	
	0.14	**L/s**	
Total Sanitary Flow	**25.39**	**L/s**	

Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

SANITARY CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Phase 4 (including vacant lot)

			References
POPULATION ESTIMATE			
Apartment Building			
Region of Peel Population Density	2.7	person/unit	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Number of Units	705	units	
Total Population	1904	persons	
Total Developed Area	0.8	ha	
Amenity Area			
Region of Peel Population Density	50	person/hectare	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (March, 2017) - 2.1
Amenity Area	0.16	hectares	
Total Population	8	persons	
SANITARY DESIGN FLOW - REGION OF PEEL METHOD			
Average daily demand	302.8	L/person * day	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.2
Equivalent Population	1912	persons	
Harmon Peaking Factor (M) M = 1+(14/(4+p^0.5))	3.60		
Average Daily Flow	578802.2	L/day	
	6.70	**L/s**	
Peak Flow	2085070.2	L/day	
	24.13	**L/s**	
Infiltration	0.0002	cms/ha	Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) - 2.3
	0.0001616	cms	
	0.16	**L/s**	
Total Sanitary Flow	**24.29**	**L/s**	

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CONSULTING ENGINEERS

Project: 91 Eglinton Ave E
Project No.: 1525-4876
Prepared By: NRS
Checked By: NC
Date: 2018.02.07
Revised: 2018.09.5

SANITARY CALCULATIONS
91 Eglinton Ave E. Proposed Residential Development - Total

SUMMARY OF SANITARY DESIGN FLOWS

Phase	Number of Units	Population	Harmon Peaking Factor	Average Daily Flow (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
1	921	2487	3.51	8.84	31.04	0.21	31.25
2	434	1172	3.75	4.14	15.54	0.12	15.65
3	740	1998	3.59	7.04	25.25	0.14	25.39
4 (including vacant lot	705	1904	3.60	6.70	24.13	0.16	24.29
Total	**2800**	**7560**	**-**	**26.72**	**95.96**	**0.16**	**96.59**

Nicole Segal

From: Mitra, Soyuz <soyuz.mitra@peelregion.ca>
Sent: Monday, July 9, 2018 2:54 PM
To: Nicole Segal
Cc: Miriam Polga; Nick Constantin
Subject: FW: 91 Eglinton Ave E Internal Sanitary Upsizing (CFCA#1525-4876)

Follow Up Flag: Follow up
Flag Status: Completed

Hi Nicole,

Please see below the response from the wastewater team about your question. Let me know if you have any further questions.

Thanks

Soyuz Mitra P.Eng
Project Manager, EA and Studies, Program Planning & Compliance

The Region of Peel
10 Peel Centre Drive, Suite A, 4th Floor, Brampton, L6T4B9
Tel. 905-791-7800 X 4550 Mob. 416-844-7543
Fax 905-791-1442
Soyuz.mitra@peelregion.ca

Region of Peel
working with you

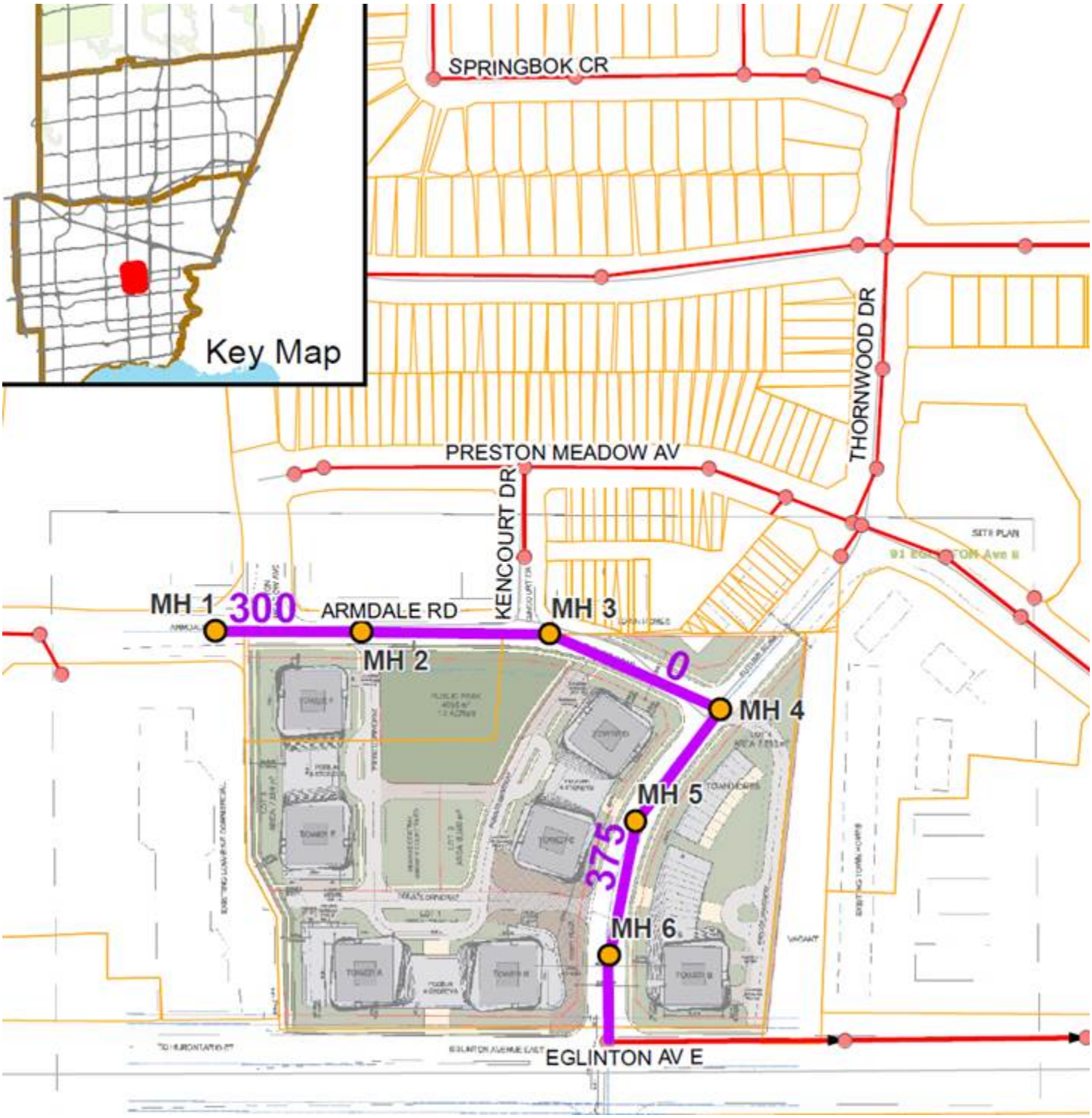
From: Motamedi, Kolsoom
Sent: July 9, 2018 2:35 PM
To: Mitra, Soyuz
Cc: Zhu, Hong; Polga, Miriam
Subject: RE: 91 Eglinton Ave E Internal Sanitary Upsizing (CFCA#1525-4876)

Hi,

The proposed sewers on the future Thornwood Drive from manhole number MH4 to MH5 and MH6 (below sketch) is 375 mm with a minimum slope of 0.5%.
The proposed sewer from the manhole number MH6 to the existing manhole on Eglinton Ave. East is 375 mm with 0.8 % slope.

Thanks and Regards,

Kolsoom Motamedi,



From: Nicole Segal [mailto:nsegal@cfcrozier.ca]
Sent: July 6, 2018 12:06 PM
To: Polga, Miriam

Cc: Nick Constantin
Subject: 91 Eglinton Ave E Internal Sanitary Upsizing (CFCA#1525-4876)

Good morning Miriam,

Nick Constantin and Nick Mocan from our office met with yourself and other Region staff on June 11, 2018 to discuss the water and wastewater servicing for 91 Eglinton Avenue East, Mississauga. During that meeting the Region indicated that upsizing of the proposed sanitary sewers on Thornwood Drive will be required to accommodate Summitview flows (Block 46).

Based on the attached Urban Tech schematic design can you please confirm the sewers which require upsizing, the required size, and confirm if the existing slopes shown are adequate?

Thank you, we appreciate your time!
Regards,

| **NICOLE SEGAL** M.M.Sc., E.I.T. | C.F. CROZIER & ASSOCIATES
| 2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
| cfcrozier.ca | nsegal@cfcrozier.ca | tel 905 875 0026

CROZIER & ASSOCIATES
Consulting Engineers
Land development engineering, from the ground up.
Water Resources · Transportation · Structural · Mechanical · Electrical · Building Science

APPENDIX C

Stormwater Management Calculations

Project: 91 Eglinton Avenue East
Project No.: 1525-4876

Date: 6/15/2018
Designed By: NRS
Checked By: NC

MODIFIED RATIONAL METHOD - 100-year post to 2-year pre - PHASE 1

MUNICIPALITY: City of Mississauga

Target Flow Rate

	C	i (mm/hr)	A (ha)	Q (m3/s)	Q (L/s)	
Phase 1	0.25	59.89	1.04	0.043	43.29	2-year pre-development peak flow
Catchment UC13	0.63	140.69	0.05	0.012	12.22	100-year post-development uncontrolled
Catchment UC19	0.63	140.69	0.03	0.007	7.33	100-year post-development uncontrolled
	Target Control Rate for Catchment 201			0.024	**23.73**	

100-yr Post-Development Peak Flow

	C	i (mm/hr)	A (ha)	Q (m3/s)	Qpost(L/s)
Catchment 201	1.00	140.69	0.96	0.38	375.47

Storage Volume Determination

T_d min	i mm/hr	T_d sec	Q m^3/s	S_d m^3
10	176.31	600	0.47	264.52
25	102.41	1500	0.27	381.49
40	74.58	2400	0.20	438.53
55	59.56	3300	0.16	474.73
70	50.03	4200	0.13	500.32
85	43.39	5100	0.12	519.44
100	38.47	6000	0.10	534.19
115	34.66	6900	0.09	545.78
130	31.62	7800	0.08	554.97
145	29.12	8700	0.08	562.28
160	27.04	9600	0.07	568.06
175	25.26	10500	0.07	572.58
190	23.73	11400	0.06	576.03
205	22.40	12300	0.06	578.58
220	21.22	13200	0.06	580.34
235	20.18	14100	0.05	581.41
250	19.25	15000	0.05	**581.87**
265	18.41	15900	0.05	581.80
280	17.65	16800	0.05	581.24
295	16.96	17700	0.05	580.24
310	16.32	18600	0.04	578.85
325	15.74	19500	0.04	577.09
340	15.20	20400	0.04	575.01
355	14.71	21300	0.04	572.62
370	14.25	22200	0.04	569.95
385	13.82	23100	0.04	567.02
400	13.42	24000	0.04	563.85
415	13.04	24900	0.03	560.45
430	12.69	25800	0.03	556.84
445	12.36	26700	0.03	553.04
			REQUIRED STORAGE VOLUME:	**581.87**

EQUATIONS:

Intensity
$I = A/(tc+B)^C$

Peak Flow
$Q_{pre} = 0.00278 \bullet C_{pre} \bullet i_{(Td)} \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{pre} (T_d + T_c) / 2$

WATER BALANCE

Infiltrate based on 5mm across impervious area

Impervious Area:	0.78	ha
Storage Required:	39	m3

CROZIER CONSULTING ENGINEERS

Project: 91 Eglinton Avenue East
Project No.: 1525-4876

Date: ######
Designed By: NRS
Checked By: NC

MODIFIED RATIONAL METHOD - 100-year post to 2-year pre - PHASE 2

MUNICIPALITY: City of Mississauga

Target Flow Rate

	C	i (mm/hr)	A (ha)	Q (m3/s)	Q (L/s)	
Phase 2	0.25	59.89	0.58	0.024	24.14	2-year pre-development peak flow
Catchment UC15	0.63	140.69	0.03	0.007	7.33	100-year post-development uncontrolled
Catchment UC16	0.63	140.69	0.05	0.012	12.22	100-year post-development uncontrolled
	Target Control Rate for Catchment 202			0.005	**4.59**	

100-yr Post-Development Peak Flow

	C	i (mm/hr)	A (ha)	Q (m3/s)	Qpost(L/s)
Catchment 202	1.00	140.69	0.50	0.20	195.56

Storage Volume Determination

T_d min	i mm/hr	T_d sec	Q m^3/s	S_d m^3
10	176.31	600	0.25	143.60
25	102.41	1500	0.14	208.02
40	74.58	2400	0.10	241.23
55	59.56	3300	0.08	263.58
70	50.03	4200	0.07	280.41
85	43.39	5100	0.06	293.86
100	38.47	6000	0.05	305.05
115	34.66	6900	0.05	314.58
130	31.62	7800	0.04	322.87
145	29.12	8700	0.04	330.17
160	27.04	9600	0.04	336.68
175	25.26	10500	0.04	342.53
190	23.73	11400	0.03	347.83
205	22.40	12300	0.03	352.66
220	21.22	13200	0.03	357.07
235	20.18	14100	0.03	361.13
250	19.25	15000	0.03	364.87
265	18.41	15900	0.03	368.33
280	17.65	16800	0.02	371.54
295	16.96	17700	0.02	374.52
310	16.32	18600	0.02	377.29
325	15.74	19500	0.02	379.87
340	15.20	20400	0.02	382.29
355	14.71	21300	0.02	384.54
370	14.25	22200	0.02	386.65
385	13.82	23100	0.02	388.62
400	13.42	24000	0.02	390.47
415	13.04	24900	0.02	392.20
430	12.69	25800	0.02	393.82
445	12.36	26700	0.02	395.34
460	12.05	27600	0.02	396.76
475	11.75	28500	0.02	398.09
490	11.47	29400	0.02	399.33
505	11.21	30300	0.02	400.50
520	10.96	31200	0.02	401.59
535	10.72	32100	0.01	402.60
550	10.49	33000	0.01	403.55
565	10.28	33900	0.01	404.43
580	10.07	34800	0.01	405.25
595	9.87	35700	0.01	406.01
610	9.69	36600	0.01	406.72
625	9.50	37500	0.01	407.37
640	9.33	38400	0.01	407.96
655	9.17	39300	0.01	408.51
670	9.01	40200	0.01	409.02
685	8.85	41100	0.01	409.47
700	8.71	42000	0.01	409.88
715	8.56	42900	0.01	410.25
730	8.43	43800	0.01	410.58
745	8.30	44700	0.01	410.88
760	8.17	45600	0.01	411.13
775	8.05	46500	0.01	411.35
790	7.93	47400	0.01	411.53
805	7.81	48300	0.01	411.68
820	7.70	49200	0.01	411.79
835	7.59	50100	0.01	411.88
850	7.49	51000	0.01	411.93
865	7.39	51900	0.01	**411.96**
880	7.29	52800	0.01	411.95
895	7.20	53700	0.01	411.92
910	7.10	54600	0.01	411.86
925	7.01	55500	0.01	411.78
940	6.93	56400	0.01	411.67
955	6.84	57300	0.01	411.53
970	6.76	58200	0.01	411.38
985	6.68	59100	0.01	411.19
1000	6.60	60000	0.01	410.99
1015	6.53	60900	0.01	410.76
1030	6.45	61800	0.01	410.52
1045	6.38	62700	0.01	410.25
1060	6.31	63600	0.01	409.96
1075	6.24	64500	0.01	409.65
1090	6.18	65400	0.01	409.32
1105	6.11	66300	0.01	408.97
1120	6.05	67200	0.01	408.61
1135	5.98	68100	0.01	408.23
1150	5.92	69000	0.01	407.83
1165	5.86	69900	0.01	407.41
1180	5.81	70800	0.01	406.97
1195	5.75	71700	0.01	406.52
1210	5.69	72600	0.01	406.06
1225	5.64	73500	0.01	405.57
1240	5.59	74400	0.01	405.08
1255	5.53	75300	0.01	404.56
1270	5.48	76200	0.01	404.04
1285	5.43	77100	0.01	403.50
1300	5.39	78000	0.01	402.94
1315	5.34	78900	0.01	402.37
			REQUIRED STORAGE VOLUME:	**411.96**

EQUATIONS:

Intensity
$I = A/(tc+B)^C$

Peak Flow
$Q_{pre} = 0.00278 \bullet C_{pre} \bullet i_{Td} \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{pre} (T_d + T_c) / 2$

