FUNCTIONAL SERVICING REPORT

35 PLAINS RD

CITY OF BURLINGTON
REGION OF HALTON
PROJECT 2021-5107 **FEBRUARY 2025**

DATE	DESCRIPTION	PREPARED	APPROVED
February 2025	Issued for OPA & ZBA	D.C.	H.S.
October 2023	Issued for ZBA	E.S.	H.S.
July 2022	Issued for SPA	D.C	H.S
November 2021	Issued for SPA	D.C	H.S

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1.0 INTRODUCTION

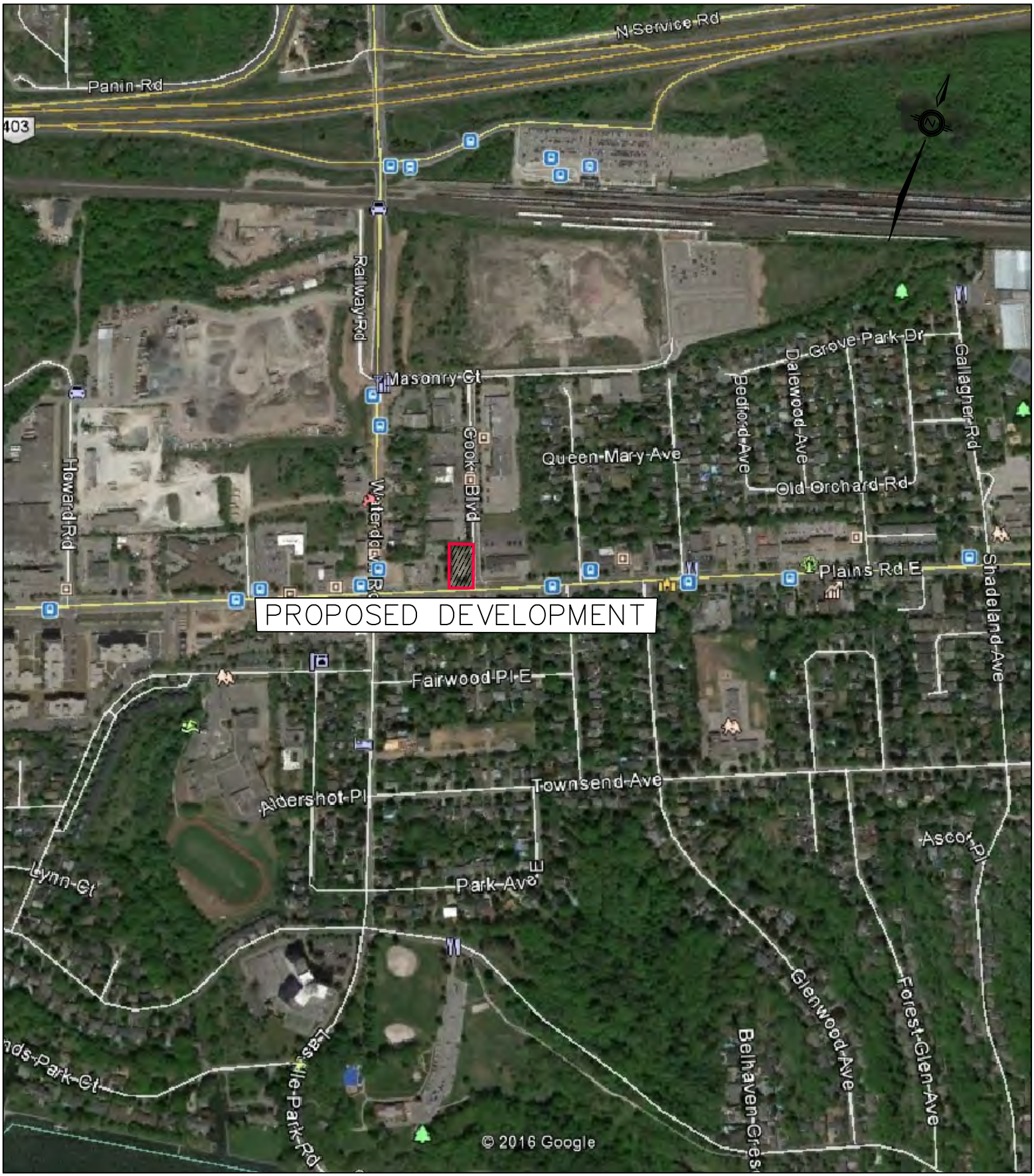
1.1 Objective

Schaeffer and Associates Ltd. has been retained by Janik Group to prepare a Functional Servicing Report in support of the proposed mixed use residential/retail development at 35 Plains Rd East & 1014 Cooke Boulevard in the City of Burlington.

The subject site designated for re-development occupies 0.1992 ha and currently consists of a gravel and landscape area. However, after a daylight triangle dedication to the City, only 0.1980 ha will remain. The site is bound by commercial buildings to west, a proposed residential development to the south, Cooke Blvd to the north and Plains Rd to the east. The location of the subject site is illustrated in as **Figure 1-1.**

The proposed development consists of a high rise residential building with retail space, complete with a 2-level below grade parking structure that will cover the vast majority of the site. The site plan has been included in **Appendix A.**

The purpose of this report is to provide site-specific information for the City's review with respect to infrastructure required to support the proposed development regarding sanitary sewage, Stormwater Management (SWM), and water supply, in accordance with the City's design requirements.



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35 PLAINS ROAD EAST CITY OF BURLINGTON		DATE: OCT 2021	PROJECT NO: 2021-5107
LOCATION PLAN		SCALE: N.T.S.	FIGURE No: 1-1

2.0 STORMWATER MANAGEMENT

2.1 Existing Services and Tributary Area

According to the information obtained from the City, there is a 250mm catch basin lead north of the site within the neighbouring property connecting to Cooke Boulevard. There is a 375 mm storm sewer running west located on the north side of Plains Road East and a 1200mm concrete storm sewer running south located on the east side of Cooke Boulevard. A portion of the site overland flows east towards Cooke Boulevard and the other portion flows overland south towards Plains Road East.

The existing grading on site consists of three split drainage areas. A small area of 0.003ha drains to the existing catch basin to the north and then connects to the existing storm system on Cooke Boulevard. Another area of 0.1198ha overland flows to the east, also towards the existing storm system on Cooke Boulevard. The third area of 0.0752ha overland flows to the south towards the existing 375mm storm sewer on Plains Road East. There are also two external drainage areas from the adjacent western property which drains into the site. An area of 0.004ha drains to the existing storm system on Cooke Boulevard and an area of 0.002ha drains to the existing storm system on Plains Road.

For a schematic illustration of the existing drainage conditions please refer to **Figure 2-1.**

Since the last FSR report was approved IDF criteria for the City of Burlington has been revised. The existing storm run-off based on the drainage area flowing to Cooke Boulevard is tabulated below:

Runoff Coefficient, C	0.51	
Drainage Area	0.127	ha
2-Year Peak Flow, Q2	12.1	l/s
5-Year Peak Flow, Q5	15.5	l/s
10-Year Peak Flow, Q10	17.9	l/s
25-Year Peak Flow, Q25	22.9	l/s
50-Year Peak Flow, Q50	27.5	l/s
100-Year Peak Flow, Q100	31.3	l/s

2.2 Allowable Release Rate

The allowable release rate for the subject site should comply with the pre-development flow generated from a 5–YR storm event and pre-development run-off coefficient of maximum 0.5. As shown below, the maximum allowable release rate from this development totals **15.2 l/s**.

Runoff Coefficient, C	0.50	
Drainage Area	0.127	ha
Q_A= Total Max allowable release rate = 5-Year Peak Flow	15.18	l/s

Therefore a release rate of **15.2 L/s** has been used as the maximum allowable release rate for the site.

2.3 Proposed Servicing and Stormwater Management Plan

The stormwater management for this site has been prepared in accordance with the City of Burlington's Stormwater Management Design Guidelines (May 2020). The proposed storm drainage and stormwater management features are shown in **Figure 2-2**, supporting calculations are included in **Appendix B**.

It has been proposed that a new control manhole be constructed at the south east corner of the site connecting to the existing storm sewer on Cooke Boulevard via a 300mm PVC pipe at 2.0% slope. The exposed at grade parking areas will be collected with area drains and directed to the storm system. Drawing SS-1 illustrates the proposed storm service connection of the subject site.

Refer to **Figure 2-2** for the sites proposed stormwater servicing plan.

The proposed grading of the subject redevelopment has been designed so the site drains into the municipal storm system with controlled flows.

2.3.1 Water Balance

In order to promote low impact development (LID), it is proposed to use rain water harvesting. In order to achieve 5mm of rain will be retained on-site. This target will be met through either infiltration, evapotranspiration, or rainwater re-use. At 0.198 ha the total 5mm retention equals 9.90 m³ (0.198ha x 5mm = 9.90 m³).

This amount can be reduced to account for the initial abstraction for the various surface areas on the site. Based on the Initial Abstraction methodology, 3.54 m³ is captured and 6.36 m³ of harvested rainwater is required for the subject development (9.90 – 3.54 = 6.36). Rainwater re-use will be used to meet the site water balance requirement. The water will be stored in the rainwater harvesting (RWH) Tank located on the P1 level and will be reused by building functions such as irrigation re-use on site, which will be discussed further during the detailed design phase. The mechanical engineer shall design the plumbing to direct water from the roofs to drain to this tank. The proposed RWH tank will provide a volume of 6.80 m³.