WATER BALANCE

Infiltrate based on 5mm across impervious area

Impervious Area:	0.44	ha
Storage Required:	22	m3

CROZIER CONSULTING ENGINEERS

Project: 91 Eglinton Avenue East
Project No.: 1525-4876

Date: 6/15/2018
Designed By: NRS
Checked By: NC

MODIFIED RATIONAL METHOD - 100-year post to 2-year pre - PHASE 3

MUNICIPALITY: City of Mississauga

Target Flow Rate

	C	i (mm/hr)	A (ha)	Q (m3/s)	Q (L/s)	
Phase 3	0.25	59.89	0.71	0.030	29.55	2-year pre-development peak flow
Catchment UC14	0.63	140.69	0.03	0.007	7.33	100-year post-development uncontrolled
	Target Control Rate for Catchment 203			0.022	**22.22**	

100-yr Post-Development Peak Flow

	C	i (mm/hr)	A (ha)	Q (m3/s)	Qpost(L/s)
Catchment 203	1.00	140.69	0.68	0.27	265.96

Storage Volume Determination

T_d min	i mm/hr	T_d sec	Q m^3/s	S_d m^3
10	176.31	600	0.33	183.32
25	102.41	1500	0.19	263.73
40	74.58	2400	0.14	301.70
55	59.56	3300	0.11	324.91
70	50.03	4200	0.09	340.60
85	43.39	5100	0.08	351.71
100	38.47	6000	0.07	359.72
115	34.66	6900	0.07	365.50
130	31.62	7800	0.06	369.58
145	29.12	8700	0.06	372.32
160	27.04	9600	0.05	373.98
175	25.26	10500	0.05	374.75
190	23.73	11400	0.04	**374.76**
205	22.40	12300	0.04	374.13
220	21.22	13200	0.04	372.94
235	20.18	14100	0.04	371.27
250	19.25	15000	0.04	369.16
265	18.41	15900	0.03	366.67
280	17.65	16800	0.03	363.84
295	16.96	17700	0.03	360.70
310	16.32	18600	0.03	357.28
325	15.74	19500	0.03	353.61
340	15.20	20400	0.03	349.70
355	14.71	21300	0.03	345.57
			REQUIRED STORAGE VOLUME:	**374.76**

EQUATIONS:

Intensity
$I = A/(tc+B)^C$

Peak Flow
$Q_{pre} = 0.00278 \bullet C_{pre} \bullet i_{(Td)} \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{pre} (T_d + T_c) / 2$

WATER BALANCE

Infiltrate based on 5mm across impervious area

Impervious Area:	0.53	ha
Storage Required:	27	m3

CROZIER CONSULTING ENGINEERS

Project: 91 Eglinton Avenue East
Project No.: 1525-4876

Date: 6/15/2018
Designed By: NRS
Checked By: NC

MODIFIED RATIONAL METHOD - 100-year post to 2-year pre - PHASE 4

MUNICIPALITY: City of Mississauga

Target Flow Rate

	C	i (mm/hr)	A (ha)	Q (m3/s)	Q (L/s)	
Phase 4	0.25	59.89	0.82	0.034	34.13	2-year pre-development peak flow
Catchment UC12	0.63	140.69	0.02	0.005	4.89	100-year post-development uncontrolled
Catchment UC17	0.63	140.69	0.05	0.012	12.22	100-year post-development uncontrolled
Catchment UC18	0.63	140.69	0.04	0.010	9.78	100-year post-development uncontrolled
	Target Control Rate for Catchment 204			0.007	**7.24**	

100-yr Post-Development Peak Flow

	C	i (mm/hr)	A (ha)	Q (m3/s)	Qpost(L/s)
Catchment 204	1.00	140.69	0.71	0.28	277.69

Storage Volume Determination

T_d	i	T_d	Q	S_d
min	mm/hr	sec	m^2/s	m^3
10	176.31	600	0.35	203.37
25	102.41	1500	0.20	294.51
40	74.58	2400	0.15	341.34
55	59.56	3300	0.12	372.75
70	50.03	4200	0.10	396.32
85	43.39	5100	0.09	415.10
100	38.47	6000	0.08	430.65
115	34.66	6900	0.07	443.86
130	31.62	7800	0.06	455.30
145	29.12	8700	0.06	465.34
160	27.04	9600	0.05	474.26
175	25.26	10500	0.05	482.24
190	23.73	11400	0.05	489.43
205	22.40	12300	0.04	495.95
220	21.22	13200	0.04	501.89
235	20.18	14100	0.04	507.33
250	19.25	15000	0.04	512.31
265	18.41	15900	0.04	516.89
280	17.65	16800	0.03	521.12
295	16.96	17700	0.03	525.02
310	16.32	18600	0.03	528.63
325	15.74	19500	0.03	531.97
340	15.20	20400	0.03	535.07
355	14.71	21300	0.03	537.94
370	14.25	22200	0.03	540.61
385	13.82	23100	0.03	543.08
400	13.42	24000	0.03	545.37
415	13.04	24900	0.03	547.50
430	12.69	25800	0.03	549.47
445	12.36	26700	0.02	551.30
460	12.05	27600	0.02	552.99
475	11.75	28500	0.02	554.55
490	11.47	29400	0.02	555.99
505	11.21	30300	0.02	557.32
520	10.96	31200	0.02	558.53
535	10.72	32100	0.02	559.65
550	10.49	33000	0.02	560.66
565	10.28	33900	0.02	561.59
580	10.07	34800	0.02	562.42
595	9.87	35700	0.02	563.17
610	9.69	36600	0.02	563.85
625	9.50	37500	0.02	564.44
640	9.33	38400	0.02	564.96
655	9.17	39300	0.02	565.41
670	9.01	40200	0.02	565.80
685	8.85	41100	0.02	566.12
700	8.71	42000	0.02	566.37
715	8.56	42900	0.02	566.57
730	8.43	43800	0.02	566.71
745	8.30	44700	0.02	566.80
760	8.17	45600	0.02	**566.83**
775	8.05	46500	0.02	566.81
790	7.93	47400	0.02	566.74
805	7.81	48300	0.02	566.62
			REQUIRED STORAGE VOLUME:	**566.83**

EQUATIONS:

Intensity
$I = A/(tc+B)^C$

Peak Flow
$Q_{pre} = 0.00278 \bullet C_{pre} \bullet i_{(Td)} \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{pre} (T_d + T_c) / 2$

WATER BALANCE

Infiltrate based on 5mm across impervious area

Impervious Area:	0.62	ha
Storage Required:	31	m3

Project: 91 Eglinton Avenue East
Project No.: 1525-4876

Date: 6/15/2018
Designed By: NRS
Checked By: NC

MODIFIED RATIONAL METHOD - 100-year post to 2-year pre - PHASE 4 (including vacant lot)

MUNICIPALITY: City of Mississauga

Target Flow Rate

	C	i (mm/hr)	A (ha)	Q (m3/s)	Q (L/s)	
Phase 4 (including vacant lot)	0.25	59.89	1.19	0.050	49.53	2-year pre-development peak flow
Catchment UC12	0.63	140.69	0.02	0.005	4.89	100-year post-development uncontrolled
Catchment UC17	0.63	140.69	0.05	0.012	12.22	100-year post-development uncontrolled
Catchment UC18	0.63	140.69	0.04	0.010	9.78	100-year post-development uncontrolled
Target Control Rate for Catchment 204				0.023	**22.64**	

100-yr Post-Development Peak Flow

	C	i (mm/hr)	A (ha)	Q (m3/s)	Qpost(L/s)
Catchment 204	1.00	140.69	1.08	0.42	422.41

Storage Volume Determination

T_d min	i mm/hr	T_d sec	Q m^3/s	S_d m^3
10	176.31	600	0.53	300.63
25	102.41	1500	0.31	434.04
40	74.58	2400	0.22	500.03
55	59.56	3300	0.18	542.59
70	50.03	4200	0.15	573.20
85	43.39	5100	0.13	596.53
100	38.47	6000	0.12	614.96
115	34.66	6900	0.10	629.82
130	31.62	7800	0.09	641.99
145	29.12	8700	0.09	652.04
160	27.04	9600	0.08	660.36
175	25.26	10500	0.08	667.27
190	23.73	11400	0.07	672.98
205	22.40	12300	0.07	677.67
220	21.22	13200	0.06	681.48
235	20.18	14100	0.06	684.51
250	19.25	15000	0.06	686.86
265	18.41	15900	0.06	688.60
280	17.65	16800	0.05	689.79
295	16.96	17700	0.05	690.50
310	16.32	18600	0.05	**690.75**
325	15.74	19500	0.05	690.61
340	15.20	20400	0.05	690.09
355	14.71	21300	0.04	689.22
370	14.25	22200	0.04	688.04
385	13.82	23100	0.04	686.57
400	13.42	24000	0.04	684.83
415	13.04	24900	0.04	682.84
430	12.69	25800	0.04	680.60
445	12.36	26700	0.04	678.15
REQUIRED STORAGE VOLUME:				**690.75**

EQUATIONS:

Intensity
$I = A/(tc+B)^C$

Peak Flow
$Q_{pre} = 0.00278 \bullet C_{pre} \bullet i_{(Td)} \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{pre} (T_d + T_c) / 2$

WATER BALANCE

Infiltrate based on 5mm across impervious area

Impervious Area:	0.89	ha
Storage Required:	45	m3

Nicole Segal

From: Kent S Campbell <Kent.Campbell@forterrabp.com>
Sent: Friday, July 20, 2018 9:43 AM
To: Nicole Segal
Cc: Isabelle Cleroux; Brandon O'Leary
Subject: RE: 1525-4876 Stormceptor Sizing
Attachments: Stormceptor Technical Bulletin - Comparative Sizing for ETV & Stormceptor Fine PSDs 4-23-18.pdf; ISO-14034-Verification-Statement-_Stormceptor_2017-11-10.pdf

Hello Ladies,

It was great talking to you this morning Nicole. I appreciate your patience with my "long winded" Canadian ETV OGS protocol – 60% TSS efficiency vs 80% efficiency for coarser PSD – explanation for Stormceptor EF/EFO sizing. I have attached the Imbrium Tech bulletin I mentioned as well as the Stormceptor EF/EFO ISO verification statement for the Canadian ETV testing program. Thanks too for getting me up to date on your new offices in Bradford and downtown. Please don't hesitate to get back to me if you need the sizing report format we discussed and good luck with your submission.

Have a great weekend,

FORTERRA

For the newest version of PCSWMM please visit the Imbrium website at
www.imbriumsystems.com

Kent Campbell
Stormwater Specialist
Cambridge Plant
Phone 888-888-3222
Cell 519 588-7473
kent.campbell@forterrabp.com
Stormceptor
Protecting the water for future generations

From: Isabelle Cleroux [mailto:icleroux@cfcrozier.ca]
Sent: Thursday, July 19, 2018 1:59 PM
To: Kent S Campbell
Cc: Nicole Segal
Subject: 1525-4876 Stormceptor Sizing

Good afternoon Kent,

I am in the process of sizing a Stormceptor for a project but I am having trouble determining which particle size distribution I should be using. The site is in the City of Mississauga and we are looking at a minimum TSS removal of 80%. When trying to use CA ETV as the particle size distribution, the tool does not allow us to use a removal rate of 80%. Would you be able to guide me towards the particle size distribution I need for this site?

Thank you in advance for your help,

| **ISABELLE CLEROUX** | ENGINEERING ASSISTANT | C.F. CROZIER & ASSOCIATES

| 2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4

| cfcrozier.ca | icleroux@cfcrozier.ca | tel 905 875 0026

CROZIER & ASSOCIATES
Consulting Engineers

Land development engineering, from the ground up.

Water Resources · Transportation · Structural · Mechanical · Electrical · Building Science

TECHNICAL BULLETIN

Sizing Stormceptor® EF/EFO for Removal of Canadian ETV and Stormceptor Fine Particle Size Distributions

(Issued April 23, 2018)

The Canadian ETV Particle Size Distribution ("ETV PSD", shown in Table 1 below) is reasonably representative of the PSD of particulates found in typical urban stormwater runoff, and was used in sediment removal and scour performance testing of Stormceptor® EF/EFO in compliance with the provisions of the Canadian ETV protocol titled *Procedure for Laboratory Testing of Oil-Grit Separators*. Municipalities across Canada are increasingly adopting the sediment removal target of 60% removal of the ETV PSD when sizing an oil-grit separator for pretreatment of stormwater runoff, replacing former sediment removal targets that were based on removal of coarser particle size distributions.

Imbrium Systems supports and recommends adoption of 60% removal of the ETV PSD as a Canada-wide standard for sizing of Stormceptor® EF/EFO. However, it is recognized that in some areas there may continue to be sediment removal targets that are based on removal of coarser particle size distributions. Imbrium engineers have performed extensive sizing analyses to determine the estimated removal efficiency of various coarser PSDs as compared to 60% removal of the ETV PSD. Removal efficiencies were calculated for a wide range of influent flow rates, utilizing Stokes' Law for particle settling and the dimensions and hydraulic capacities of each Stormceptor model size.

Based on these analyses, sizing Stormceptor® EF/EFO for 60% removal of the ETV PSD is comparable to sizing for 80% removal of the Stormceptor Fine PSD.

Table 1: Particle Size Distribution of Test Sediment

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

The particle size distribution shown in Table 1 above is the Canadian ETV Particle Size Distribution ("ETV PSD") specified in the Canadian ETV protocol titled *Procedure for Laboratory Testing of Oil-Grit Separators*.

Project Summary Report: 91 Eglinton - Phase 1 Stormceptor Sizing

Project Information & Location			
Project Name	91 Eglinton - Phase 1	**Project Number**	1525-4876
City	Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	6/22/2018
Designer Information		**EOR Information (optional)**	
Name	Nicole Segal	**Name**	
Company	C.F. Crozier and Associates	**Company**	
Phone #	305-875-0026	**Phone #**	
Email	nsegal@cfcrozier.ca	**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.

Project Summary						
Site Name	**Drainage Area (ha)**	**Imperviousness %**	**PSD**	**Target TSS Removal (%)**	**TSS Removal (%) Provided**	**Recommended Model**
91 Eglinton - Phase 1	1.04	75.0	CA ETV	60	60	EF6

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.

Project Summary Report: 91 Eglinton - Phase 2 Stormceptor Sizing

Project Information & Location			
Project Name	91 Eglinton - Phase 2	**Project Number**	1525-4876
City	Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	6/22/2018
Designer Information		**EOR Information (optional)**	
Name	Nicole Segal	**Name**	
Company	C.F. Crozier and Associates	**Company**	
Phone #	305-875-0026	**Phone #**	
Email	nsegal@cfcrozier.ca	**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.

Project Summary						
Site Name	**Drainage Area (ha)**	**Imperviousness %**	**PSD**	**Target TSS Removal (%)**	**TSS Removal (%) Provided**	**Recommended Model**
91 Eglinton - Phase 2	0.58	75.0	CA ETV	60	63	EF6

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.

Project Summary Report: 91 Eglinton - Phase 3 Stormceptor Sizing

Project Information & Location			
Project Name	91 Eglinton - Phase 3	**Project Number**	1525-4876
City	Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	6/22/2018
Designer Information		**EOR Information (optional)**	
Name	Nicole Segal	**Name**	
Company	C.F. Crozier and Associates	**Company**	
Phone #	305-875-0026	**Phone #**	
Email	nsegal@cfcrozier.ca	**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.

Project Summary						
Site Name	**Drainage Area (ha)**	**Imperviousness %**	**PSD**	**Target TSS Removal (%)**	**TSS Removal (%) Provided**	**Recommended Model**
91 Eglinton - Phase 3	0.71	75.0	CA ETV	60	62	EF6

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.

Project Summary Report: 91 Eglinton - Phase 4 Stormceptor Sizing

Project Information & Location			
Project Name	91 Eglinton - Phase 4	**Project Number**	1525-4876
City	Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	6/22/2018
Designer Information		**EOR Information (optional)**	
Name	Nicole Segal	**Name**	
Company	C.F. Crozier and Associates	**Company**	
Phone #	305-875-0026	**Phone #**	
Email	nsegal@cfcrozier.ca	**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.

Project Summary						
Site Name	**Drainage Area (ha)**	**Imperviousness %**	**PSD**	**Target TSS Removal (%)**	**TSS Removal (%) Provided**	**Recommended Model**
91 Eglinton - Phase 4	1.18	75.0	CA ETV	60	63	EF8

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.