Refer to **Appendix B** for supporting calculations.

2.3.2 Water Quality Control

The water quality target, as per MOE's Enhanced Level of Protection is based on a long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site based on the post development level of imperviousness. A treatment unit is to be selected from a list of products that will meet the MOE requirements which will be further discussed during detailed design.

2.3.3 Water Quantity Control

Section 3.5.1 of the Storm Water Management Practices Planning and Design Manual specifies that the accepted criteria is that the maximum peak flow rates must not exceed pre-development values for storms with return periods ranging from 2 to 100 years. As per discussions with the City, the design criteria for the subject site is to limit all allowable release rates to the 5-year pre-development peak flow.

Since we are proposing to connect into the 1200mm storm sewer located on Cooke Boulevard, the maximum allowable release rate for the development has been determined to be 15.2 L/s based on the existing internal and external drainage area that flows to Cooke Boulevard which is 0.127ha (0.1198ha + 0.003ha draining north + 0.004ha from western site) with a runoff coefficient of 0.37. The time of concentration was determined to be 13.55 min. based on the airport method. All the storm runoff from the subject site will be collected and directed to the underground storage tank located on the P1 level which will be used to meet the required SWM storage. Since the elevation of the storm sewer and top of slab of the P1 levels are shallow, a pump system is proposed where water will be pumped to a stabilization chamber upstream of the control manhole where the water will flow to the existing sewer by gravity, at the allowable release rate from the site. A 100mm orifice tube downstream of stabilization chamber, MH 3, will ensure that the allowable release rate be maintained.

Orifice Control System

It is proposed to use a 100mm dia. orifice tube upstream of the site's filtration unit and control manhole, which will limit flows to 15.0 L/sec, which is less than the allowable release rate of 15.2 L/sec.

The high-water depth of the orifice within the stabilization chamber is 0.34m and is controlled by the associated pump rate of 15.0 L/sec. For calculations, refer to **Appendix B**.

Quantity Control Storage

The modified rational method, runoff coefficient for 100-year storm event, the City IDF rainfall curve and the actual release rate of 15.0 L/sec have been used to calculate the total required storage for this drainage area. The city of Burlington provides multiplication factors to the runoff

coefficient for design storms greater than the 10-year storm. Based on the City of Burlington guidelines the runoff coefficient for the post development of the site is 0.90.

City of Burlington Runoff Coefficient Multiplication (Max 1.0)		
2-Year	0.90	No Change
5-Year	0.90	No Change
10-Year	0.90	No Change
25-Year	0.99	x1.1
50-Year	1.08	x1.2
100-Year	1.12	x1.25

A runoff coefficient of 1.00 per the maximum allowable value noted in the City of Burlington guidelines has been used for the post development runoff calculations. The calculations of required storage for this drainage area has been presented in **Appendix B.**

Based on these calculations the storage requirement on site is 61.0 m³ within the storage tank. The storage tank will be built within the P1 level to be pumped to STM.MH.3 before entering the filtration unit and ultimately STM.CTL.MH.1 and the municipal storm sewer on Cooke Blvd.

The proposed tank will provide total of 70.0 m³ of storage.

Storage requirements for the 2-yr to 100-yr event storm event have been provided below. Refer to **Appendix B** for details.

Post Development Discharge for 2 YR - 100 YR Storm Events						
Storm Event	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
Groundwater Discharge [l/s]	0.00	0.00	0.00	0.00	0.00	0.00
External Drainage Area [ha]	0.006	0.006	0.006	0.006	0.006	0.006
Total Drainage Area [ha]	0.204	0.204	0.204	0.204	0.204	0.204
Allowable Release rate (Pre 5-YR rate) [l/s]	15.2	15.2	15.2	15.2	15.2	15.2
Actual Release rate - Pumped [l/s]	15	15	15	15	15	15
Required Storage [m^3]	16.0	24	31	44	53	61.0
Provided Storage [m^3]	70.0	70.0	70.0	70.0	70.0	70.0

The pumping system will be placed in the SWM storage tank and designed by the mechanical engineer with sufficient redundancies and with a backup pump and generator. The main pump needs to provide a maximum pump rate of 15.0 L/s as per the maximum allowable release rate for the subject site. In extremely unlikely events that the pump system fails, the water will spill back to the SWM Tank via an overflow, and/or off-site towards Cooke Boulevard via overflow from the stabilization chamber (STM.MH.2). It should be noted that the storm plumbing system should be water tight under pressure. Details of the pumping and plumbing system will be designed by the mechanical engineer.

Pump System Details and Redundancies

In order to provide an extra level of safety, multiple submersible pumps are recommended to be provided within the SWM Tank.

The pump system is recommended to be provided with switches installed for different situations: Pump off, Pump on, Both Pumps on and Alarm level. For each situation, the related switch will send a signal to the control panel to control the operation of the pumps.

In the extremely unlikely event that both pumps fail, the water will spill towards Cooke Blvd from the stabilization chamber's overflow grate. If both pumps fail and/or the water is rising towards the top of the SWM tank, the system will send a high-water alarm signal to the control panel which is provided with a buzzer and connection to the concierge/maintenance team as a warning.

The pump system should also be provided with an emergency back-up generator to ensure that the system can operate during power outages.

It is recommended that the SWM tank be inspected every 4 months to ensure there is no debris or sand build up that could prevent the pumps from working properly or in any way damage the pumps. It is strongly recommended that the building management establish a maintenance schedule for the pump and electronic systems based on the suppliers' manual.

The pump system design and maintenance shall be detailed by the mechanical engineer.

2.4 Emergency Overland Flow Route and Erosion & Sediment Control

The site grading has been designed to protect the building and underground structure from flooding during 100 year-storm event.

The site has been graded such that the emergency overland flow will route all runoff towards Cooke Blvd.

The proposed siltation control measures for the site will be designed in accordance with the City of Burlington and Halton Conservation Authority.

The following control measures will be installed and maintained during construction.

- Sediment Control Fence around the perimeter of the site
- Entrance Mud-Mat
- Sediment Traps for existing CB's adjacent to the site.

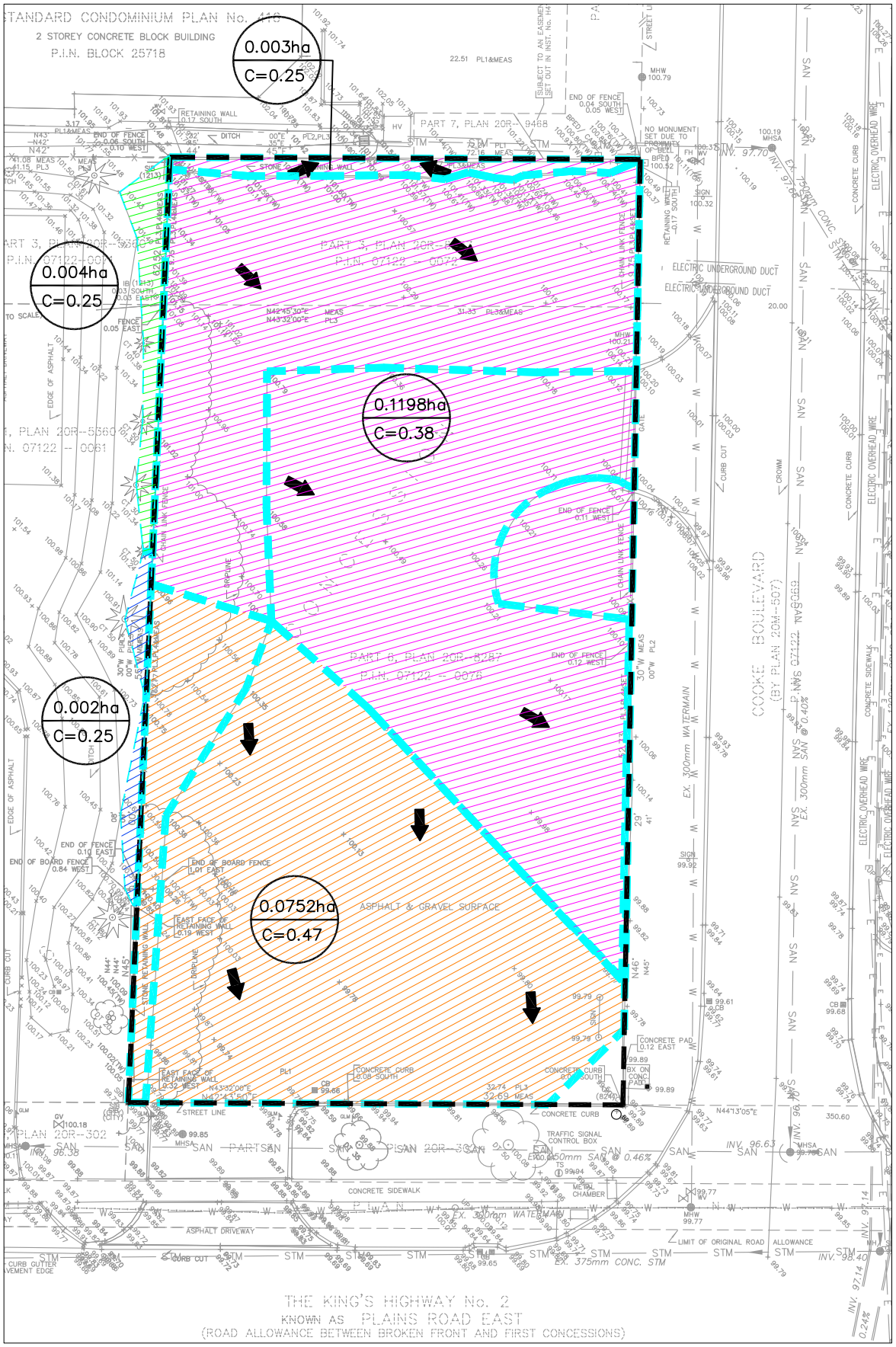
A detailed drawing showing these control measures will be provided as part of the future site plan application materials.

2.5 Proposed Storm Connection

As mentioned above, the storm release rate is being controlled to equal or less than the pre-development peak flow during the 5-year storm event. This results on a maximum release rate of 15.0 L/s from the site into the receiving storm system. A 300mm dia. storm sewer service connection with a grade of 2% will be adequate for the controlled design flow of 15.0 L/sec that will be released from the subject site during the 100-year storm. The 1200mm storm pipe at 0.16% on Cooke Boulevard has a capacity of approximately 1545 l/s. Thus, less than 1.00% of the pipe's capacity will be used form the subject's site's controlled released rate. As such the proposed development will not adversely affect the downstream receiving storm sewers.

2.6 Groundwater Discharge

A groundwater analysis has been conducted by the Hydrogeologist for the site and has determine that no long term dewatering will be required. Refer to **Appendix B** for excerpts from the Hydrogeological report.

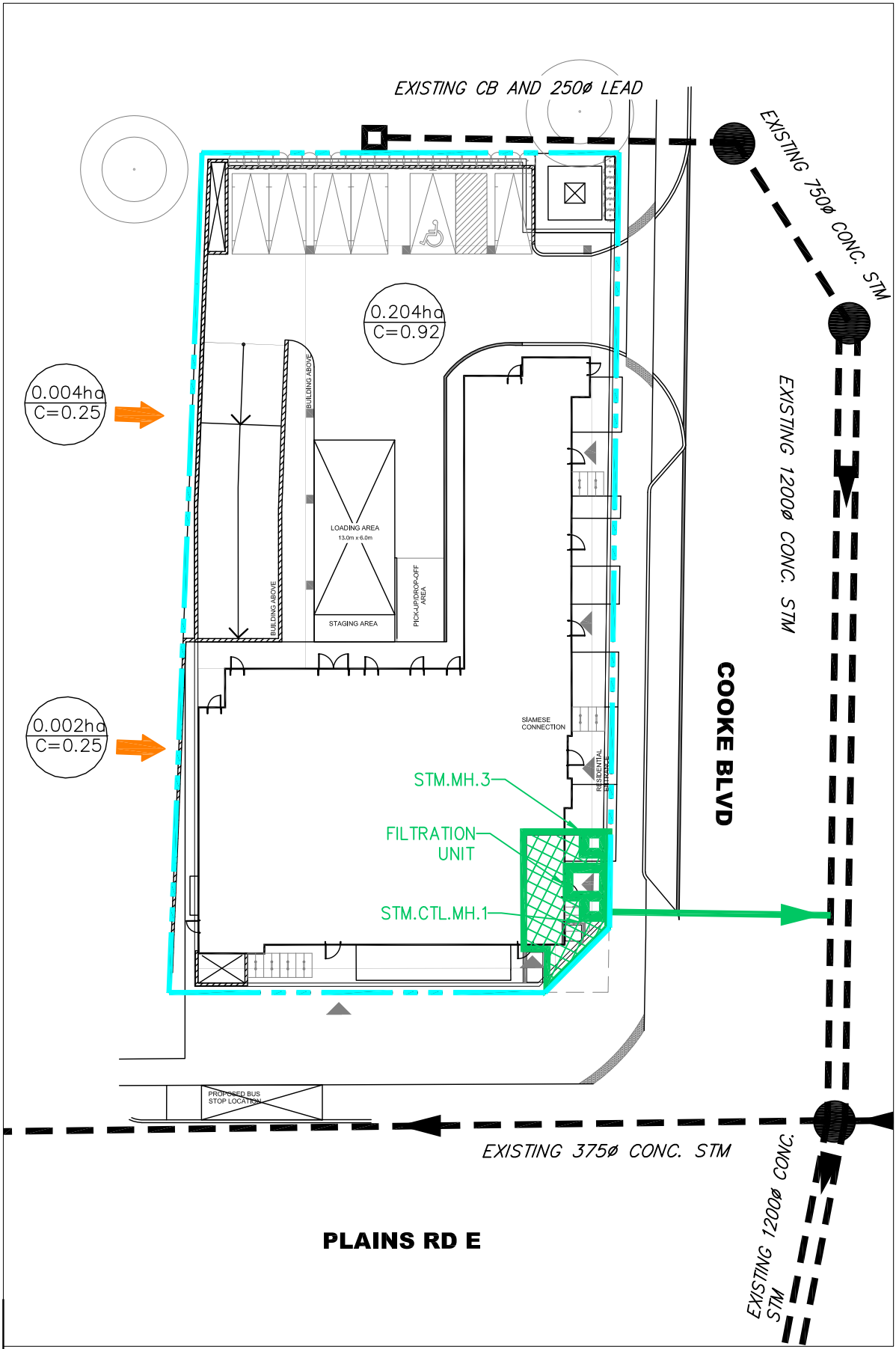


LEGEND

- 0.037ha / C=0.25 — AREA IN HECTARES, RUN-OFF COEFFICIENT
- TRIBUTARY AREA
- AREA DRAINING TO PLAINS ROAD EAST
- AREA DRAINING EAST TOWARDS COOKE BOULEVARD
- EXTERNAL AREA DRAINING TO COOKE BOULEVARD
- EXTERNAL AREA DRAINING TO PLAINS ROAD EAST
- OVERLAND FLOW ROUTE

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35 PLAINS ROAD EAST CITY OF BURLINGTON	DATE: OCT 2021	PROJECT NO: 2021-5107
EXISTING STORM DRAINAGE PLAN	SCALE: N.T.S.	FIGURE No: 2-1



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35 PLAINS ROAD EAST CITY OF BURLINGTON	DATE: JULY 2024	PROJECT NO: 2021–5107
PROPOSED STORM SERVICING PLAN	SCALE: N.T.S.	FIGURE No: 2–2

3.0 SANITARY SERVICING

3.1 Existing Services

Sanitary service in the vicinity of the subject lands is provided by a 300mm diameter sanitary sewer running south on Cooke Boulevard and a 250mm sanitary sewer running west on Plains Road East. The existing sanitary sewer located along Plains Road east is approximate 3.0m away from the southern property line. The shoring should be designed to ensure that there is no undermining of the existing sanitary sewer during the construction of the underground parking. The existing sanitary sewer should be inspected with a CCTV camera prior to commencing construction and after construction has completed. If there are any signs of damage to the existing sewer, it should be repaired or replaced accordingly.

3.2 Proposed Servicing

The sanitary servicing for the proposed mixed used residential/retail development will consist of a 200mm diameter sanitary connection at a 2.0% slope. The connections will be made to the existing 250mm diameter sewer located on Plains Road East. A cast-in-place control manhole located adjacent to the stormwater tank will discharge to a proposed MH along Plains Rd E and provide a sanitary outlet for the site. This configuration have been proposed to avoid interfering with the existing traffic control box fronting Plains Rd.

Drawing SS-1 illustrates the proposed sanitary service connection of the subject site.

According to the site plan provided by KFA Architects + Planners included in **Appendix A**, the development will consist of 91 one-bedroom units, 54 two-bedroom units, 16 three-bedroom units and a retail space of ±453 m² on Level 1. The equivalent residential population is 267 people, based on a population density of 1.655 persons per unit for high density (As per Region of Halton 2022 Development Charges Background Study, 10-year forecast as noted on Table A-5) and the retail population is 5 people based on 90 p/ha for Light Commercial Areas (As per Region of Halton Water and Waste Water Linear Design Manual) Therefore the total population for the development is 272 people.

The Halton 2022 Development Charges Background study also included populations determinations based on land use and site area which yielded a population of 57 people for the residential development. As such the previously noted population of 244 people for the residential units was used as the more conservative estimate of sanitary demand.

The post development peak sanitary flow is calculated at 3.60 L/s based on a sewage flow of 275 L/cap/d for high density residential and a sewage flow of 24,750 m³/ha/day for light commercial areas. In addition, an infiltration rate of 0.286 L/s/ha was used together with the calculated peaking factors of 4.10 for residential and 3.55 for commercial (As per Region of Halton Water and Waste Water Linear Design Manual)

It is, therefore, proposed to install a 200mm diameter sanitary service connection at 2.0% slope.

Refer to **Appendix C** for sanitary demand calculations. **Figure 3-1** illustrates the proposed sanitary service connections of the subject site.

3.3 Sanitary Capacity Analysis

In order to assess the impact of the subject development to the downstream municipal sanitary system, a detailed sanitary analysis has been conducted and its results have been presented in the Sanitary Capacity Analysis Report. The Sanitary Capacity Analysis Report has been included in **Appendix F**.