CROZIER & ASSOCIATES
Consulting Engineers

91 Eglinton Avnue East
STORM SEWER DESIGN SHEET

10 YEAR DESIGN STORM - CITY OF MISSISSAUGA[1]

A	1010	B	4.6	C	0.78

PROJECT: 91 Eglinton Avenue East
PROJECT No.: 1525-4876
FILE: Storm Sewer Design
DATE: June 26, 2018
Revised: September 7, 2018
Design: NRS
Updated By: NRS
Reviewed By: NC

INITIAL TIME OF CONCENTRATION (min) 15.00 MANNINGS "n" 0.013

STREET	FROM MH	TO MH	AREA (A) Ha	RUN-OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q m3/sec	CONSTANT CONTROLLED Q m3/s	ACCUM. CONSTANT Q m3/s	TOTAL Q m3/s	LENGTH m	SLOPE %	PIPE DIA. mm	VEL. m/sec	INITIAL Tc min	TIME OF CONC min	ACC. TIME OF CONC. min	CAPACITY m3/s	% Capacity
Fut. Armdale Road	PR. MH7	PR. MH8	0.07	0.90	0.06	0.06	15.00	99.2	0.017			0.017	58.9	1.00	300	1.37	15.00	0.72	15.72	**0.097**	18%
Fut. Armdale Road	Phase 3	EX. MH8	0.68	0.90			15.00	99.2		0.030	0.030	0.030									
Fut. Armdale Road	PR. MH8	EX. MH8	0.07	0.90	0.06	0.13	15.72	96.4	0.034		0.030	0.063	60.8	1.00	300	1.37	15.72	0.74	16.46	**0.097**	65%
Total Flow to Existing MH 8												**0.063**									
Fut. Armdale Road	Park	PR. MH6	0.32	0.25	0.08		15.00	99.2		0.022	0.022	0.022									
Fut. Armdale Road	PR. MH7	PR. MH6	0.05	0.90	0.05	0.05	15.54	97.1	0.012		0.022	0.034	44.1	1.00	300	1.37	15.00	0.54	15.54	**0.097**	35%
Fut. Armdale Road	PR. MH6	PR. MH5	0.10	0.90	0.09	0.14	16.01	95.3	0.036		0.022	0.058	45.4	1.00	375	1.59	15.54	0.48	16.01	**0.175**	33%
Fut. Armdale Road	PR. MH5	PR. MH4	0.04	0.90	0.04	0.17	16.18	94.8	0.045		0.022	0.067	12.5	0.50	450	1.27	16.01	0.16	16.18	**0.202**	33%
Fut. Thornwood Drive	PR. MH4	PR. MH3	0.23	0.90	0.21	0.38	17.77	89.4	0.094		0.022	0.116	93.0	0.20	600	0.97	16.18	1.60	17.77	**0.275**	42%
Fut. Thornwood Drive	PR. MH3	PR. MH2	0.18	0.90	0.16	0.54	18.72	86.6	0.130		0.022	0.152	68.0	0.20	825	1.20	17.77	0.94	18.72	**0.642**	24%
Fut. Thornwood Drive	Phase 1	PR. MH2	1.04	0.90			15.00	99.2		0.043	0.043	0.043									
Fut. Thornwood Drive	Phase 2	PR. MH2	0.58	0.90			15.00	99.2		0.024	0.024	0.024									
Fut. Thornwood Drive	Phase 4[2]	PR. MH2	1.19	0.90			15.00	99.2		0.050	0.050	0.050									
Fut. Thornwood Drive	PR. MH2	PR. MH1			0.00	0.54	18.90	86.1	0.129		0.139	0.268	13.0	0.20	825	1.20	18.72	0.18	18.90	**0.642**	42%
Total Flow to PR. MH 1												**0.268**									

Notes: 1. A, B, and C coefficients as per City of Mississauga Design Requirements
2. Phase 4 includes the vacant lot

urbantech

STORM SEWER DESIGN SHEET

10 Year Storm (Ultimate)

SUMMIT EGLINTON INC., T-9004

City of Mississauga

PROJECT DETAILS

Project No: 12-029W
Date: 28-Jul-14
Designed by: ZS
Checked by: AH

DESIGN CRITERIA

Min. Diameter = 300 mm
Mannings 'n'= 0.013
Starting Tc = 15 min

Rainfall Intensity = $\frac{A}{(Tc+B)^{c}}$

A = 1010
B = 4.6
C= 0.78

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT CONTROLLED FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
Preston Meadow Ave	5	4	0.20	0.60	0.12	0.12	99.2	0.033			0.033	30.0	0.50	375	0.124	1.12	15.00	0.45	15.45	27%
Preston Meadow Ave	4	3	0.53	0.45	0.24	0.36	97.4	0.097			0.097	91.8	0.50	525	0.304	1.40	15.45	1.09	16.53	32%
Kencourt Drive	6	12	0.11	0.90	0.10	0.10	99.2	0.027			0.027	24.1	1.00	300	0.097	1.37	15.00	0.29	15.29	28%
Block 45	Plug	12	0.55	0.60			99.2		0.023	0.023	0.023	8.5	1.00	300	0.097	1.37	15.00	0.10	15.10	24%
Kencourt Drive	12	3				0.10	98.0	0.026		0.023	0.049	36.0	1.00	300	0.097	1.37	15.29	0.44	15.73	51%
Preston Meadow Ave	3	2	0.47	0.45	0.21	0.67	93.5	0.173		0.023	0.196	87.6	0.50	600	0.434	1.54	16.53	0.95	17.49	45%
	2	1	0.23	0.45	0.10	0.77	90.3	0.193		0.023	0.216	33.3	1.80	600	0.824	2.91	17.49	0.19	17.68	26%
Block 44	Plug	1	0.76	0.60			99.2		0.031	0.031	0.031	12.0	1.00	375	0.175	1.59	15.00	0.13	15.13	18%
Preston Meadow Ave	1	*EX. 2*	0.25	0.60	0.15	0.92	89.7	0.230		0.054	0.284	43.3	1.80	600	0.824	2.91	17.68	0.25	17.92	34%
Thronwood/Block 48	*EX. 1*	*EX. 2*	*0.20*	*0.90*	*0.18*	*0.18*	*99.2*	*0.051*			*0.051*	*17.7*	*1.19*	*675*	*0.917*	*2.56*	*15.00*	*0.12*	*15.12*	*6%*
Forum Drive	*EX. 2*	*EX. 3*	*0.13*	*0.90*	*0.11*	*1.22*	*89.0*	*0.301*		*0.054*	*0.355*	*40.5*	*0.99*	*675*	*0.836*	*2.34*	*17.92*	*0.29*	*18.21*	*42%*
Armdale Road	10	7	0.22	0.90	0.20	0.20	99.2	0.054			0.054	67.0	0.50	300	0.068	0.97	15.00	1.15	16.15	79%
Block 46	TEMP. DICB1	7	1.22	0.75			99.2		0.051	0.051	0.051	19.5	1.00	450	0.285	1.79	15.00	0.18	15.18	18%
Armdale Road	9	8	0.31	0.90	0.27	0.27	99.2	0.076			0.076	3.0	1.00	300	0.097	1.37	15.00	0.04	15.04	78%
Belbin St./Armdale Road	8	7	0.25	0.90	0.23	0.50	99.0	0.137			0.137	46.5	0.50	450	0.202	1.27	15.04	0.61	15.65	68%
Existing Plaza	7	11				0.70	94.8	0.183		0.051	0.234	11.5	1.25	525	0.481	2.22	16.15	0.09	16.24	49%
Existing Plaza	*11*	*EX. 9*	*0.23*	*0.75*	*0.17*	*0.87*	*94.5*	*0.227*		*0.051*	*0.278*	*40.8*	*1.50*	*525*	*0.527*	*2.43*	*16.24*	*0.28*	*16.52*	*53%*
Existing Plaza	*EX. 9*	*EX. 8*				*0.87*	*93.6*	*0.225*		*0.051*	*0.276*	*22.8*	*0.57*	*525*	*0.325*	*1.50*	*16.52*	*0.25*	*16.77*	*85%*
Existing Plaza	*EX. 8*	*EX. 7*	*0.46*	*0.75*	*0.34*	*1.21*	*92.7*	*0.311*		*0.051*	*0.362*	*48.8*	*0.74*	*600*	*0.528*	*1.87*	*16.77*	*0.44*	*17.21*	*68%*
Existing Plaza	*EX. 7*	*EX. 6*	*1.51*	*0.75*	*1.13*	*2.34*	*91.2*	*0.592*		*0.051*	*0.643*	*87.2*	*0.73*	*675*	*0.718*	*2.01*	*17.21*	*0.72*	*17.93*	*90%*
Fut Armdale Road	FUT. 2	FUT. 1	0.18	0.90	0.16	0.16	99.2	0.045			0.045	58.9	1.00	300	0.097	1.37	15.00	0.72	15.72	46%
Fut Armdale Road	FUT. 1	8	0.12	0.90	0.11	0.27	99.2	0.076			0.076	61.1	1.00	300	0.097	1.37	15.00	0.74	15.74	78%
Fut. Armdale Road	FUT. 2	FUT. 3	0.50	0.50	0.25	0.25	99.2	0.069			0.069	44.1	1.00	300	0.097	1.37	15.00	0.54	15.54	71%
Fut. Armdale Road	FUT. 3	FUT. 4		0.90		0.25	97.1	0.067			0.067	45.5	1.00	300	0.097	1.37	15.54	0.55	16.09	70%
Fut. Armdale Road	FUT. 4	FUT. 5	0.38	0.66	0.25	0.50	95.1	0.133			0.133	18.1	0.50	450	0.202	1.27	16.09	0.24	16.33	66%
Fut. Thronwood Drive	FUT. 5	FUT. 6	0.26	0.90	0.23	0.74	94.2	0.192			0.192	88.5	0.20	600	0.275	0.97	16.33	1.52	17.85	70%
Fut. Thronwood Drive	A	FUT. 6	2.00	0.50	1.00	1.00	307.2	0.853			0.853									
Fut. Thronwood Drive	B	FUT. 6	0.83	0.45	0.37	0.37	307.2	0.319			0.319									
Fut. Thronwood Drive	FUT. 6	FUT. 7	0.31	0.90	0.28	2.39	89.2	0.592			0.592	86.1	0.20	825	0.642	1.20	17.85	1.19	19.04	92%
Exsitng Eglinton Ave. E	FUT. 7	*EX. 17*	0.80	0.75	0.60	2.99	85.7	0.711			0.711	97.7	1.00	900	1.810	2.85	19.04	0.57	19.62	39%
Exsitng Eglinton Ave. E	*EX. 17*	*EX. 18*		0.75		2.99	84.1	0.698			0.698	85.0	1.00	900	1.810	2.85	19.62	0.50	20.11	39%
Exsitng Eglinton Ave. E	*EX. 18*	*EX. 6*	0.55	0.75	0.41	3.40	82.8	0.782			0.782	56.3	1.00	900	1.810	2.85	20.11	0.33	20.44	43%
Exsitng Eglinton Ave. E	*EX. 6*	*EX. 19*		0.75		5.74	81.9	1.306		*0.051*	1.357	65.7	1.00	900	1.810	2.85	20.44	0.38	20.83	75%

Note: Runoff from Blocks 44 ,45 and 46 will be controlled to 2 year pre-development level.

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APPENDIX D

Region's Water and Wastewater Analysis

PUBLIC WORKS
Water and Wastewater Program Planning

91 Eglinton Avenue East – City of Mississauga

Analysis in support of the growth-related water and wastewater servicing plan

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Executive Summary

The City of Mississauga is proposing to develop the 91 Eglinton Avenue East Block, located on the northeast corner of Eglinton Avenue East and Hurontario Street. A water and wastewater servicing study is required to evaluate the servicing alternatives and develop a servicing strategy which will align with the Region's current Water and Wastewater Master Servicing Plan.

The proposed development is located within the City of Mississauga and is one block south of Nahani Way, one block east of Hurontario Street, west of Forum Drive, and is north of Eglinton Avenue East. The total site area is about 11 acres. The proposed land use within the proposed development area is entirely comprised of residential land use as per the data provided by the developers at the time of this report.

Planning	Water Servicing	Wastewater Servicing
Key Concepts	Key Concepts	Key Concepts
• The proposed development is contained completely within a single SGU (M1347). • Residential population projections for the proposed development are beyond the Region's future 2041 projections (SGU Scenario 15). • Development is proposed in an area where potential intensification can occur around the area. • The proposed development consists of 7 residential towers.	• Water servicing to the development will be provided entirely by Pressure Zone 4. • Beckett Sproule, Hanlan, Streetsville and Meadowvale pumping stations provide local Zone 4 water service. • Storage to the area will be provided by the Tullamore and West and East Brampton reservoirs. • Treatment, pumping and transmission are assumed to be sufficient to service the proposed development based on the total population. • Connections to the existing system should be made on future Armdale Rd, future Thornwood Drive and Eglinton Avenue East. • No new vertical water infrastructure projects were identified to service the proposed development.	• Wastewater flows from the area drain south by gravity via the East Trunk System to the G.E. Booth wastewater treatment facility. • Treatment is assumed to be sufficient to service the proposed development based on future planned infrastructure. • Connections to the existing system should be to the Eglinton Avenue East sewer. • No triggers to any pumping stations were identified, as the proposed development is serviceable entirely by gravity. • However, there are conveyance capacity limitations to infrastructure downstream of the proposed development and further downstream in the East Trunk Sewer system.
Next Steps	Next Steps	Next Steps
Program Planning will be informed of any changes to the projections.	Final connection points and fire flow requirements will be discussed.	Final connections and sanitary sewer upgrades will be discussed.

1 Introduction and Background

1.1 Background

The 91 Eglinton Block is located on the northeast corner of Eglinton Avenue East and Hurontario Street in the City of Mississauga. A development application has been made to the City of Mississauga for a total of seven (7) towers of varying number of stories.

The total number of units as provided by the developer is 2800. At the time of this report the entire development is assumed to be residential based on the information provided by the developer.

1.2 Objectives

The purpose of this report is to demonstrate the adequacy of the existing water and wastewater infrastructure as well as the proposed water and wastewater infrastructure to satisfy the servicing needs of the proposed development. The intent is also to present the detailed servicing analysis of the proposed development undertaken as part of this study including:

- Establishing water and wastewater servicing requirements.
- Identifying servicing alternatives, if applicable.
- Evaluating the water and wastewater servicing alternatives, if applicable.
- Recommending a preferred water and wastewater servicing strategy for the development.

Details of the analysis are based on the proposed land use, development size and location and the relationship with any other relevant studies that have been completed within the proposed development area.

2 Planning Context

This proposed development lies within the City of Mississauga, just north of Mississauga City Centre and east of the Hurontario Street corridor. The proposed development is assumed to be completely residential. Details of the proposed development are summarized below.

TABLE 1 PROPOSED DEVELOPMENT RESIDENTIAL AND EMPLOYMENT FORECASTS

Building No.	Planning Estimates	Number of Units	Residential Population	Employment Population	Total Population
1	Tower 1 and Tower 2 Combined	765	2066	0	2066
2	Tower 3 and Tower 4 Combined	512	1382	0	1382
3	Tower 5 and Tower 6 Combined	600	1620	0	1620
4	Tower 7 and Future	923	2492	0	2492
	Proposed Development Total	2800	7560	0	7560
	SGU Estimate (2031)		1790	410	2200
	SGU Estimate (2041)		2860	500	3360
	SGU Estimate (Ultimate)		6551	1030	7581
	Note: SGU's Reference Scenario 15 and Scenario 0 respectively				

Population and employment forecasts from SGU M1347 were considered in the analysis for comparison purposes. It was assumed that 100% of the proposed development will occupy and occur within the entire SGU M1347, as shown in Figure 1.

FIGURE 1 PROPOSED DEVELOPMENT SGU BOUNDARY

The City's planning forecasts for this area are greater than the Region's planned 2041 and Ultimate growth forecasts (SGU Scenario 15 and Scenario 0 respectively), as shown in Table 2. It is important to keep in mind that the SGU contains the developing Summitview sites and well as developed areas in addition to this proposed development.

TABLE 2 POPULATION GROWTH FORECAST COMPARISON

Scenario / Year	Population Growth	Employment Growth	Total Growth
2031	1790	410	2200
2041	2860	500	3360
Ultimate	6551	1030	7581
Proposed Development Only	7560	0	7560
Note: Ultimate growth numbers reference Scenario 0 and 2031-41 numbers reference SGU Scenario 15.			

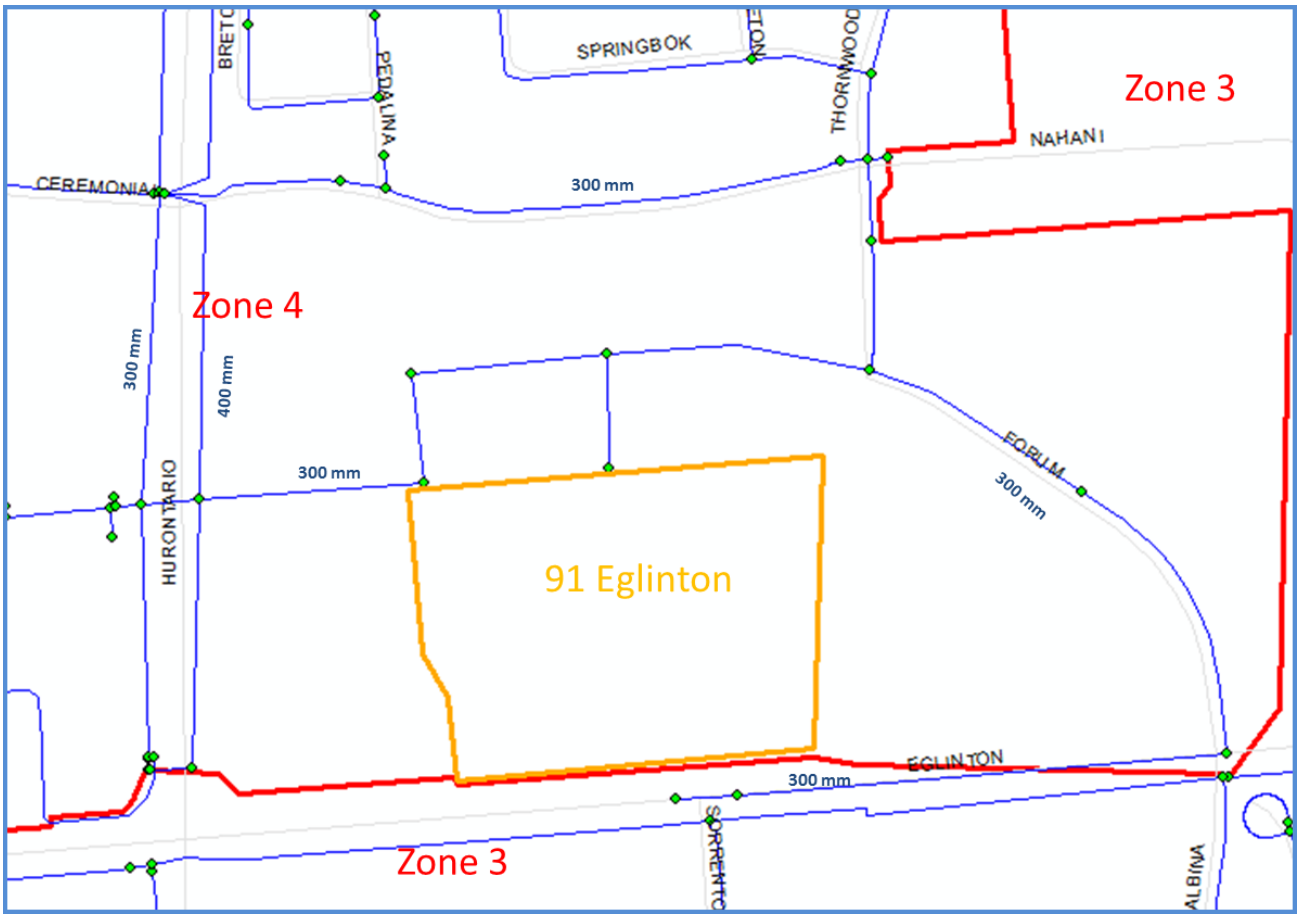
3 Water Servicing

There is water infrastructure surrounding the proposed development which service existing land uses in the area. The development falls within the service boundary of water pressure Zone 4.

3.1 Existing Infrastructure

The major feed to the area is a 600 mm sub-transmission main on Bristol Road connecting to 400 mm and 300 mm watermains on Hurontario Street. Internal servicing is provided through smaller 300 mm distribution mains on Nahani Way, Preston Meadow Ave and Forum Drive. There is a constructed, but not in use, 300 mm watermain on Eglinton Avenue East from Forum Drive up to the proposed site which is intended to be looped through the future Thornwood Drive extension. The pressure zone changes to Zone 3 south of Eglinton Avenue East and west of Forum Drive.

FIGURE 2 EXISTING WATER INFRASTRUCTURE IN THE VICINITY OF PROPOSED DEVELOPMENT



3.2 Planned Water Infrastructure

Based on the Region's latest population and employment growth projections, the existing trunk infrastructure in the area is sufficient to service 2041 demands and there is allowance for growth beyond the 2041 time frame.

There are no new local infrastructures planned in the vicinity of the proposed development for the near future.

3.3 Water Design Criteria and Service Levels

Demands for the proposed development were calculated using the Region's latest water design criteria. The design criteria are summarized as follows:

- 265 Lpcd for average day water consumption.
- A maximum day peaking factor of 1.8 for residential and 1.4 for employment growth.
- A peak hour factor of 3.0.

Establishing hydraulic performance criteria is required in determining the project requirements to service new growth. Assessing the impact of growth on the existing water distribution system was undertaken following the 2013 Water and Wastewater Master Servicing Plan approach.

A linear water project is triggered or flagged for further analysis if it meets one or more of the following criteria:

- Under maximum day demand scenario pipe velocity exceeds 1.5 m/s;
- Under maximum day demand scenario pressure in the system drops below 40 psi or drops by more than 10 psi, reducing the level of service for existing users;
- Pressure in the system drops below 20 psi under a maximum day plus fire scenario.

The trigger for a pumping station upgrade is based on exceeding the firm capacity of the station feeding the area. Firm capacity of a pumping station is defined as the sum of the all the pump capacities minus the largest pump capacity. The station's firm capacity should be able to handle peak hour demands when distributing flow into the local system.

Water storage requirements for the 91 Eglinton Avenue East Block are calculated in accordance with MOECC Guidelines as follows:

Total Storage Requirements = A + B + C where,

- A = Equalization Storage (25% of maximum day demand of zone)
- B = Fire storage in accordance with the standard of Municipal Fire Protection of the Canada Underwriter's Association (modified from the MOECC criteria)
- C = Emergency Storage (25% of A + B)

3.4 Water Servicing Analysis

The objective of the hydraulic water servicing analysis is to identify alternatives for servicing the development and select a servicing strategy that considers the following key impacts:

- Existing level of service
- Water quality
- Security of supply and system redundancy
- Flexibility of servicing
- Complexity and cost of infrastructure
- Opportunity to support long term servicing of other growth areas

The 91 Eglinton Avenue East Block is situated within the serviceable range of Pressure Zone 4. The pressure zone boundary runs through the south side of Eglinton Avenue East in the vicinity of the development but no boundary change expected in the near future. The area will be serviced from the existing Zone 4 pumping stations with the easterly stations (Beckett Sproule and Hanlan) more influential than the westerly stations (Streetsville and Meadowvale). Tullamore, East Brampton and West Brampton reservoirs will provide the floating storage.

Treatment, pumping and transmission are assumed to be sufficient to service the proposed development based on future planned infrastructure.

3.4.1 Water Demand Requirements

Using the design criteria outlined in Section 3.3, the average day, maximum day and peak hour demands for the proposed development were calculated. These demands are summarized in Table 3.

TABLE 3 WATER DEMANDS FOR THE 91 EGLINTON AVENUE EAST BLOCK

Demand Scenario	Proposed Development	SGU Estimate (2041)	SGU Estimate (Ultimate)
Average Day (m3/d)	2003.4	890.4	2009.0
Maximum Day (m3/d)	3606.1	1549.7	3616.1
Peak Hour (m3/d)	6010.2	2671.2	6026.9

The proposed development is only a part of the overall SGU and contributes towards total water demand requirements that are beyond even the ultimate demand requirements for the entire SGU, as per the Region's growth forecasts outlined in Table 2.

3.4.2 Storage Requirements

As stated earlier, storage will be provided from Tullamore and East and West Brampton pumping stations. All storage facilities have sufficient available storage capacity to 2031 and beyond. Table 4 shows the required storage for the proposed development. The fireflow of the proposed development was assumed to be 83 L/s (residential only) due to lack of actual fireflow data from the proponent.

It was confirmed that the existing storage in the system is sufficient to meet the additional requirement and no new storage upgrades are required.

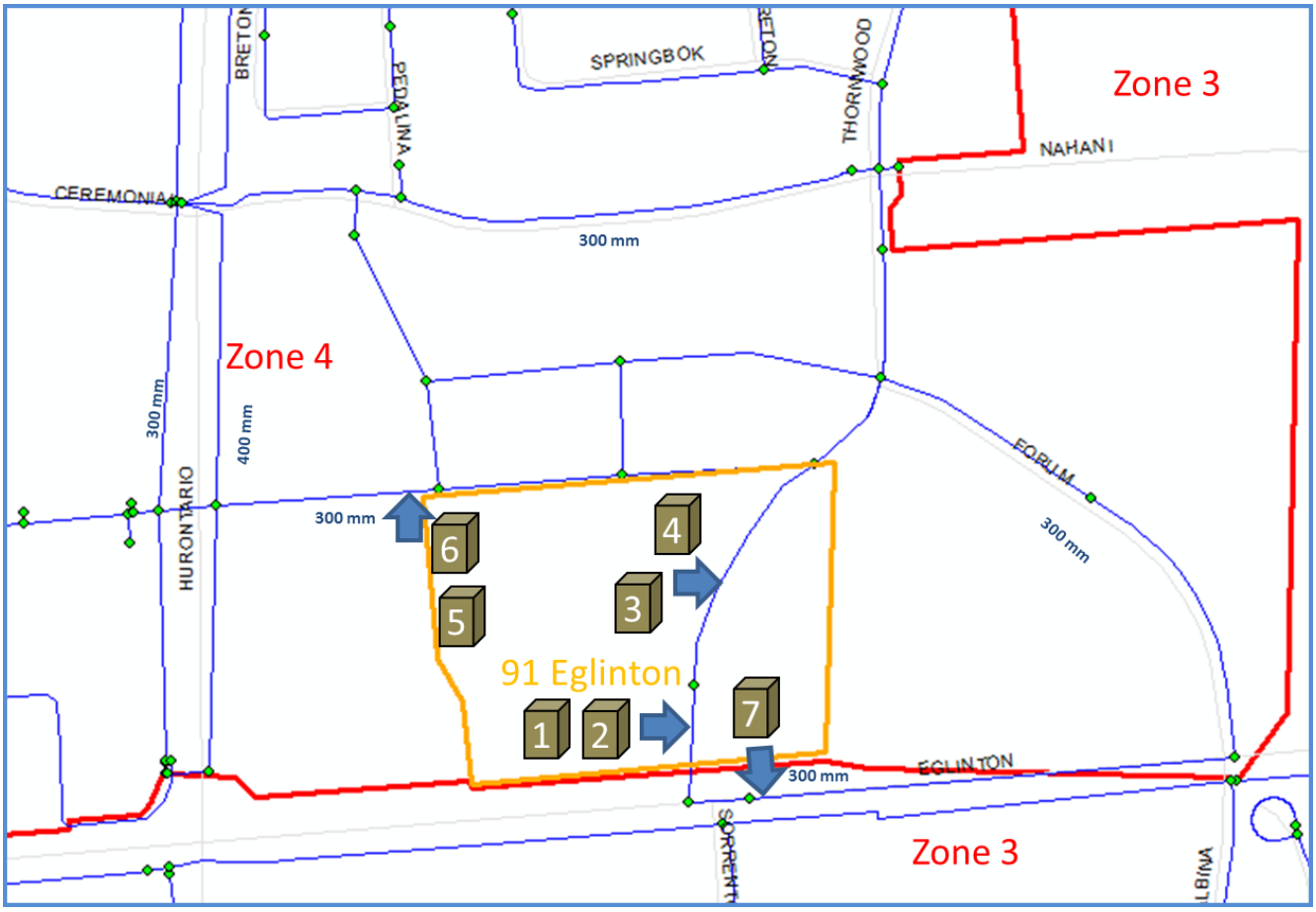
TABLE 4 STORAGE CALCULATION FOR THE 91 EGLINTON AVENUE EAST BLOCK

Requirement in m3/d	Proposed Development	SGU Estimate (Ultimate)
Equalization: A (25% MDD)	901.5	904.0
Fire Flow: B	7171.2	7171.2
Emergency: C (25% (A+B)	2018.2	2018.8
Total Storage Requirement	10090.9	10094.0

3.4.3 Servicing Alternatives

Typically, a number of alternative servicing strategies are identified and further evaluated to select the most preferred servicing option. In this case, the area is surrounded by existing and planned future infrastructure. Therefore, only one servicing alternative was identified, as shown in Figure 3. Connections to watermains on Armdale Road, Thornwood Drive (future) and Eglinton Avenue East will provide service to the buildings.

FIGURE 3 WATER SERVICING CONCEPT FOR PROPOSED DEVELOPMENT



Hydraulic modeling was performed to identify impacts to the existing water distribution system and to assess future infrastructure and potential water service connection points.

It was determined that assumed fire flow for the development can be supported by the existing and proposed watermains in the area.

3.5 Preferred Servicing Strategy

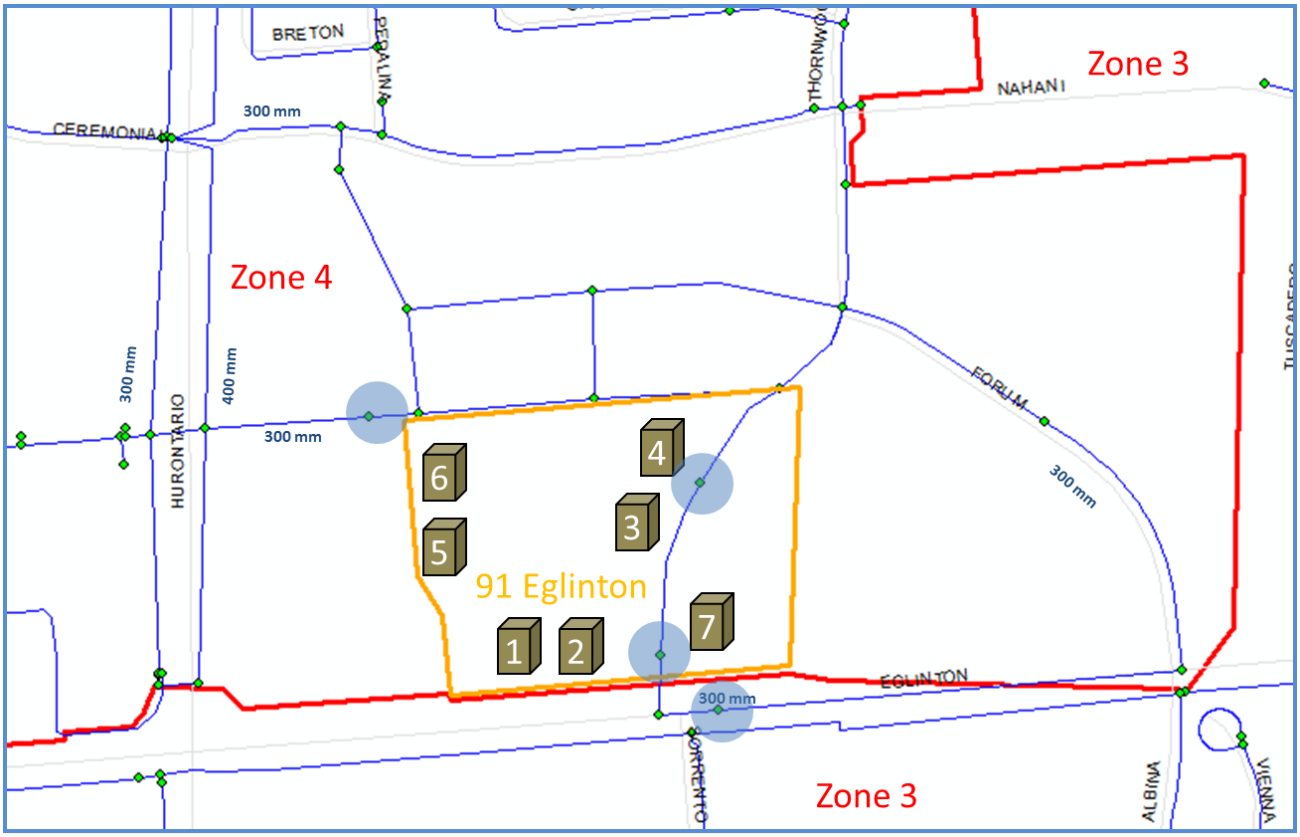
The preferred servicing strategy for the 91 Eglinton Avenue East development will be as follows:

- Tower 1 and Tower 2 (combined 765 units) will be serviced via a single connection from the future 300 mm on Thornwood Drive as there are no watermains fronting Eglinton Avenue East, west of Thornwood Drive.
- Tower 3 and Tower 4 (combined 512 units) will be serviced via a single connection from the future 300 mm on Thornwood Drive.
- Tower 5 and Tower 6 (combined 600 units) will be serviced via a single connection from the 300 mm on Armdale Road.
- Tower 7 and future builds (923 units) will be serviced via connections from the 300 mm on Eglinton Avenue East.