Pre-development (existing conditions as well as development applications included in the City's development applications website) and post-development (pre-development scenario + subject site) scenarios were analyzed in the InfoWorks model provided by the Region of Halton.

Dry Weather Flow (DWF)

The results show that three (3) existing sewer legs on Plains Road East are expected to be surcharged under both pre-development and post-development scenarios, due to the various development applications in the immediate vicinity of the site, including the subject site.

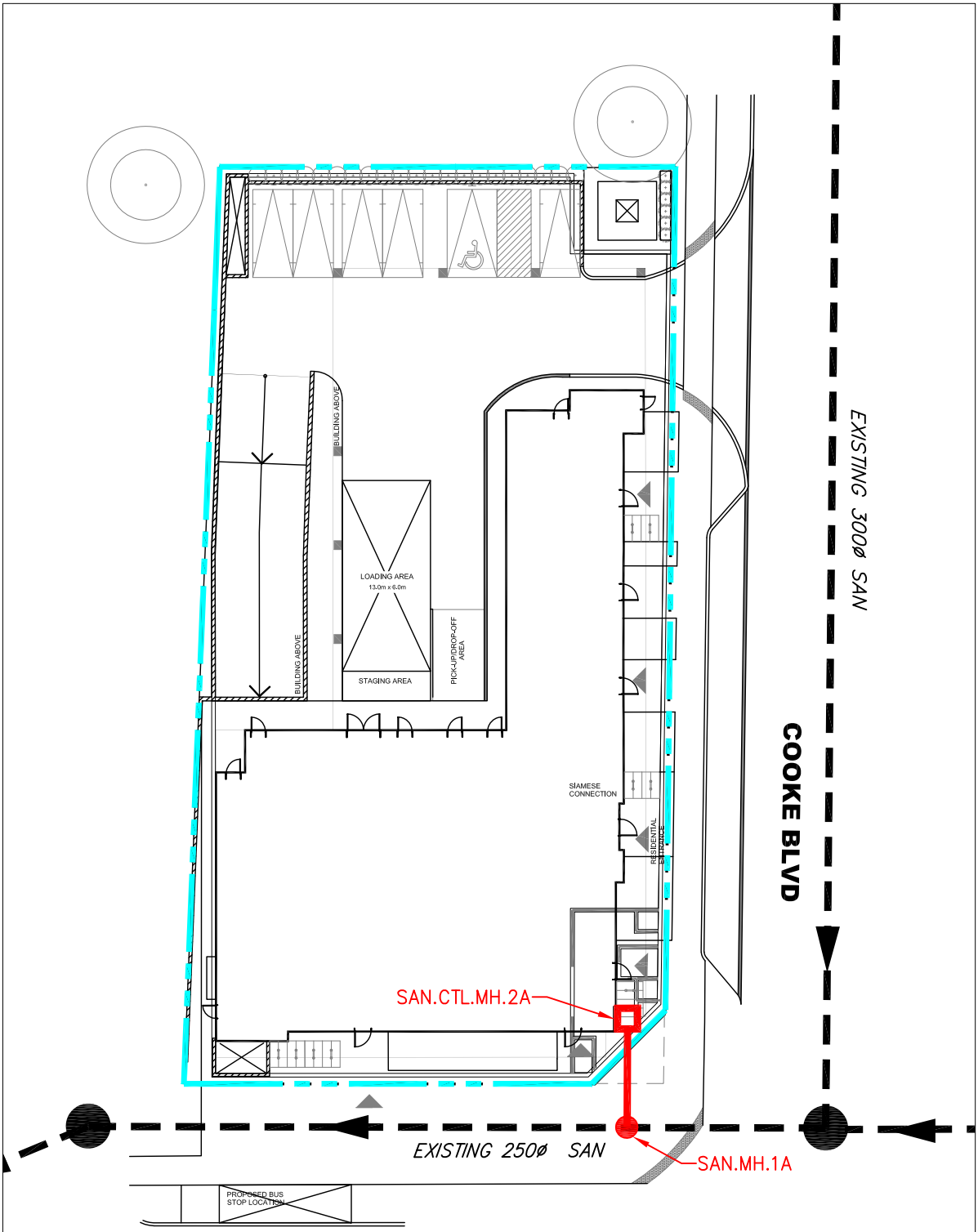
Wet Weather Flow (WWF)

The 10-year design storm event was considered in the WWF analysis. The result shows that 3 existing nodes have freeboard less than 1.8m in both pre-development and post-development scenarios, due to the various development applications in the immediate vicinity of the site, including the subject site.

Proposed Sanitary Upgrade

Based on the analysis, it is proposed to have three sewer legs on Plains Road East (Cooke Blvd. to Lasalle Park Rd.) upgraded to 375mm dia., which would alleviate both the DWF surcharge and WWF HGL issues. These upgrades would benefit the development applications in the vicinity, including the subject site, as well as the Regional sanitary system.

It should be noted that the development applications of both 1120 Cooke Blvd. and 1062-1074 Cooke Blvd. have also indicated sanitary upgrades are required in the above identified sewer legs.



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER & MANHOLE
- EX. SANITARY SEWER

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		PROPOSED SANITARY SERVICING PLAN	SCALE: N.T.S.	FIGURE No: 3–1

4.0 WATER SUPPLY SERVICING

4.1 Existing Services

The subject site is located in the City of Burlington and Region of Halton Water Supply System. Water service in the vicinity of the site is provided by a 300mm diameter watermain on the west side of Cooke Boulevard. In addition, there is a 300mm diameter watermain located at the north side of Plains Road East and a 400mm Watermain on the south side of Plains Road East. There is an existing fire hydrant located at the north-east corner of the site.

4.2 Proposed Servicing

A 200mm fire connection and two 75mm domestic connections for the residential and retail water services are proposed within the site to service the proposed mix used development. These water service connections will be made to the existing 300mm watermain on Cooke Boulevard. The proposed service connections will be made in a valve chamber in accordance with the Region of Halton STD RH 402.080.

Fire hydrants are present on Cooke Blvd in the immediate vicinity of the subject site, providing sufficient fire coverage. The subject site's siamese connection shall be located within 45 m of an exiting hydrant. **Figure 4.1** illustrates the proposed water servicing plan of the subject site.

Based on the calculations in Section 3.2, the population for the development is estimated to be 272 persons. The average demand for the development can be estimated based on 275 l/cap/day for residential and 24.75m³/ha/day for retail, thus the average daily demand for the development is 0.86 l/s.

The max day peaking factor of 2.25 and peak hour factor of 2.25 for commercial and max hour peaking factor of 4.0 and max day peaking factor of 2.25 for residential can be assumed for the subject site. Thus, the Max Day Demand and the Max Hour Demand for the development are 1.91 l/s and 3.43 l/s respectively. Detail calculations can be found in **Appendix D.**

Water Supply for Public Fire Protection calculations, as provided by the Fire Underwriters Survey (FUS), was undertaken to assess the minimum requirement for fire suppression outlined in the FUS.

According to our calculations, a minimum fire suppression flow of approximately 11,000 L/min or 183.33 L/sec which results in a Peak Day Fire Flow of 185.3 l/sec required for the site. Per the Region's criteria, a minimum pressure of 140 kPa (20 PSI) is required at the hydrant for the Max Day + Fire demand, the expected water supply demands have been summarized in **Table 4-1** and all demand and fire flow calculations are provided in **Appendix D**.

Table 4.1 Water Supply Demands

Demand Scenario	Demand (l/s)
Average Day Demand	0.86
Maximum Day Demand	1.94
Peak Hourly Demand	3.43
Fire Demand	183.33
Total Demand *	**185.3***