The connection sizes, including fire connections, in all cases should be smaller than the watermain size. Region's internal modeling showed that there is no requirement to extend the existing Eglinton Avenue East 300 mm main west Thornwood Drive to connect with the Zone 4 main on Hurontario Street. However, it is required that the future Thornwood main connects to the existing 300 mm Eglinton Avenue East main to complete looping. Also, the internal looping of watermains by connecting Armdale Road main to Thornwood Drive main is required for the purpose of servicing this new development.

The blue circles in Figure 4 show the recommended connection points along the watermains.

FIGURE 4 PREFERRED WATER SERVICING STRATEGY



4 Wastewater Servicing

There is existing wastewater infrastructure surrounding the proposed development, which services the existing land uses in the area. The area is serviced via the East Trunk (Etobicoke Creek West) system, where flows are ultimately treated at the G.E. Booth wastewater treatment facility.

4.1 Existing Infrastructure

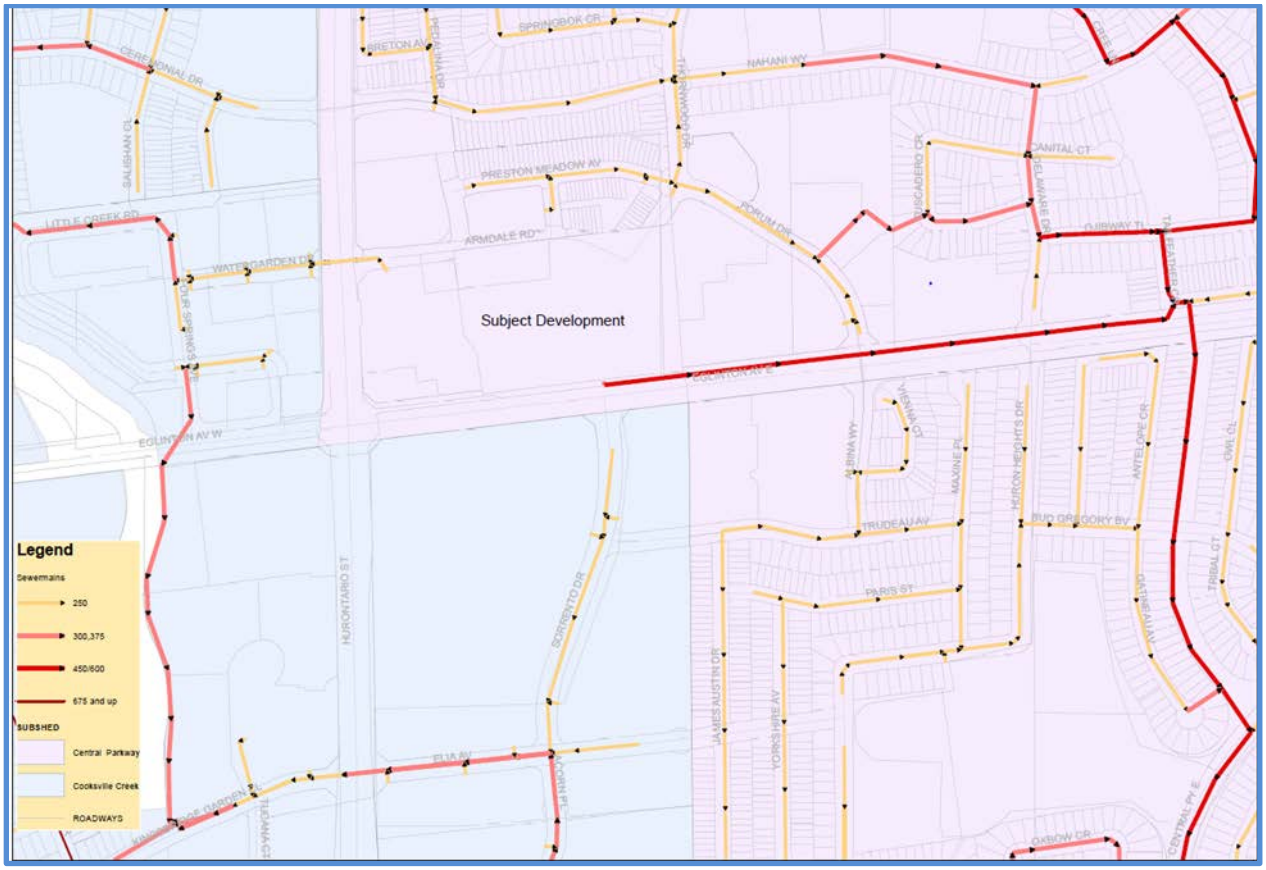
The existing sanitary sewers outlet adjacent to subject site are as follows:

An existing 450 mm sanitary sewer, north of Eglinton Avenue East, heading towards the east is connected to an existing 525 mm diameter sanitary sewer on Tailfeather Crescent which in turn heads south along a creek and conveys flow to the Central Park Way Trunk sewer.

An existing 250 mm sanitary sewer along Sorrento Drive, south of Eglinton Avenue East, conveys flow to the 300 / 375 mm sewer on Ella Avenue. Ella Avenue sewer heads west, crosses Hurontario Street, and drains flows to Upper Cooksville Creek Trunk sewer.

Existing wastewater infrastructure in the vicinity of the proposed development is shown in Figure 5.

FIGURE 5 EXISTING WASTEWATER INFRASTRUCTURE IN THE VICINITY OF PROPOSED DEVELOPMENT



4.2 Planned Wastewater Infrastructure

There are no major planned projects around the development area. A new 450 mm sanitary sewer along Eglinton Avenue East from Sorrento Drive to Tailfeather Crescent was built in 2016. The main purpose of this sewer is to service the future development area north of Eglinton Avenue East.

Based on the Region's latest population and employment projections, the existing and planned infrastructure is sufficient to service 2041 wastewater flows and there is some allowance for growth beyond the 2041 time frame.

4.3 Wastewater Design Criteria and Service Levels

Wastewater flows for the proposed development were calculated using the Region's latest revised wastewater design criteria. The wastewater design criteria are summarized as follows:

- 285 Lpcd for average day wastewater generation rate.
- Peaking factor is based on the Harmon formula.
- Inflow and infiltration allowance is based on 0.26 L/s/ha.

Establishing hydraulic performance criteria is required in determining the project requirements to service new growth. Assessing the impact of growth on the existing wastewater collection system was undertaken following the 2013 Water and Wastewater Servicing Master Plan approach.

A linear wastewater project is triggered or flagged for further analysis if it meets the following criteria:

- Pipe is surcharged and,
- Maximum water level is within 1.8 meters of ground level, indicating the potential for basement flooding,
- Under a 1 in 5 year design storm, Soil Conservation Service (SCS) Type II.

The trigger for a pumping station upgrade is based on exceeding the firm capacity of the station servicing the area. Firm capacity of a pumping station is defined as the sum of all the pump capacities minus the largest pump. The station's firm capacity should be able to handle peak wet weather flows.

4.4 Wastewater Servicing Analysis

The objective of the hydraulic wastewater servicing analysis is to identify alternatives for servicing the development and select a servicing strategy that considers the following key impacts:

- Existing level of service
- System capacity
- Complexity and cost of infrastructure
- Opportunity to support long term servicing of other growth areas

The 91 Eglinton Avenue East development will be serviced by the East Trunk sewer system. The area drains by gravity via the East Trunk system to the G.E. Booth wastewater treatment facility. It was confirmed that treatment capacity is sufficient to service the 91 Eglinton Avenue East development. However, hydraulic modelling shows conveyance capacity limitations to infrastructure adjacent to the proposed development and further downstream in the East Trunk Sewer System.

4.4.1 Wastewater Flow Requirement

The theoretical average dry weather flow, peak dry weather flow and peak wet weather flows were calculated using the design criteria described in Section 4.3. The estimated wastewater flows for this development (91 Eglinton Avenue East) are presented in Table 5.

TABLE 5 WASTEWATER FLOWS FOR THE 91 EGLINTON AVENUE EAST DEVELOPMENT

Flow Scenario	Proposed Development	SGU Estimate (2041)	SGU Estimate (Ultimate)
Average Dry Flow (L/s)	25	3.8	8.7
Peak Dry Flow (L/s)	76.7	14.5	30.4
Peak Wet Weather (L/s)	78	15.5	30.6

Table 6 shows the population split for the new 91 Eglinton Avenue East development by lot.

TABLE 6 WASTEWATER FLOWS FOR THE 91 EGLINTON AVENUE EAST DEVELOPMENT BY LOTS

	Unit	Area-ha	Population	Peak wet weather Flow
Lot 1- Tower A & B	765	0.8	2066	24.6
Lot 2- Tower C & D	512	0.7	1382	17.1
Lot 3- Tower E & F	600	0.8	1620	19.7
Lot 4- Tower G & future	923	0.8	2492	29.1

The proposed development is only a part of the overall SGU (M1347). Hydraulic modeling was performed to determine if the existing collection system has sufficient capacity to convey the higher wastewater flows generated by the additional population.

4.4.2 Capacity of the Existing Sewers adjacent to 91 Eglinton Avenue East development

4.4.2.1 Eglinton Ave. Sewer (450mm)

The existing sanitary sewer, north of Eglinton Avenue East from Sorrento Drive to Tailfeather Crescent is a 450 mm sanitary sewer. This sewer is connected to an existing 525 / 600 mm diameter sanitary sewer on Tailfeather Crescent which is headed south along the creek and conveys flows to the Central Parkway Trunk sewer.

Overall, the minimum slope of the 450 mm diameter sanitary sewer is 0.99%, providing a maximum capacity of approximately 284 L/s. The two sections of 525 mm sewer have minimum slopes of 0.39% and 0.276%, providing a maximum capacity of approximately 269 & 226 L/s respectively. The minimum slope of the 600 mm diameter sanitary sewer is 0.4%, providing a maximum capacity of 390 L/s. Figure 6 and 7 show a plan and profile of the existing 450 mm, 525 mm & 600 mm sewers.

A modelling analysis of the existing wastewater system and 2041 condition was undertaken to determine if there is sufficient conveyance capacity in the existing 450 mm, 525 mm & 600 mm sanitary sewers.

Based on the results of the analysis, the existing 450 mm sewer has enough capacity but linear conveyance upgrades of the 525 mm and 600 mm sanitary sewers will be required to accommodate the proposed development.

FIGURE 6 EXISTING CAPACITY OF 450 MM EGLINTON AVE. EAST SEWER

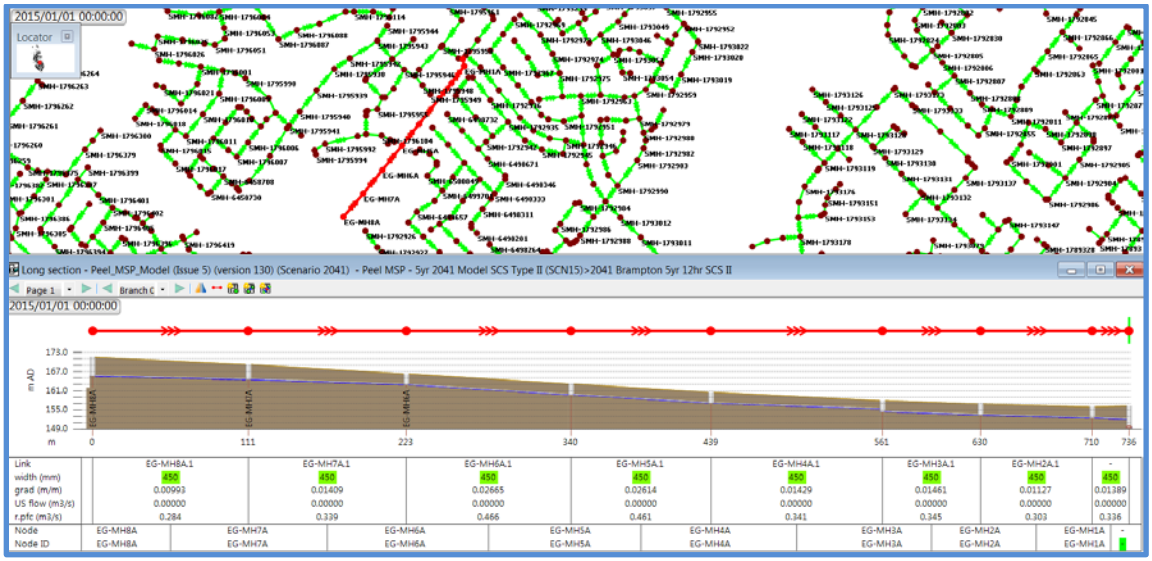
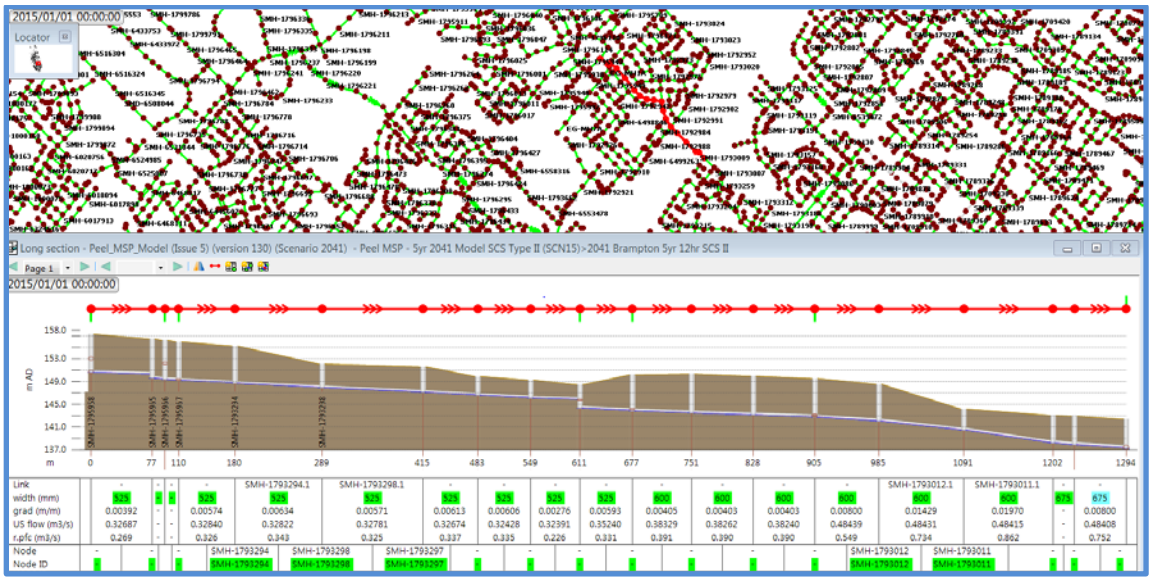


FIGURE 7 EXISTING CAPACITIES OF 525 MM AND 600 MM SEWERS, DOWNSTREAM OF 450 MM SEWER



4.4.2.2 Sorrento Drive Sanitary Sewer (250 / 300 mm)

The existing 250 mm sanitary sewer along Sorrento Drive, south of Eglinton Avenue East conveys flow to the 300 / 375 mm sewer on Ella Avenue. Ella Avenue sewer is headed west, crossing Hurontario Street, and drains to the 825 / 750 mm Upper Cooksville Creek Trunk sewer.