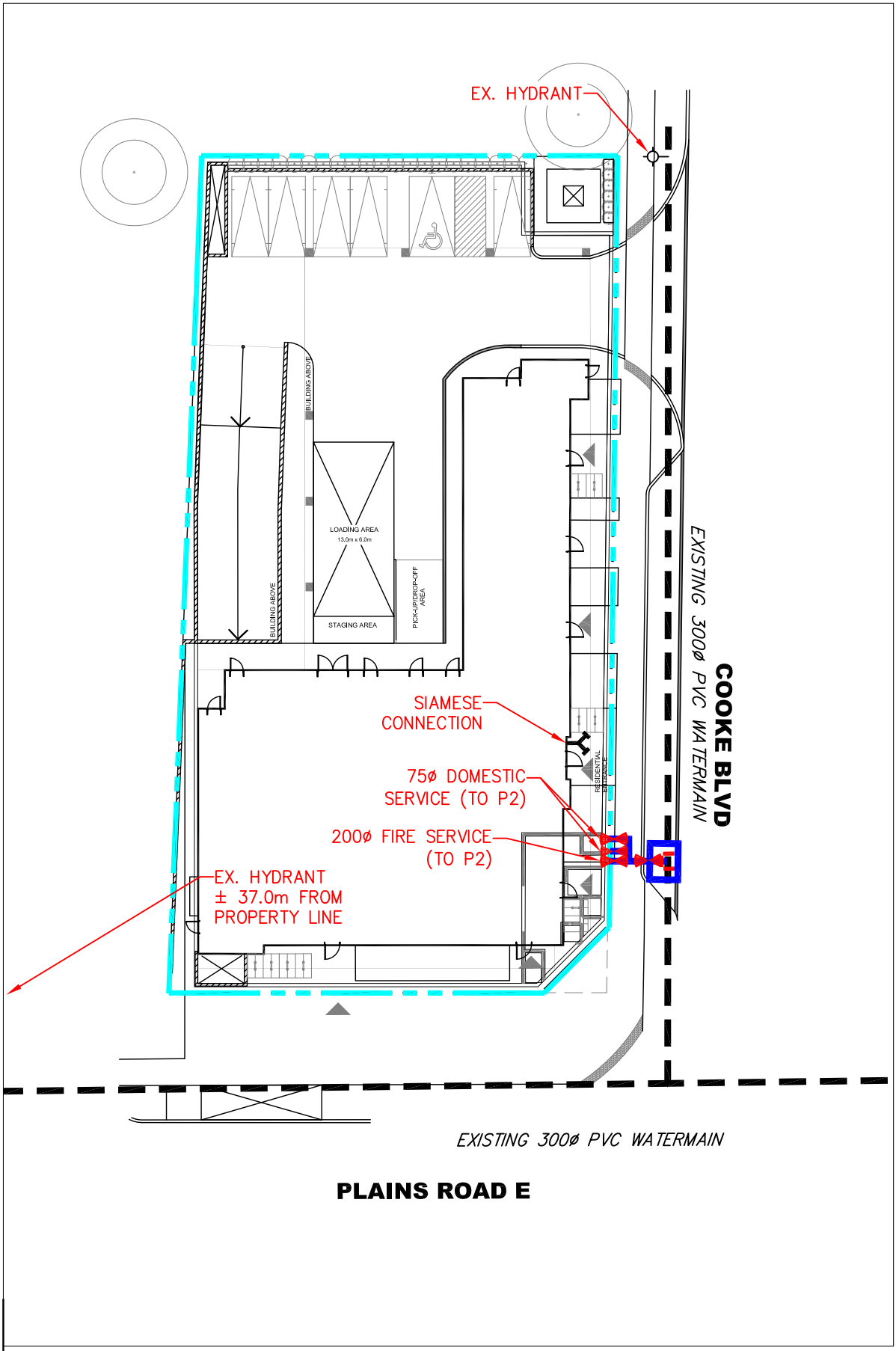
*Total demand is the sum of Max. Day Demand and Fire Demand

4.3 Existing System Analysis

A hydrant flow test was conducted on the 300mm watermain on Cooke Boulevard to ensure that adequate flow and pressure are available in the existing watermain. The residual hydrant is located at 15 Plains Road East. Refer to **Appendix D** to view the test results.

The flow test measured a static pressure of 45 PSI (892 kPa) in the City watermain. Flow rates corresponding to residual pressure reading were provided. By extrapolation, it was determined that the max day plus fire scenario (max demand of 185.3 l/s) has an expected pressure of 157 kPa, which is greater than the minimum required residual pressure of 140 kPa. It also indicates that at 140 kPa (20 psi), the available flow is 195 l/s, which is greater than the required peak flow.

As such, the hydrant flow test results suggest that available pressure and flow in the surrounding municipal mains will satisfy the water demand of the proposed development.



LEGEND

- PROPERTY LINE
- PROPOSED WATERMAIN
- EX. WATERMAIN

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35 PLAINS ROAD EAST CITY OF BURLINGTON	DATE: JULY 2024	PROJECT NO: 2021–5107
PROPOSED WATER SERVICING PLAN	SCALE: N.T.S.	FIGURE No: 4–1

5.0 GROUNDWATER AND FOUNDATION DRAINAGE

Hydrogeological calculations and analysis for the subject site was undertaken by Toronto Inspection Ltd. to assess the potential effects of groundwater on the proposed development. Please refer to the excerpts from the Hydrogeology Study included in **Appendix B.** The detailed investigation has indicated that no groundwater dewatering will be required for both construction and permanent dewatering but storm water dewatering during construction may be required. The construction stormwater dewatering is estimated to be 72,800 l/day (0.85 l/sec).

Additionally, the client has indicated that the building underground structure will be of water-tight construction. As such, no long term dewatering is required, even with addition of more underground parking levels.

The client has indicated that the groundwater will be discharged to the municipal storm sewer for temporary short-term stormwater dewatering.

The short-term construction dewatering rate of 0.85 l/sec is significantly less than the ultimate storm release rate of 15.0 l/sec noted in Section 2.3.3 above, and can be safely handled by the existing municipal infrastructure. It is proposed to discharge the short-term construction dewatering flows to the Ex. 1200mm dia. storm sewer on Cooke Boulevard.

The required permitting for temporary dewatering will be required for the above noted dewatering.

6.0 UTILITIES AND EXISTING SERVICE CONNECTIONS

The proposed development will connect to the available utilities fronting the site. The servicing plan SS-1 indicate the available utilities confirmed via a utility investigation conducted by 4Sight (Feb 2022), refer to **Appendix A** for details. Please note utility (telecom/hydro/gas) connections will be detailed by the building group at the permitting stage.

Existing water or wastewater service connections that currently exist to the property shall be decommissioned per Region of Halton standards.

7.0 CONCLUSION

This document has provided detailed information on the functional servicing and stormwater management plan for the subject site, indicating the City's criteria is met.

- A stormwater management plan can be implemented to meet quantity, quality and water balance requirements. On-site controls are required to ensure the allowable release rate from the site to the existing 1200mm dia. storm sewer on Cooke Blvd is not exceeded. The municipal storm sewer system will not be adversely affected by the post-development conditions, as the total rate of stormwater released from this site should decrease. Water balance requirements will be met via the implementation of a rainwater harvesting system.

- No permanent groundwater dewatering is proposed for the site per the hydrogeologist. Short term discharge of stormwater, rainfall, during construction has been proposed to discharge to the existing 1200mm dia. storm sewer on Cooke Blvd.

- Sanitary servicing of the subject site will be provided through Plains Road East via a proposed 200mm diameter pipe connection off the existing 250mm sanitary sewer. Downstream upgrades are required for the area at large, specifically on Plains Road East (Cooke Blvd. to Lasalle Park Rd.).

- Water servicing of the subject site will be provided off the existing 300mm diameter watermain on Cooke Boulevard. Hydrant testing has indicated sufficient pressure and flows are available to service the subject site.

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

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.