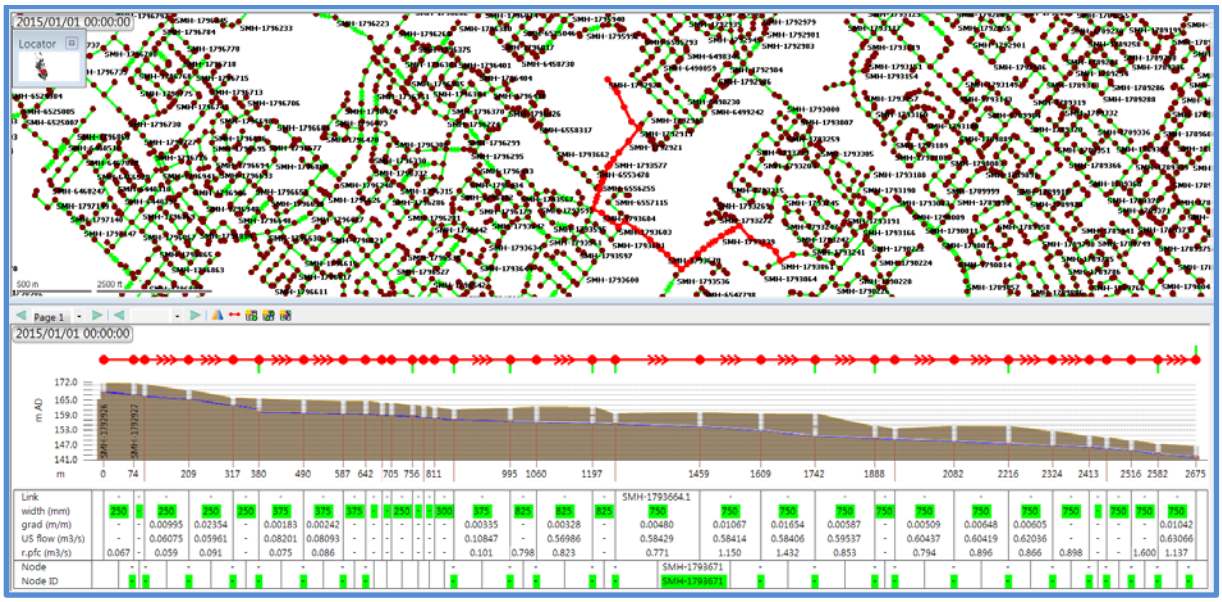
The minimum slope of the 250 mm diameter sanitary sewer is 0.72%, having a maximum capacity of 51 L/s. Some sections of the existing 375 mm sewer between have very low slope (0.183% and 0.242%)

providing a capacity of only 75 L/s. Figure 8 shows a plan and profile of the existing 250 / 300 / 375 mm diameter sanitary sewer on Sorrento Drive and Ella Avenue.

A modelling analysis of the existing wastewater system and 2041 condition was undertaken to determine if there is sufficient conveyance capacity in the existing 250 / 300 / 375 mm sanitary sewer to service the proposed growth.

Based on the results of the analysis, the existing sanitary sewer on Sorrento Drive does not have enough capacity. Also, an upgrade of the 750 / 825 mm Upper Cooksville Creek Trunk sewer will be required for the proposed development.

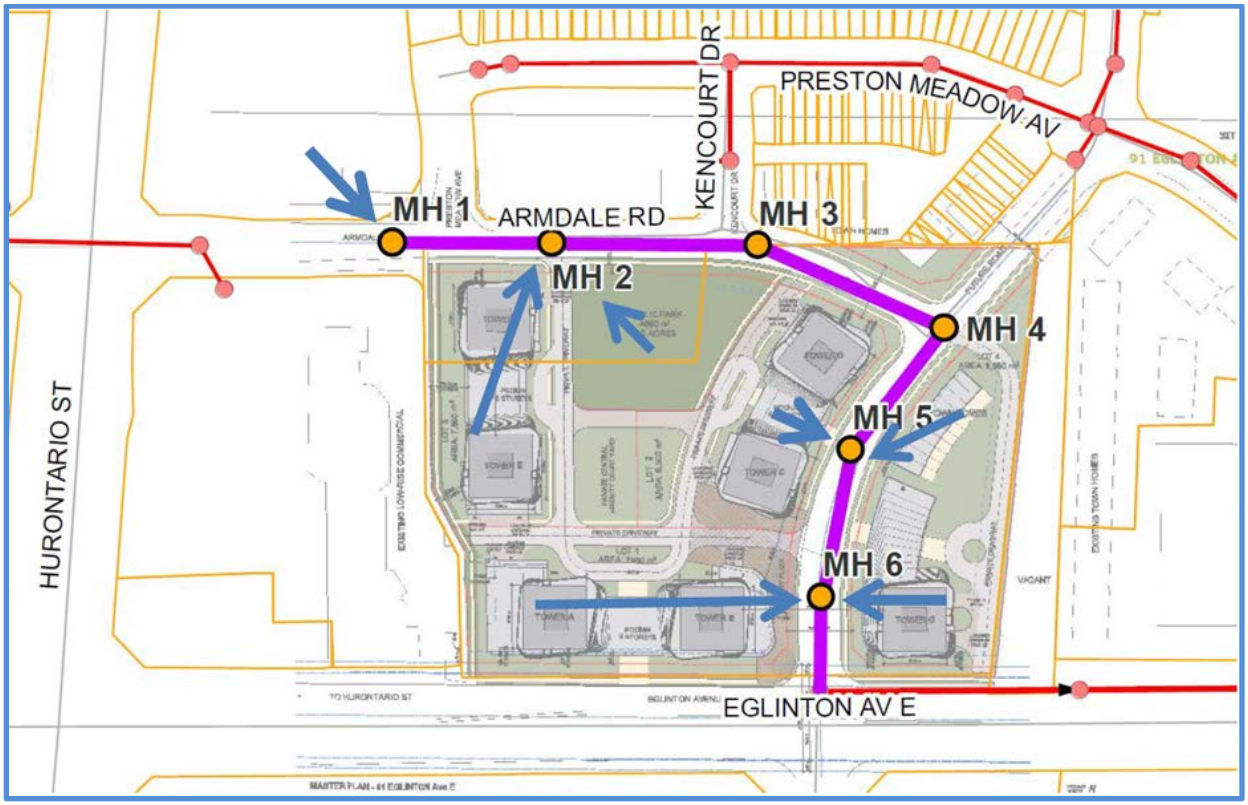
FIGURE 8 EXISTING CAPACITIES OF 250 / 300 / 375 MM SEWERS



4.4.3 Servicing Alternatives

The sanitary flows from subject site should be conveyed through the proposed 300 mm / 375 mm sewers along Armdale Road and the future Thornwood Drive. The proposed sewers will also provide the possibility of servicing Block 46 (Summitview Eglinton Development), located adjacent to the subject site. Multiple connections are proposed to the Armdale Road and future Thornwood Drive sewers to convey the wastewater flows generated by the proposed development. Figure 9 shows the conceptual wastewater servicing layout for the proposed development.

FIGURE 9 CONCEPTUAL INTERNAL WASTEWATER SERVICING FOR THE PROPOSED DEVELOPMENT



The approach for wastewater servicing is based on utilizing existing sanitary infrastructure in the vicinity of the proposed development site. Three wastewater servicing alternatives were identified and further evaluated to select the most preferred servicing option.

- Drain the sanitary flows from the proposed development to the existing 450 mm sewer along the north side of Eglinton Avenue East.
- Drain the sanitary flows from the proposed development to the existing 250 mm sewer along Sorrento Drive.
- Split the sanitary flows from the proposed development between the 450 mm Eglinton Avenue sewer and 250 mm Sorrento Drive sewer.

4.4.3.1 Wastewater Servicing Alternative A

The first alternative wastewater servicing concept is shown in Figure 10 and is based on conveying the generated flow to the existing 450 mm sewer on Eglinton Avenue East. The flows would drain to the existing 525 / 600 mm sanitary sewer on Tailfeather Crescent which is headed south along the creek and conveys flows to Central Park Way Trunk sewer, and they will eventually be discharged by gravity via the East Trunk sanitary sewer to the G.E. Booth wastewater treatment facility.

Sanitary Model analysis revealed that the existing 525 mm / 600 mm sewers do not have enough capacity to convey additional flow from this development so, two options can be considered:

- Upsizing approximately 900 m of the existing 525 mm / 600 mm sewer to 675mm.
  Or,
- Twinning the existing 525 mm / 600 mm sewer by constructing a new 450 mm sewer.

4.4.3.2 Wastewater Servicing Alternative B

The second alternative wastewater servicing concept is shown in Figure 11 and is based on conveying the generated flows through the existing 250 mm sanitary sewer along Sorrento Drive, south of Eglinton Avenue East to the 300 / 375 mm sewer on Ella Avenue. Ella Avenue sewer heads west, crossing Hurontario Street, and drains to the 825 / 750 mm Upper Cooksville Creek Trunk sewer.

Sanitary Model analysis revealed that the existing 250 / 300 /375 mm sewer along Sorrento Drive and Ella Avenue do not have enough capacity to convey additional flow from this development, two options can be considered:

- Upsizing the existing 250 mm / 300 mm / 375 mm sewer on Sorrento Drive and Ella Avenue to 675mm.
  Or,
- Twinning the existing 250 mm / 300 mm / 375 mm sewer on Sorrento Drive and Ella Avenue by constructing a new 450 mm sewer.

In both options, the sanitary sewers will cross Hurontario Street and convey flows to the existing 825 mm Upper Cooksville Creek trunk sewer. The sanitary model results revealed capacity constraints in some sections of the existing 750 mm / 825 mm Upper Cooksville Trunk sewer, downstream of the possible connection manhole. Therefore, these sections of the Upper Cooksville Creek trunk sewer will require upsizing to 900 mm sewer.

4.4.3.3 Wastewater Servicing Alternative C

This wastewater servicing alternative is based on splitting the generated flow between the existing 450 mm sewer on Eglinton Avenue and 250 mm Sorrento Drive. However, this will mean upsizing the 525 / 600 mm and the 250 / 300 / 375 mm sewers on Tailfeather Crescent and Sorrento Drive respectively. This alternative was not evaluated further due to the amount of upgrades required.

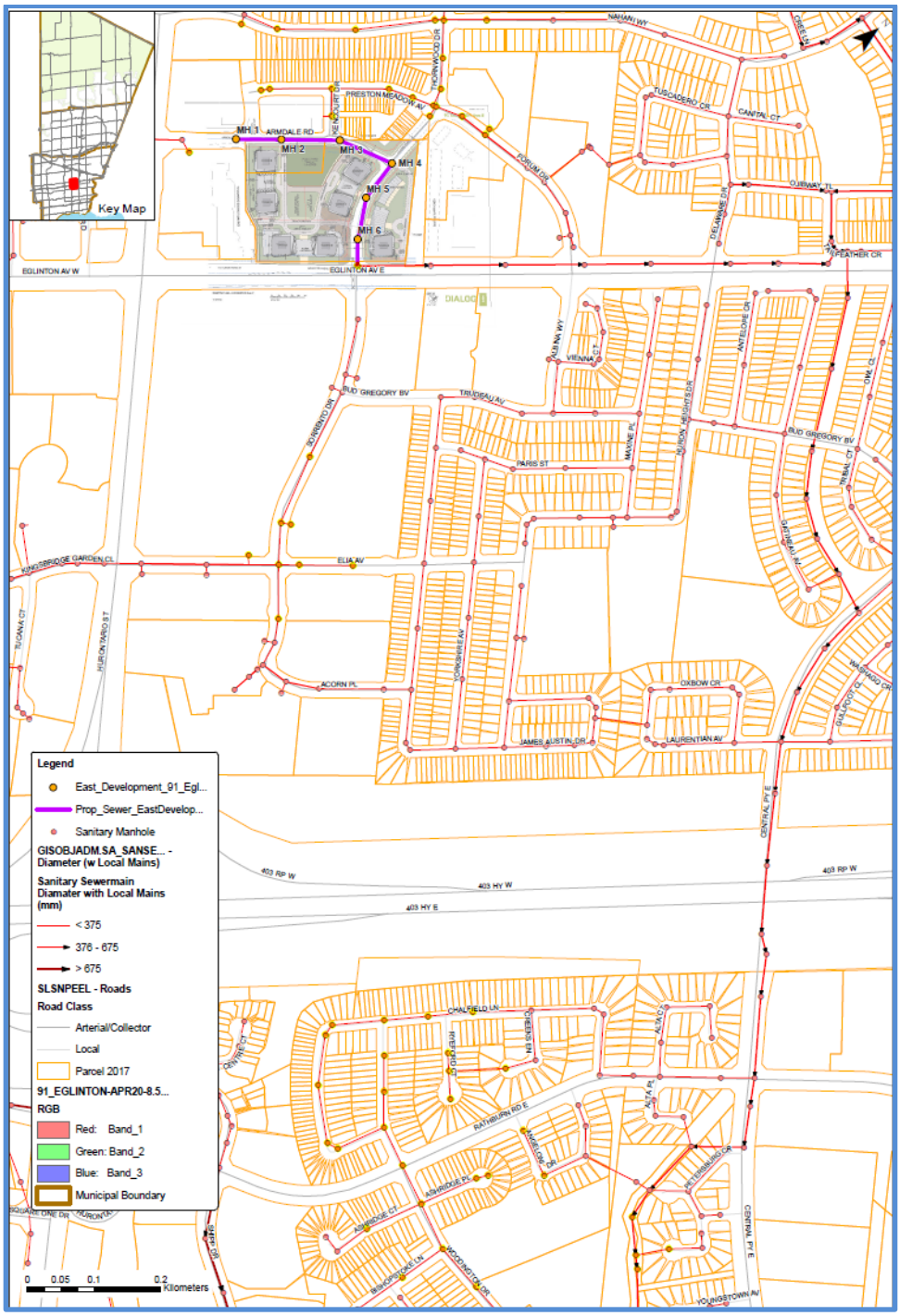


FIGURE 10 WASTEWATER SERVICING ALTERNATIVE A

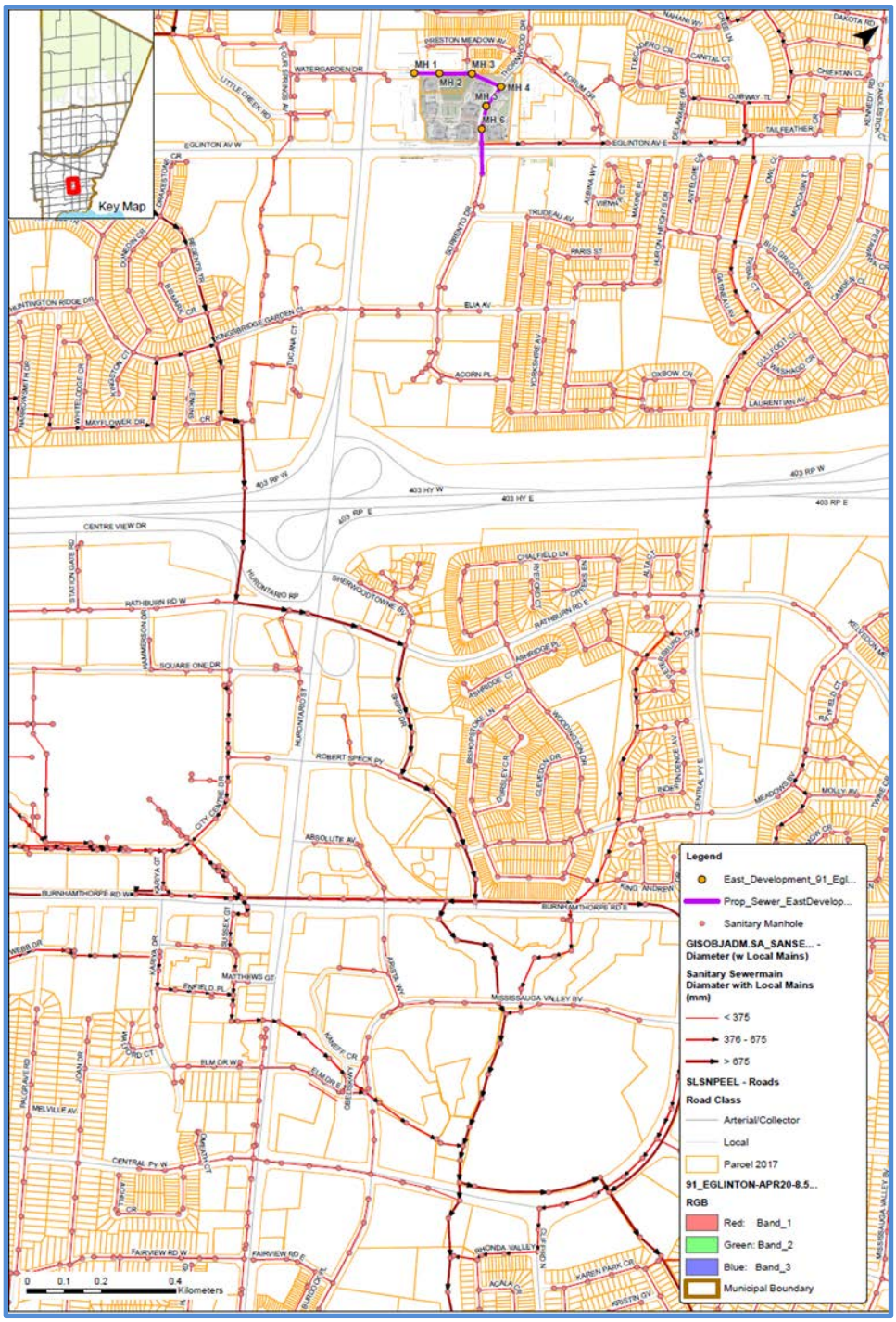


FIGURE 11 WASTEWATER SERVICING ALTERNATIVE B

4.4.4 Preferred Alternative Analysis

The preferred wastewater servicing alternative is Alternative A. This alternative utilizes the existing 450 mm sewer on Eglinton Avenue East that will convey flows generated by the new development to the existing 525 mm sewer on Tailfeather Crescent.