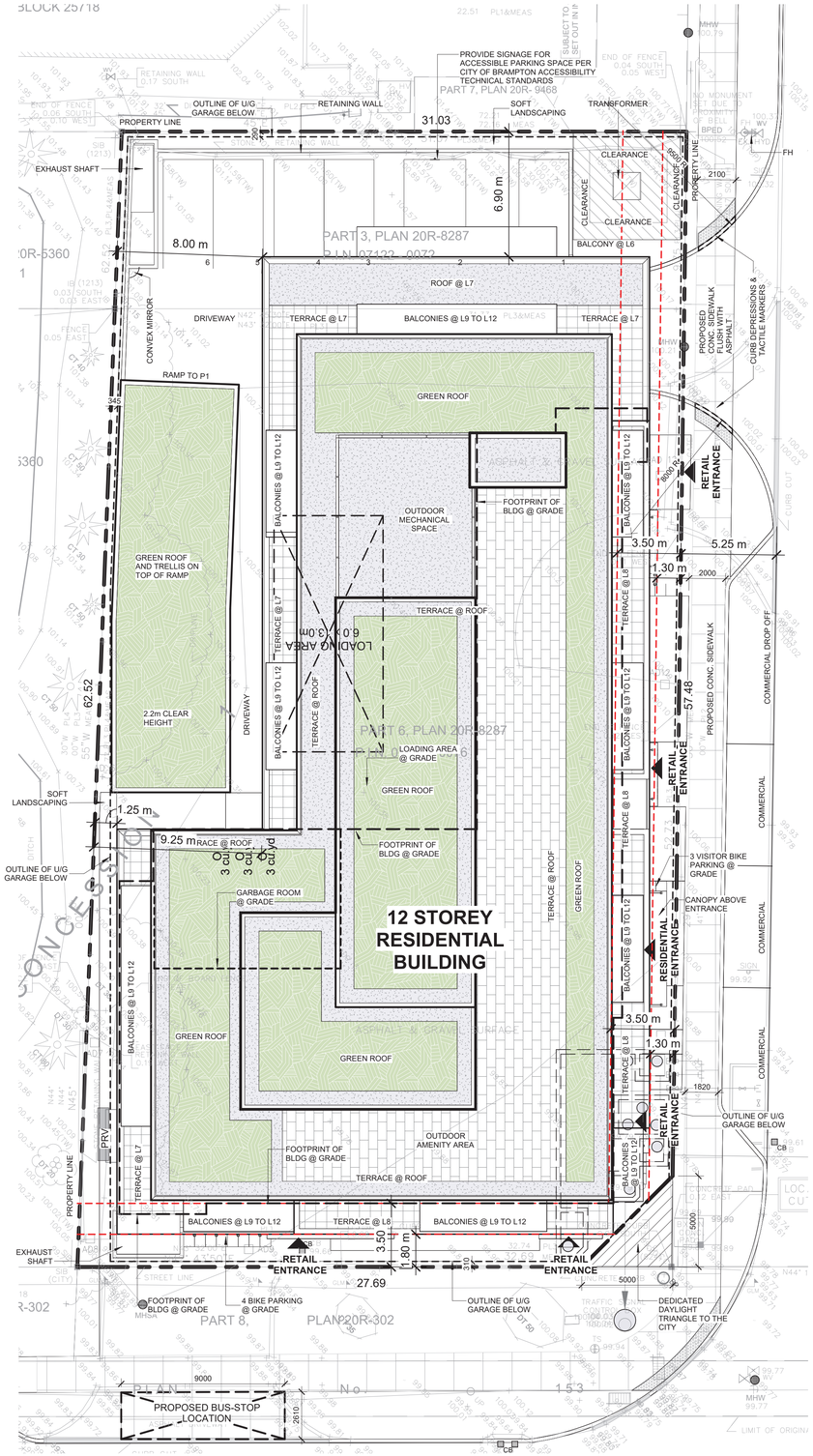
Hagop Sarkissian, P. Eng.
Partner

Daniel Chisholm

Daniel Chisholm
Designer

APPENDIX A

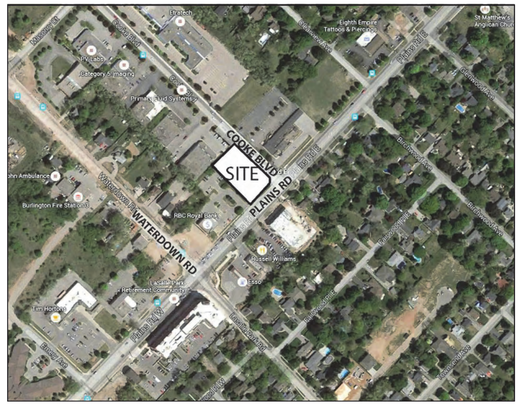
Site Plan & Background Information



1 Site Plan
1 : 150

NOTES:

1. THIS SITE PLAN HAS BEEN PREPARED IN ACCORDANCE TO THE ZONING BY-LAW NO. 2020.384 OF THE CITY OF BURLINGTON
2. ANY GRADE ELEVATIONS ARE SHOWN FOR REFERENCE ONLY. REFER TO GRADING AND SITE SERVICING PLAN FOR GRADING AND U/G SERVICES.
3. ALL SITE AREA LIGHTING TO BE DIRECTED DOWNWARD AND DEFLECTED AWAY FROM ADJACENT LOTS, ROADS AND STREETS.
4. ALL CURBING AND DRIVEWAY ENTRANCES TO BE DESIGNED IN ACCORDANCE WITH THE CITY'S MATERIALS STANDARDS AND SPECIFICATIONS MANUAL
5. THE BUILDING AND THE SITE HAS BEEN DESIGNED TO BE BARRIER FREE IN ACCORDANCE WITH THE REQUIREMENTS OF BILL 118 AND 126, ACCESSIBILITY FOR ONTARIANS WITH DISABILITY ACT, 2005 AND IN THE GENERAL CONTENTS OF THE ONTARIO BUILDING CODE
6. 15% OF ALL RESIDENTIAL SUITES SHALL BE PROVIDED WITH BARRIER-FREE DESIGN REQUIREMENTS IN ACCORDANCE WITH OBC 3.7.2.1.(1)
7. GUARD RAILS IN ACCORDANCE TO OBC 2006 SHALL BE PROVIDED WHEREVER GRADE DIFFERENCE EXCEEDS 600mm. DETAILS TO BE SUBMITTED AT BUILDING PERMIT STAGE
8. CONSTRUCTION OF ASPHALT PAVING ALONG SERVICE ROUTE:
   40mm COMPACTED HL-3 ASPHALT
   50mm COMPACTED HL-8 ASPHALT
9. RAMP TO THE U/G GARAGE SHALL BE DESIGNED WITH A SLOPE NOT EXCEEDING 15.0% AND WITH TRANSITION AREAS AT THE TOP AND BOTTOM HAVING MAXIMUM SLOPES OF 7.5% FOR A MINIMUM DISTANCE OF 6.0m.



2 CONTEXT PLAN

PROJECT STATISTICS
35 PLAINS ROAD EAST RESIDENTIAL DEVELOPMENT
Wednesday, July 3, 2024

PROJECT NO. 21024

1.0 SITE STATISTICS

1.1 LOT AREA

	sq.m.	sq. ft.	acres	hectares
Lot	1,992.0	21,441.5	0.49	0.20
Land conveyed to the City as daylight triangle	12.5			
Lot (minus Daylight Triangle)	1,979.5	21,306.9	0.49	0.20

1.2 LOT FRONTAGE

	metres	feet
Lot Frontage (Measured 7.5m from Property Line on Plains Road East)	84.6	277.6

1.3 PROPOSED BUILDING HEIGHT

	metres	feet
Measured FROM Est. Grade from Plains Road East	42.5	139.43

BUILDING SETBACKS
Cooke Blvd. **3.5m** max. GF, **1.3m** other storeys
Plains Road E **3.5m** max. GF, **1.8m** other storeys

1.4 MAXIMUM SITE DENSITY

Units per Hectare
813.34

2.0 GBFA

*Includes all the areas above and below grade with the exception of parking areas above and below grade.

2.1 RESIDENTIAL CONDOMINIUM PROPOSED FLOOR AREA		GFA sq.m.	GFA sq. ft.	GBFA* excl.	GBFA* sq.m.	GBFA* sq. ft.
P2 - LEVEL	1 x	26.35	284	187.33	213.670	2300
P1 - LEVEL	1 x	26.35	284	314.31	340.650	3667
L1	1 x	198.31	2135	84.02	282.320	3039
L2	1 x	1,036.59	11158	17.81	1,054.395	11349
L3	1 x	1,208.03	13003	17.80	1,225.830	13195
L4	1 x	1,208.03	13003	17.80	1,225.830	13195
L5	1 x	1,208.03	13003	17.80	1,225.830	13195
L6	1 x	1,208.03	13003	17.80	1,225.830	13195
L7	1 x	1,042.06	11217	17.80	1,059.860	11408
L8	1 x	985.22	10605	17.80	1,003.020	10796
L9	1 x	962.48	10360	17.80	980.280	10552
L10	1 x	962.47	10360	17.80	980.275	10552
L11	1 x	962.47	10360	17.80	980.275	10552
L12	1 x	962.48	10360	17.80	980.280	10552
L13	1 x	138.60	1492	150.72	289.310	3114
Total GFA		**12135.44**	**130625**		**13067.66**	**140659**
2.2 NON-RESIDENTIAL GBFA		**sq.m.**	**sq. ft.**	**excl.**	**sq.m.**	**sq. ft.**
Retail - L1	1 x	452.78	4874	4.62	457.40	4923
Total GBFA		**452.78**	**4874**		**457.40**	**4923**
2.3 GRAND TOTAL GFA & GBFA		**12588.22**	**135498**		**13525.06**	**145582**

3.0 FLOOR AREA RATIO

	FAR	Total Allowable Area
(Grand Total GBFA divided by LOT AREA)	4.8	8764.7	94343

4.0 UNIT STATISTICS

UNIT COUNT	1-BED	1-BED + D	2-BED	2-BED + D	3-BED	Studio	TOTAL
L2	9	0	4	1	0	1	15 Units
L3	12	1	4	1	0	0	18 Units
L4	12	1	4	1	0	0	18 Units
L5	12	1	4	1	0	0	18 Units
L6	12	1	4	1	0	0	18 Units
L7	8	2	5	0	0	0	15 Units
L8	9	2	4	0	0	0	15 Units
L9	2	0	4	1	4	0	11 Units
L10	2	0	4	1	4	0	11 Units
L11	2	0	4	1	4	0	11 Units
L12	2	0	4	1	4	0	11 Units
Total Units	**82**	**8**	**45**	**9**	**16**	**1**	**161 Units**
Ratio	51%	5%	28%	6%	10%	1%	100%

5.0 AMENITY AREA

5.1 AMENITY AREA REQUIRED

Bylaw Number 2020.384	sq.m.	sq. ft.
Total	**1240.0**	**13,347.2**

5.2 AMENITY AREA PROVIDED

	Outdoor - sq.m.	Indoor - sq.m.	sq.m.	sq. ft.
Level 1	0.00	0.00	0.00	0.0
Level 2 (Balconies)	95.60	0.00	95.60	1,029.0
Level 3 (Balconies)	103.78	0.00	103.78	1,117.1
Level 4 (Balconies)	103.78	0.00	103.78	1,117.1
Level 5 (Balconies)	103.78	0.00	103.78	1,117.1
Level 6 (Balconies)	103.78	0.00	103.78	1,117.1
Level 7 (Balconies & Terraces)	177.63	0.00	177.63	1,912.0
Level 8 (Balconies & Terraces)	146.90	0.00	146.90	1,581.2
Level 9 (Balconies & Terraces)	135.69	0.00	135.69	1,460.5
Level 10 (Balconies)	117.41	0.00	117.41	1,263.7
Level 11 (Balconies)	117.41	0.00	117.41	1,263.7
Level 12 (Balconies)	117.41	0.00	117.41	1,263.7
Level 12 (Indoor and Outdoor Amenity)	232.88	100.93	333.81	3,593.0
Total Amenity Area Provided	**1,556.02**	**100.93**	**1,656.95**	**17,835.3**

6.0 PARKING

6.1 PARKING REQUIRED

Bylaw Number 2020.384	Total
Residential	86 spaces *
Visitor and Non-Residential Shared Parking Spaces	6 spaces **
Total Parking Required	**92 spaces**

* including 4 accessible spaces ** including 2 accessible spaces

6.2 TOTAL PARKING PROVIDED

Residential	Resident	Accessible	Visitor	Total
P2 Level	62	2	0	64 spaces
P1 Level	44	2	0	46 spaces
At Grade	0	0	0	0 spaces
Total Residential Parking				**110 spaces**
Parking Ratio for Residential Scope		**0.68 Parking Ratio**		

Visitor and Non-Residential Parking Spaces	Commercial/Visitor	Accessible	Car Share	Total
At Grade	3	1	2	6 spaces
On Street	0	0	0	0 spaces
Total Commercial Parking				**6 spaces**

6.3 BIKE PARKING PROVIDED

	Res. Short Term	Res. Long Term	Comm. Short Term	Comm. Long Term	Total
At Grade	17	0	3	2	20 spaces
P1 Level	0	81	0	0	81 spaces
P2 Level	0	0	0	0	0 spaces
TOTAL BIKE PARKING PROVIDED					**101 Spaces**

6.4 GRAND TOTAL PARKING PROVIDED
116 Parking Spaces
101 Bicycle Spaces

35 PLAINS ROAD EAST

BURLINGTON, ONTARIO

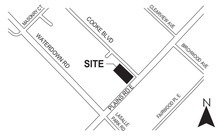
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All dimensions to be checked on site by the contractor. Drawings are not to be scaled, any discrepancies are to be reported to the Architect before proceeding with the work.

Revisions

1	Issued for PAC	2023-11-22
10	Issued for Review	2024-04-18
11	Issued for Coordination	2024-05-13

Notes

Context Plan



Project North

Stamp

Client

JANIK GROUP
1020 Lawrence Ave West, Suite 302
Toronto, Ontario
M6A 1C8

KFA architects + planners inc.
197 SPADINA AVE • SUITE 500
TORONTO • ON • M5T 2C8
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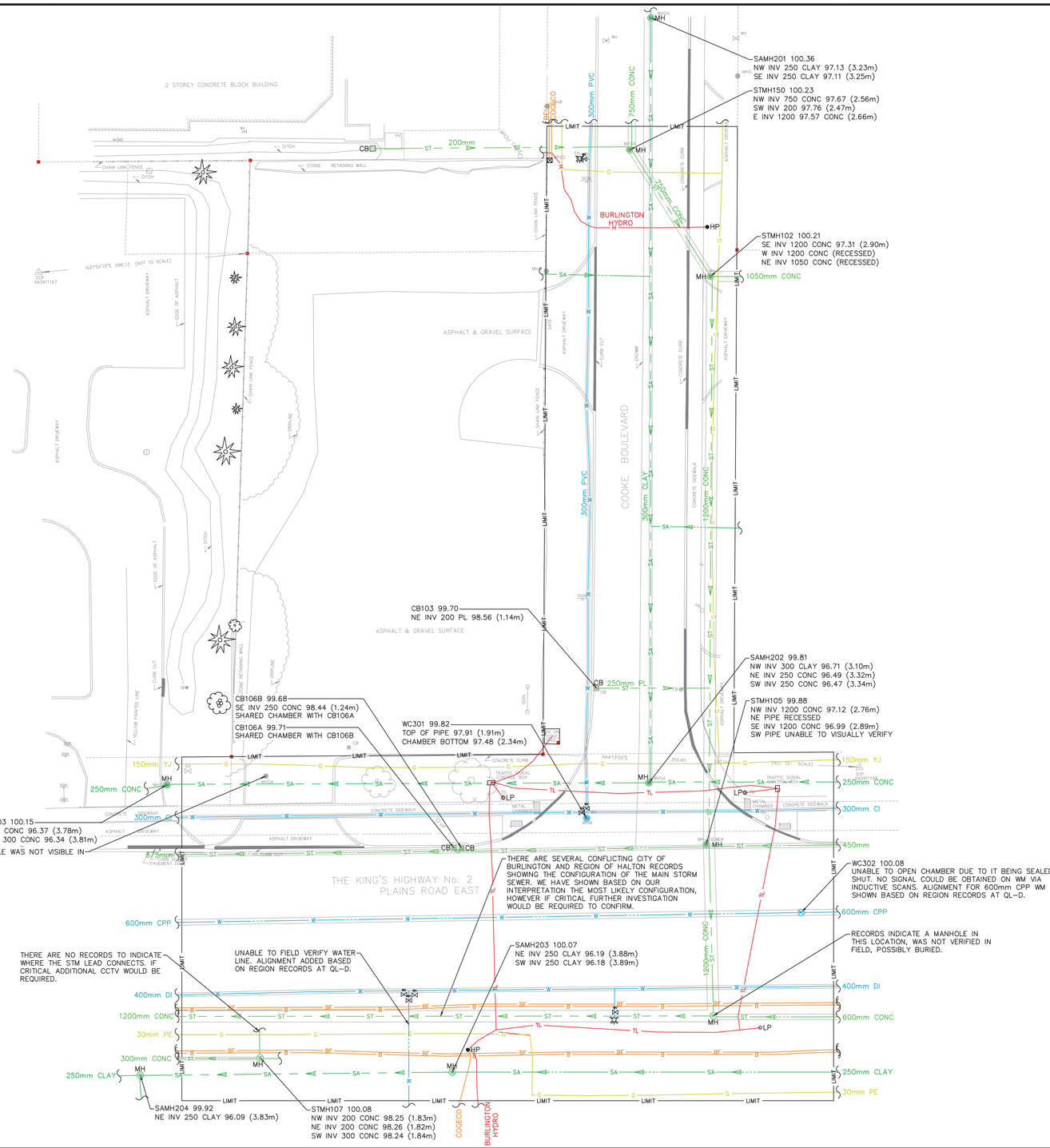
Project No.:	21024
Scale:	1 : 150
Issue Date:	11/21/2023
Drawn By:	AC

Title

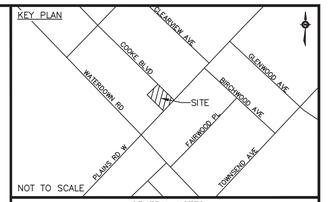
SITEPLAN, CONTEXT PLAN & STATS

No.

A001







GENERAL NOTES

1. THE FIELD INVESTIGATION WAS COMPLETED IN NOVEMBER, 2021.
2. THE LIMITS OF THE INVESTIGATION ARE AS PER SHOWN ON THE DRAWING.
3. THE BASE PLAN FOR THIS DRAWING WAS PROVIDED BY THE CLIENT AND 4SIGHT IS NOT RESPONSIBLE FOR ITS ACCURACY.
4. UTILITY SIZES AND MATERIALS ARE SHOWN IF AVAILABLE FROM RECORD INFORMATION.
5. KNOWN UTILITY OWNERS IDENTIFIED WITHIN PUBLIC RIGHT OF WAY INCLUDE:
   a. WATER – HALTON REGION / CITY OF BURLINGTON
   b. SEWERS – HALTON REGION / CITY OF BURLINGTON
   c. ELECTRICAL – BURLINGTON HYDRO
   d. TELECOM – BELL, ROGERS, COGECO
   e. GAS – ENBRIDGE
7. SEE PROJECT REPORT FOR ADDITIONAL DETAILS.

LEGEND:

- G — GAS (ENBRIDGE)
- W — WATER
- SA — SANITARY SEWER
- ST — STORM SEWER
- H — HYDRO
- B — TELECOMMUNICATIONS (BELL)
- TV — ROGERS COAXIAL
- SL — STREETLIGHT
- TL — TRAFFIC LIGHT
- PL — PIPELINE
- C — PRIVATE COMMUNICATIONS
- E — PRIVATE ELECTRICAL
- FO — FIBER OPTIC
- BF — BELL FIBER OPTIC
- RF — ROGERS FIBER OPTIC
- CF — COGECO FIBER OPTIC
- QUALITY LEVEL "B"
- QUALITY LEVEL "C"
- QUALITY LEVEL "D"
- LIMIT — LIMIT OF INVESTIGATION
- CONTINUES OUT OF LIMITS
- FLOW ARROW
- END CAP
- LOCATION BASED ON FIELD OBSERVATION
- # LOCATION BASED ON RECORDS
- LOSS OF SIGNAL
- CONTROL MONUMENT
- MH STORM MANHOLE
- MH SANITARY MANHOLE
- CB CATCH BASIN
- WATER CHAMBER
- FIRE HYDRANT
- WATER VALVE
- HP HYDRO POLE
- LS LIGHT STANDARD
- HW HAND WELL
- FIRE HYDRANT
- TELECOM PEDESTAL
- FTG FLUSH-TO-GRADE

ASCE QUALITY LEVELS

THE UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COLLECTED IN ACCORDANCE TO ASCE STANDARD 38-02. THE INFORMATION IS SHOWN BY QUALITY LEVEL WHICH INDICATES THE LEVEL OF EFFORT USED TO DETERMINE THE LOCATION OF THE DATA

INCREASED QUALITY

QUALITY LEVEL "D" – INFORMATION DERIVED FROM EXISTING RECORDS OR VERBAL RECOLLECTIONS.

QUALITY LEVEL "C" – INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO THE QUALITY LEVEL "D" INFORMATION.

QUALITY LEVEL "B" – INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF THE UTILITIES.

QUALITY LEVEL "A" – PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES.