However, it is important to note that sanitary model analysis revealed capacity constraints at 525mm / 600 mm sewers, so upsizing the existing sewers or constructing a new sewer is required.

Four options can be considered:

- A1 Upsizing approximately 900 m of the existing 525mm / 600 mm sewer to 675 mm along the Creek and Central Parkway East from manhole number 1795966 to manhole number 1793012. Refer figure 12 for details.
- A2 Constructing a new 450 mm sewer for approximately 900 m along the Creek and Central Parkway East from manhole number 1795966 to manhole number 1793012. Refer figure 13 for details.
- A3 Constructing a new 450 mm sewer for approximately 1300 m along Eglinton Avenue East and Central Parkway East From manhole number 6564041 to manhole number 1793012. Refer figure 13 for details.
- A4 Constructing a new 450 mm sewer for approximately 950 m along Huron Heights Drive, crossing the existing Huron Heights Park through a proposed easement towards Central Parkway to be connected to manhole number 1793012. Refer figure 13 for details.

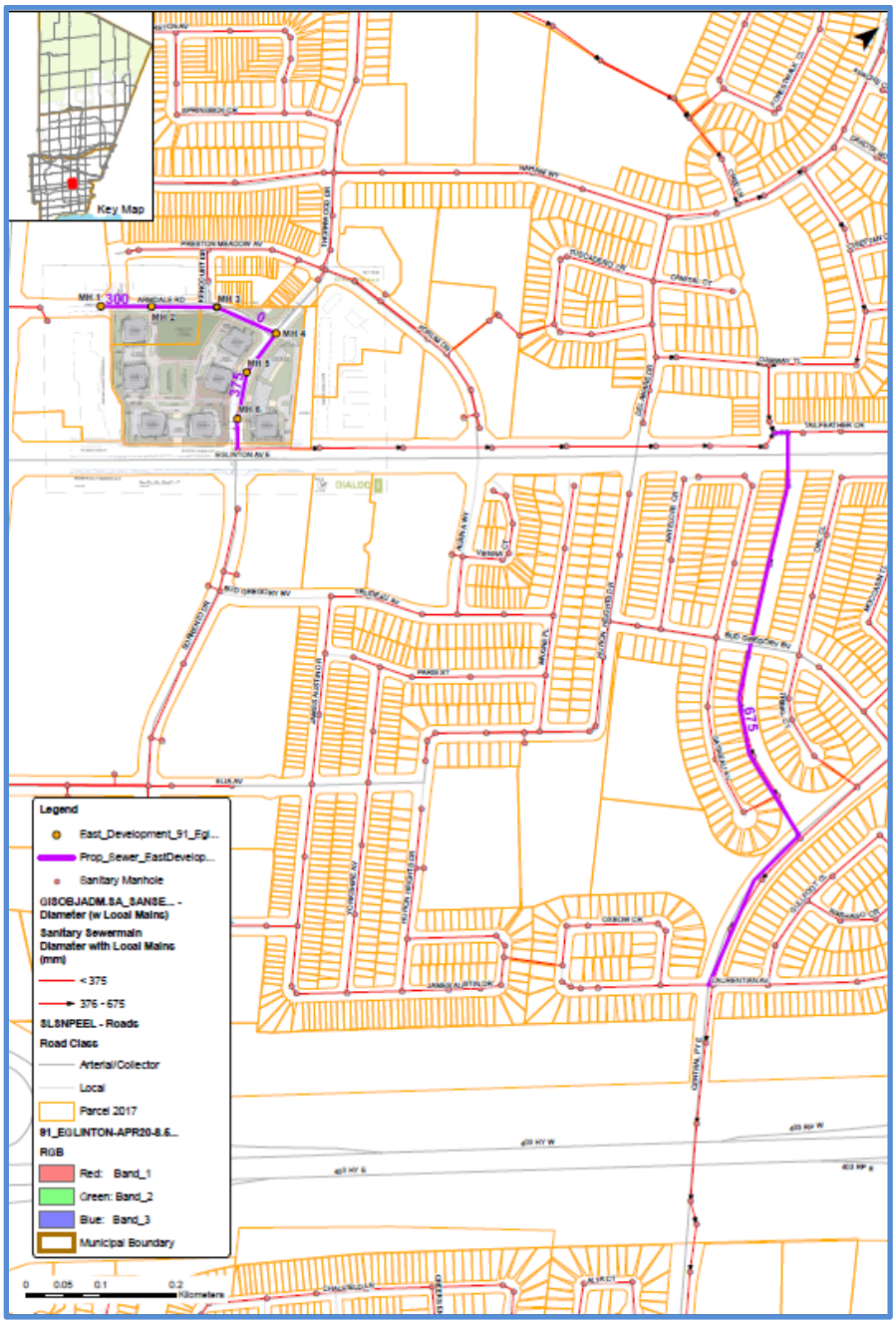


FIGURE 12 WASTEWATER SERVICING ALTERNATIVE A1

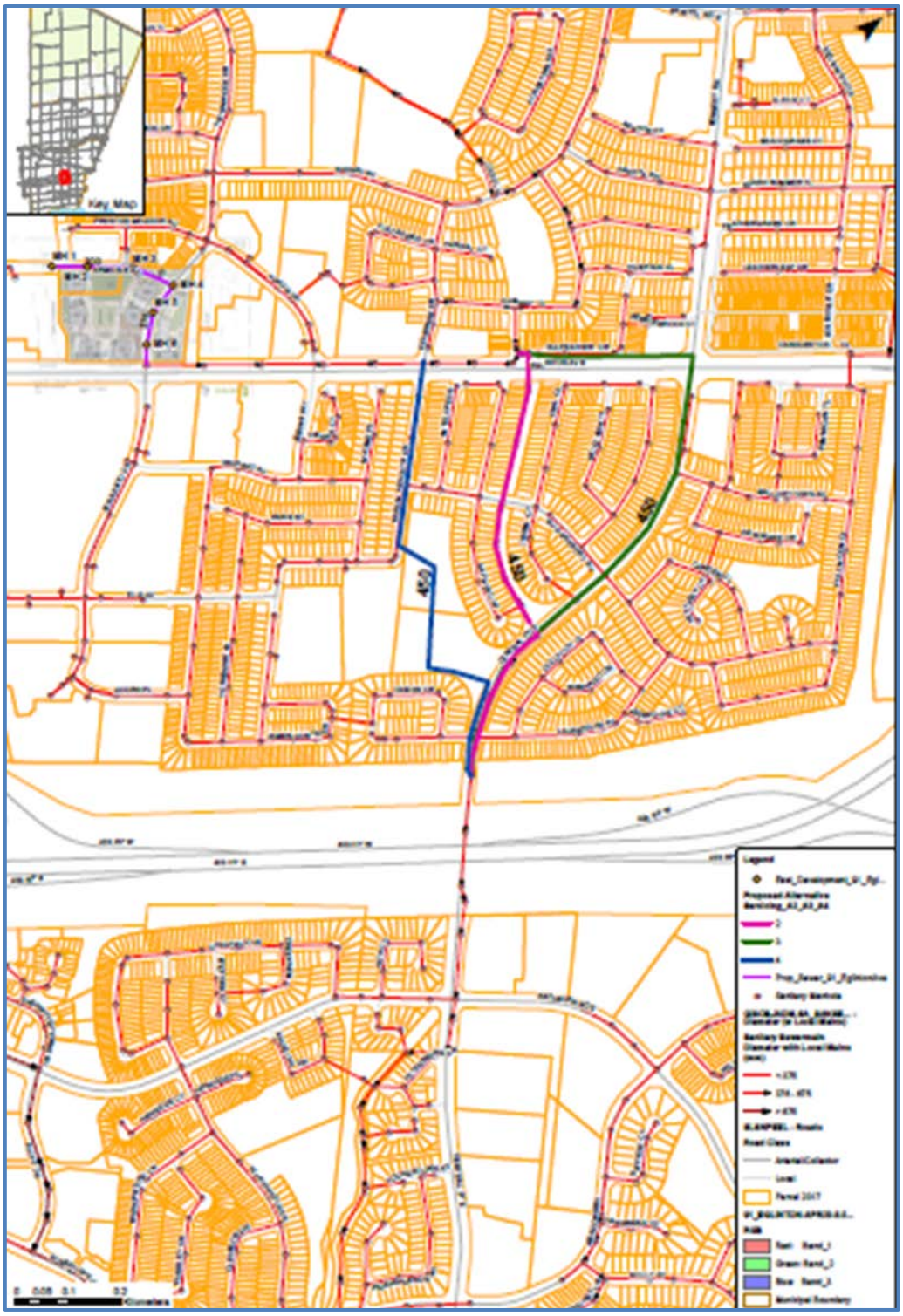


FIGURE 13 WASTEWATER SERVICING ALTERNATIVE A2, A3 AND A4

4.5 Preferred Servicing Strategy

The various options listed in Section 4.4.4 were evaluated using following criteria to determine the preferred servicing strategy.

- Technical feasibility and operational suitability
- Constructability
- Construction cost
- Environmental impact
- Community impact

Comparative assessments of the options were conducted by the Region of Peel wastewater team and alternative A4 was considered as the preferred wastewater servicing strategy.

It is important to note that this preferred strategy would require a dedicated easement along the existing municipal Huron Heights Park. The preferred wastewater servicing strategy is shown in figure 16.

The preferred wastewater servicing strategy can be summarized as follows:

- Install a new 300 mm sewer (approximately 240 m length) along Armdale Road from manhole number 1 to manhole number 3.
- Install a new 375 mm sewer (approximately 180 m length) along the future Thornwood Drive from manhole number 3 to the existing 450 mm sewer.
- Install a new 450 mm sewer (approximately 950 m length) along Huron Heights Drive, crossing an existing park through a proposed easement toward Central Parkway to be connected to manhole number 1793012.

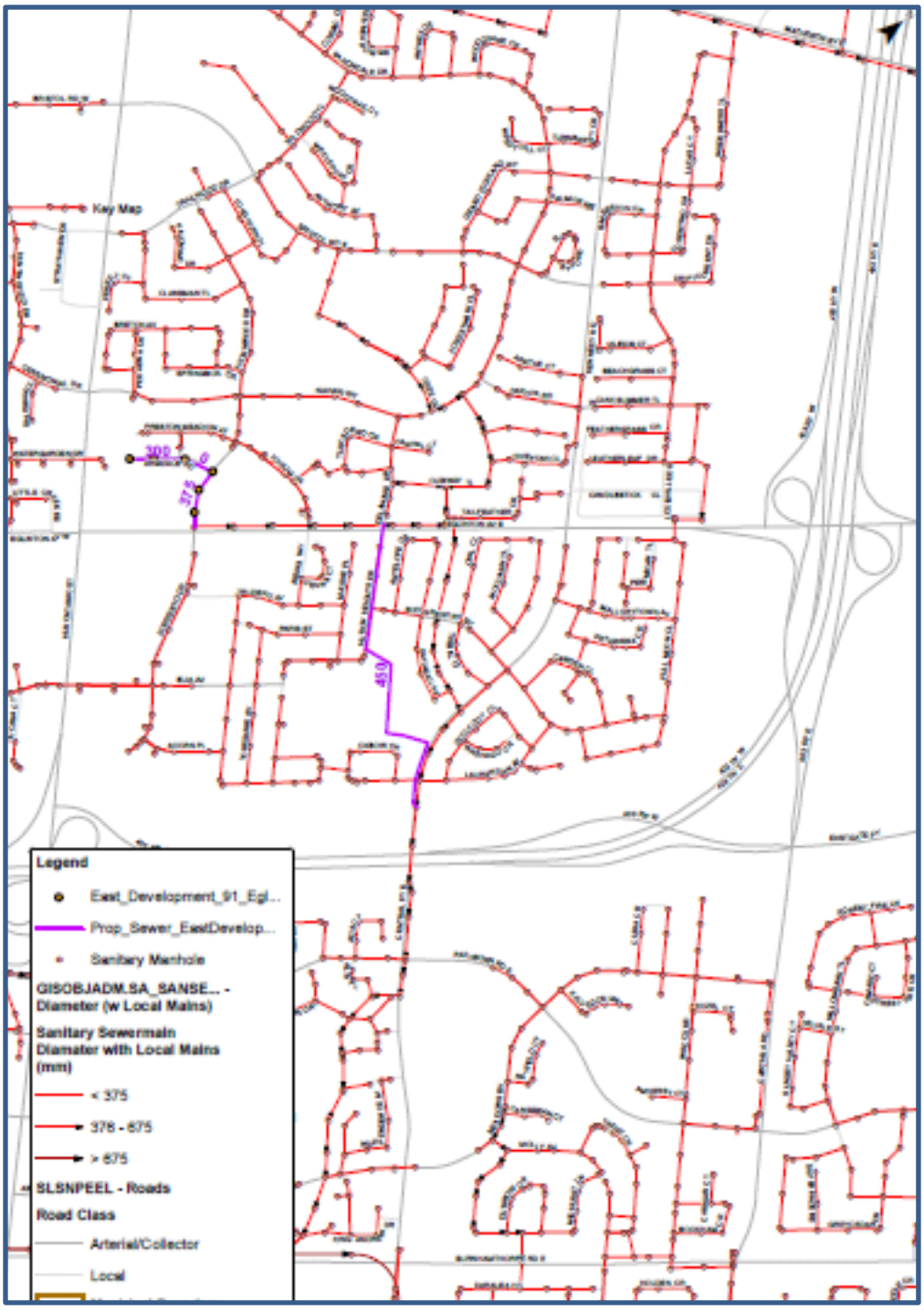


FIGURE 14 PREFERRED WASTEWATER SERVICING STRATEGY

5 Conclusion

The proposed development is located within the City of Mississauga and is one block south of Nahani Way, one block east of Hurontario Street, west of Forum Drive, and is north of Eglinton Avenue. The total site area is about 11 acres. The development plan includes seven (7) towers contained within one SGU (M1347). Based on the residential and employment population projections proposed by the City, they are beyond the Region's forecasted 2041 (SGU Scenario 15 and Scenario 0) population.

The proposed development has an equivalent population of 7560 from 2800 units. The Region's 2041 forecast for this SGU includes 2860 residents and 500 employees, for a total population of 3360.

The Region's Ultimate (or Buildout) forecast for this SGU is closer to the proposed development projections and includes 6551 residents and 1030 employees, for a total population of 7581.

Hydraulic modeling was performed to determine if the existing water distribution and wastewater collection system have sufficient capacity to distribute and collect the additional water demands and wastewater flows, respectively, generated by the proposed development.

Recommended Water Servicing

Water servicing to the proposed 91 Eglinton Avenue East development will be provided entirely by Pressure Zone 4 in Mississauga. Zone 4 is serviced by Beckett Sproule and Hanlan pumping stations from the east and Streetsville and Meadowvale pumping stations from the west. The proposed development however is mostly influenced by the easterly pumping stations. Storage to the area will be provided by the existing Tullamore and West and East Brampton reservoirs. The major feed to the area is a 600 mm sub-transmission main on Bristol Road connecting to 400 mm and 300 mm watermains on Hurontario Street.

Four (4) buildings are proposed to be serviced from the future 300 mm on Thornwood Drive, two (2) buildings are proposed to be serviced from the 300 mm on Armdale Road and one (1) building from the existing but not yet in service 300 mm on Eglinton Avenue East.

To provide water service to the proposed development, the following water servicing components are recommended:

- A new future watermain on Thornwood Drive should be a 300mm main which connects at either end to the future 300mm on Armdale Road and existing 300mm on Eglinton Avenue East.
- There is no requirement to extend the existing watermain on Eglinton Avenue East to connect to the 400 mm main on Hurontario Street.
- The service connections should be smaller than the watermain size at all locations to maintain the integrity of the Regional water system.

Recommended Wastewater Servicing

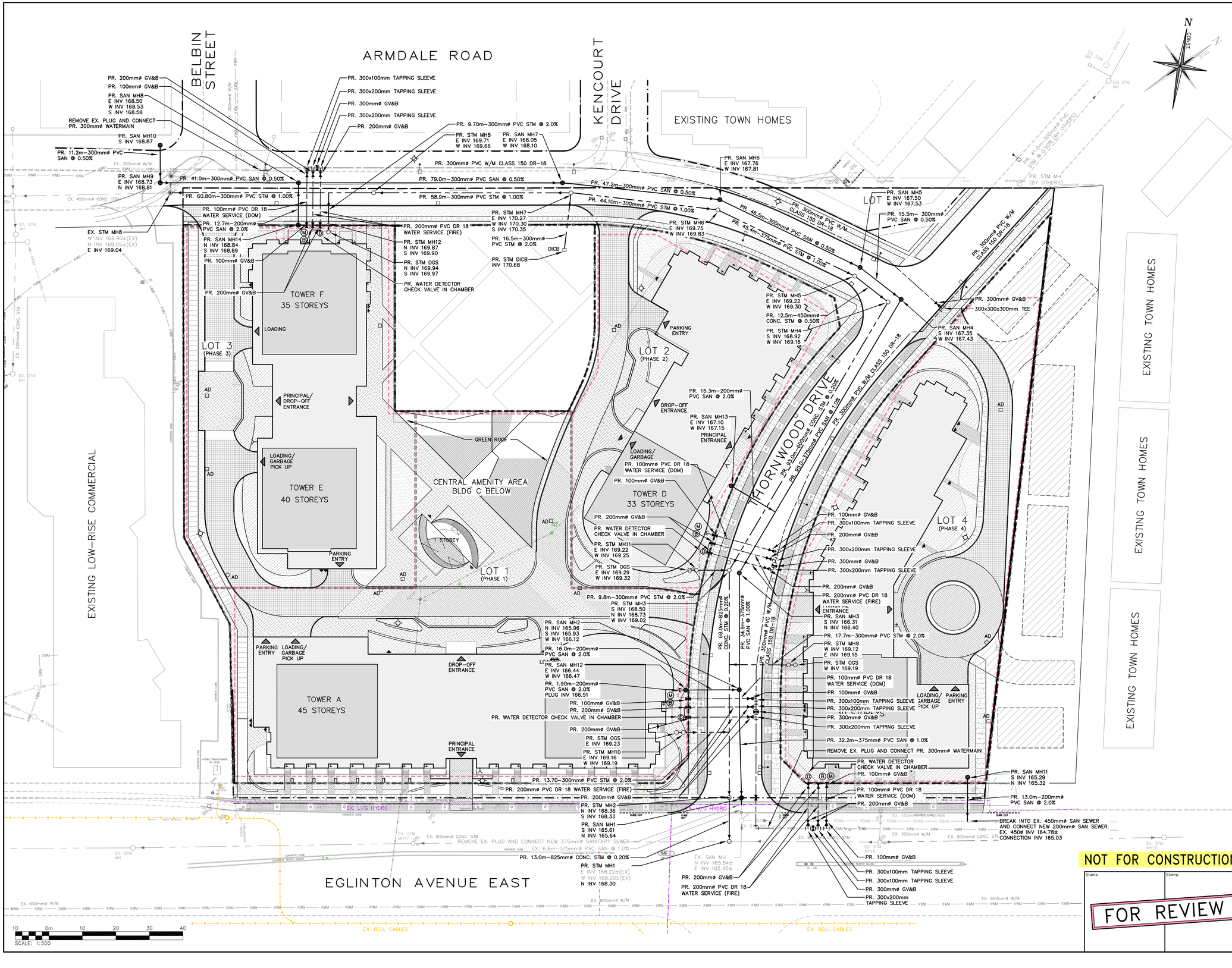
Currently there is existing infrastructure in the area that will collect flows from the 91 Eglinton Avenue East development. However, there are some limitations in downstream conveyance capacity that will need to be addressed to support the proposed development.

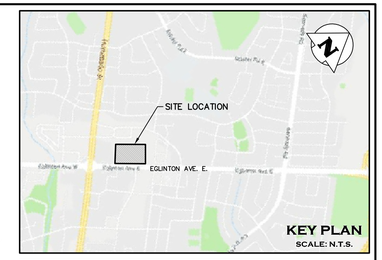
The recommended wastewater servicing strategy utilizes the existing 450 mm sewer on Eglinton Avenue East to convey flows generated by the new development to the existing 525 mm sewer on Tailfeather Crescent. The proposed seven (7) residential towers could connect at various locations to the future sewers on Armdale Road and Thornwood Drive to carry the sanitary flows to the 450 mm Eglinton Avenue East sewer.

To provide wastewater service to the proposed development, the following wastewater servicing components are recommended:

- Install a new 300 mm sewer (approximately 240 m length) along Armdale Road from manhole number 1 to manhole number 3.
- Install a new 375 mm sewer (approximately 180 m length) along the future Thornwood Drive from manhole number 3 to the existing 450 mm sewer.
- Install a new 450 mm sewer (approximately 950 m length) along Huron Heights Drive, crossing an existing park through a proposed easement toward Central Parkway to be connected to manhole number 1793012.

FIGURES





LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED WATER SERVICE LATERAL (XXmmø)
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE CONNECTION
- (M) PROPOSED WATER METER PER MECHANICAL DESIGN AND SPECIFICATIONS
- (B) PROPOSED BACKFLOW PREVENTOR MECHANICAL DESIGN AND SPECIFICATIONS
- (D) PROPOSED BACKFLOW PREVENTOR MECHANICAL DESIGN AND SPECIFICATIONS
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED LIMIT OF UNDERGROUND PARKING
- PROPOSED PHASE LIMIT
- PROPOSED STREET LIGHT LOCATION

PROPOSED HATCHING PATTERNS AND SYMBOLS FOR PAVING, CONCRETE, SOD ETC., AS SHOWN BELOW ARE PER LANDSCAPE ARCHITECTS DESIGN AND SPECIFICATIONS.

- UNIT PAVERS A
- UNIT PAVERS B
- COBBLE PAVING
- SIDEWALK CONCRETE PAVING
- TREE GRATE
- PRECAST CONCRETE PAVING
- CONCRETE SPLASH PAD
- PLANTER
- SOD

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MISSISSAUGA

Project

PROPOSED HIGH–RISE DEVELOPMENT
91 EGLINTON AVE. E. & 5055 HURONTARIO ST.
CITY OF MISSISSAUGA

Drawing

PRELIMINARY OVERALL SERVICING PLAN

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Stamp

FOR REVIEW

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2800 HIGH POINT DRIVE
SUITE 100
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905-875-4915 F
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Drawn	M.I.M.	Design	N.S.	Project No.	1525–4876
Check	S.C.	Check	N.C.	Scale	1:500
				Dwg.	FIG 1

NOTE:
REFER TO DIALOG DRAWING SET (AUG 30, 2018) FOR DETAILS ON GREEN ROOF CONFIGURATION.
ARCHITECT TO PROVIDE ROOF DRAINS AND SLOPE THE GREEN ROOF AREA SO THERE IS NO STORMWATER RUNOFF ONTO THE PUBLIC PARK LANDS.

BELBIN STREET

ARMDALE ROAD

KENCOURT DRIVE

EXISTING TOWN HOMES

EXISTING LOW-RISE COMMERCIAL

EXISTING TOWN HOMES

EXISTING TOWN HOMES

EXISTING TOWN HOMES

TOWER F
35 STOREYS

TOWER E
40 STOREYS

TOWER D
33 STOREYS

TOWER A
45 STOREYS

TOWER B
40 STOREYS

TOWER G
30 STOREYS

LOT 1 (PHASE 1)

LOT 2 (PHASE 2)

LOT 3 (PHASE 3)

LOT 4 (PHASE 4)

LOT 5

THORNWOOD DRIVE

EGLINTON AVENUE EAST

CENTRAL AMENITY AREA
BLDG C BELOW

LOADING

PARKING ENTRY

PRINCIPAL/ DROP-OFF ENTRANCE

PRINCIPAL ENTRANCE

DROP-OFF ENTRANCE

LOADING/ GARBAGE PICK UP

GREEN ROOF

3:1 MAX SLOPE

DICB

MATCH EXISTING GRADES ALONG PROPERTY LINE

PR. RETAINING WALL

TW 171.90

TW 171.93

TW 171.94

EX. RETAINING WALL TO BE REMOVED

EX. HYDRO POLE TO BE REMOVED (BY OTHERS)

EX. LIGHT POLE TO BE RELOCATED (BY OTHERS)

EX. TRAFFIC LIGHT POLE TO BE RELOCATED (BY OTHERS)

EX. BELL CABLES

EX. U/G HYDRO

EX. 900mmø CONC STM

EX. 600mmø W/M

EX. SAN MH

EX. STM MH

EX. STM MH19

EX. DB TO BE REMOVED (BY OTHERS)

A SFS-S1

B SFS-S1

C SFS-S1

D SFS-S1

E SFS-S2

SCALE: 1:500

N

SITE LOCATION

EGLINTON AVE. E.

KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- 215.00 EXISTING GRADE
- 215.00 PROPOSED GRADE
- 215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- EXTENTS OF WORK
- BUILDING ENTRANCE (PERSONNEL DOOR)
- BUILDING ENTRANCE (OVERHEAD DOOR)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- PROPOSED LIMIT OF UNDERGROUND PARKING
- PROPOSED PHASE LIMIT
- PROPOSED STREET LIGHT LOCATION

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- SOD

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MISSISSAUGA

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PROPOSED HIGH-RISE DEVELOPMENT
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CITY OF MISSISSAUGA

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PRELIMINARY OVERALL GRADING PLAN

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Drawn	Design	Project No.	
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Check	Check	Scale	Dwg.
S.C.	N.C.	1:500	FIG 2

ARMDALE ROAD

KENCOURT DRIVE

LOT 1, CONCESSION 1, EAST OF HURONTARIO STREET

PEEL CONDOMINIUM PLAN No. 546

PEEL CONDOMINIUM PLAN No. 560

EGLINTON AVENUE EAST

BLOCK 52

(DEDICATED AS PUBLIC HIGHWAY BY BY-LAW 436-91, INST. 988602)

101
4.44 | 0.25

102
0.38 | 0.25

EX. U/G HYDRO

EX. 900mmø CONC. STM

EX. 300mmø W/M

EX. 600mmø W/M

EX. BELL CABLES

EX. SAN MH

EX. STM MH

EX. STM MH17

EX. STM MH18

EX. STM MH19

10 0m 10 20 30 40
SCALE: 1:500

N
GRID
TRUE

KEY PLAN
SCALE: N.T.S.
SITE LOCATION
EGLINTON AVE. E.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- EXISTING STORM DRAINAGE CATCHMENT
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT

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Drawn	Design	Project No.
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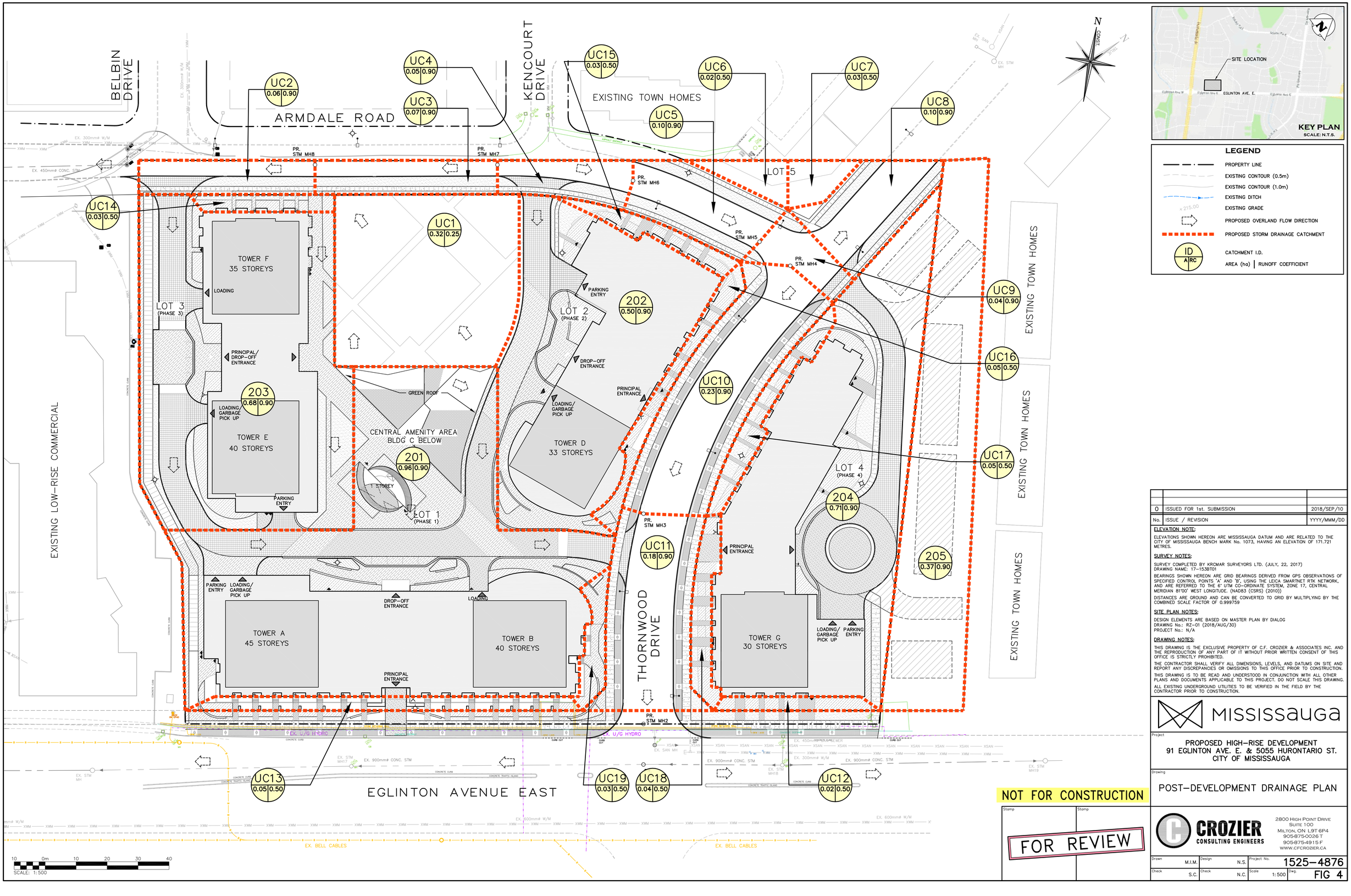
Check	Check	Scale / Dwg.
S.C.	N.C.	1:500 / FIG 3



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED STORM DRAINAGE CATCHMENT
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT

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CITY OF MISSISSAUGA

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

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MILTON, ON L9T 6P4
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S.C.	N.C.	1:500	FIG 4