PREPARED BY.
4SIGHT UTILITY ENGINEERS

REVISIONS

DISCLAIMER.
THIS DRAWING WAS PRODUCED BY 4SIGHT INC FOR THE USE OF THE CLIENT. 4SIGHT INC DOES NOT ACCEPT ANY RESPONSIBILITY FOR ANY UNAUTHORIZED USE BY THIRD PARTIES, OR ANY MODIFICATION MADE TO THIS DRAWING

		DATE (MM/DD/YY)
DRAWN	R. WYRZYKOWSKI	12/06/21
CHECKED	J. COWAN	12/07/21
APPROVED	L. ARCAND	12/08/21

SCALE 1:250 (0, 5, 10m)

THE ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN ACCORDANCE WITH STANDARD SUE INDUSTRY PRACTICES. ALL OTHER INFORMATION HEREON HAS BEEN PROVIDED BY OTHERS AND IS NOT A PART OF THIS CERTIFICATION.

LICENSED PROFESSIONAL ENGINEER
L.E. ARCAND
90538159
Dec 7, 2021
PROVINCE OF ONTARIO
Right #21-0216

PROJECT.
35 PLAINS RD
BURLINGTON

DRAWING.
SUBSURFACE UTILITY ENGINEERING INVESTIGATION

CLIENT.
SCHAEFFERS CONSULTING ENGINEERS

PROJECT NO. 21-0216

SHEET NO. 01 OF 01

APPENDIX B

SWM Calculations & Documentation

City of Burlington

Pre-development Runoff Coefficient

Project: 35 Plains Road
2021-5107

Criteria:

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

Calculations for Internal Drainage Area - Draining to Plains Road

	Area (ha)	Runoff Coeff.	A x C
Impervious Area (Gravel)	0.065	0.80	0.0519
Pervious Area	0.010	0.25	0.0026
External Area (West Development)	0.002	0.25	0.0005
Sub Total	**0.077**		**0.0550**

Weighted Coefficient - Site Draining to Plains Rd.	**0.71**

Calculations for Internal Drainage Area - Draining to Cooke Boulevard

	Area (ha)	Runoff Coeff.	A x C
Impervious Area (Gravel)	0.060	0.80	0.0483
Pervious Area	0.059	0.25	0.0149
Pervious Area draining north to Ex. CB	0.003	0.25	0.0008
External Area (West Development)	0.004	0.25	0.0010
Sub Total	**0.127**		**0.06492**

Weighted Coefficient - Draining to Cooke Blvd.	**0.51**

Schaeffers Consulting Engineers
Printed: 08-Jul-24

SCHAEFFERS
Consulting Engineers
SCHAEFFER & ASSOCIATES LTD.

6 Ronrose Drive, Concord,
Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
design@schaeffers.com

Time of Concentration

City of Burlington
35 Plains Road East.
Project No.: 5107

Equivalent Slope Method

# of Reaches	Height	Difference	Length (m)	Slope	Slope$^{-.5}$
	101.27	0.25	10.4	0.0240	6.4498
1	101.02	0.25	4.5	0.0556	4.2426
2	100.79	0.23	13.75	0.0167	7.7319
3	100.49	0.3	14.15	0.0212	6.8678
4	100.17	0.32	15.25	0.0210	6.9034
5	99.88				32.1955

S_w(%)	**2.412%**

Airport Method

When c < 0.4

L (m) =	58.05	Tc(min)=	**13.55**
S(%) =	2.412	Tp(min)=	**9.03**
c =	0.37		

City of Burlington

Storm Runoff - Existing Conditions

Schaeffers Consulting Engineers

Project: 35 Plains Road

08-Jul-24

2021-5107

Rainfall intensity

Design Storm Event	A	B	C	I (mm/hr)
2-Year	681.5	6.0	0.780	67.048
5-Year	802.0	5.0	0.764	86.135
10-Year	918.3	5.0	0.763	98.907
25-Year	1066.0	5.0	0.762	115.149
50-Year	1172.3	5.0	0.761	127.012
100-Year	1281.3	5.0	0.761	138.821

Note:

T=13.55 minutes

I= A / (T + B) ^ C

Existing Peak Discharge Rate to Cooke Blvd.

Runoff Coefficient, C	0.51	
Drainage Area	0.127	ha
2-Year Peak Flow, Q2	12.1	l/s
5-Year Peak Flow, Q5	15.5	l/s
10-Year Peak Flow, Q10	17.9	l/s
25-Year Peak Flow, Q25	22.9	l/s
50-Year Peak Flow, Q50	27.5	l/s
100-Year Peak Flow, Q100	31.3	l/s

Maximum Allowable Release Rate to Storm Sewer

If the existing Weighted Coefficient is more than 0.5, a Runoff Coefficient of C=0.50 should be used.

Runoff Coefficient, C	0.50	
Drainage Area	0.127	ha
Q_A= Total Max allowable release rate = 5-Year Peak Flow	15.18	l/s

Maximum Allowable Release Rate from the site is: **15.18** **l/s**

City of Burlington

Runoff Coefficient - Post-Development Stage

Project: 35 Plains Road

2021-5107

Calculations for areas Controlled On-Site

	Area (ha)	Runoff Coeff.	A x C
Roof Canopy (Excl. Green Roof & Soft roof landscape)	0.100	0.95	0.095
Green Roof	0.029	0.95	0.028
Soft Roof Landscape	0.000	0.95	0.000
Other Impervious (Walkways/Ramps/Patio)	0.053	0.90	0.048
Soft Landscaping at Grade	0.006	0.25	0.002
Soft Landscaping (on U/G)	0.010	0.95	0.010
External Area (West of Site)	0.006	0.25	0.002
Sub Total	**0.204**		**0.183**

Weighted Coefficient - Controlled (SWM Tank)	**0.90**

Schaeffers Consulting Engineers

Printed: 08-Jul-24

WATER BALANCE ANALYSIS

35 Plains Road

A = REQUIRED AVG. ANNUAL PRECIPITATION TO BE RETAINED 5 mm

B = INITIAL ABSTRACTION

Site Features	Area (ha)	% of Site Area	Initial Abstraction (mm)	Overall Site Capture (mm)
Green Roof	0.03	14.7%	5	0.74
Pervious Landscape (at grade and soft landscape on roof)	0.01	3.0%	5	0.15
Building Footprint (excl. Green Roof and soft landscape on roof)	0.10	50.3%	1	0.50
Impervious landscape at grade	0.05	26.8%	1	0.27
Pervious Landscape on U/G	0.01	5.2%	2.5	0.13
Total	0.198	100.0%		**1.79**

Over the site area (With externals) of 0.198ha, the 1.79mm translates to a volume of (1.79 mm x 0.198 ha) = **3.54** m^3

SUMMARY

A= Required average annual Precipitation depth to be retained	**5**	**mm**
B= Total Capture over entire site through the surface (IA)	**1.79**	**mm**
C= Total Capture over entire site through Tree Canopy Interception	**0.00**	**mm**
D= Total Captured over entire site (B + C)	**1.79**	**mm**

Deficit = A - D =	**3.21**	**mm**

Total Capture over entire site through the surface = D x Area =	**3.54**	**m^3**

Total Required 5mm Retention = 5mm x Area =	**9.90**	**m^3**
Total required volume for rain harvesting =	**6.36**	**m^3**

Job No. 5107
Jul-24

35 Plains Road

City of Burlington
Size Orifice

Allowable Release Rate = 15.2 l/sec

	Orifice
DIA (mm)=	**100**
AREA m^2=	0.008
COEFF =	**0.80**
GRAVITY =	9.81
K =	1.0
D/S HGL=	N/A m
Orifice Inv.=	98.56 m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.20	0.25	0.0124	0.0124	98.81
0.22	0.27	0.0131	0.0131	98.83
0.24	0.29	0.0136	0.0136	98.85
0.29	**0.34**	**0.0150**	**0.0150**	**98.90**
0.30	0.35	0.0152	0.0152	98.91

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5

WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers

Printed: 08-Jul-24

Main SWM Tank - Storage Volume Calculation

100-Year Storm Event Storage Calculation

Project: 35 Plains Road

Schaeffers Consulting Engineers

Printed: 08-Jul-24

Modified Rational Method

Area (ha) =	0.204	
C =	1.00	0.90 x1.25
Allowable Release Rate (l/s) =	15.2	
Actual Release Rate (l/s) =	15.0	

Ground water allowance (l/s) =	0.00
Release from Roof 2 (l/s) =	0.00

100 Year Storm

Design Storm =	City of Burlington
A =	1281.34
B =	5
C =	0.761

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Runoff	Ground	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Roof 2	Water	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
6	206.62	117.18	0.00	0.00	117.18	42.18	5.40	36.79
7	193.38	109.67	0.00	0.00	109.67	46.06	6.29	39.77
8	181.95	103.19	0.00	0.00	103.19	49.53	7.19	42.34
9	171.97	97.53	0.00	0.00	97.53	52.67	8.09	44.57
10	163.18	92.54	0.00	0.00	92.54	55.52	8.99	46.53
11	155.36	88.11	0.00	0.00	88.11	58.15	9.89	48.26
12	148.35	84.13	0.00	0.00	84.13	60.58	10.79	49.78
13	142.04	80.55	0.00	0.00	80.55	62.83	11.69	51.14
14	136.31	77.31	0.00	0.00	77.31	64.94	12.59	52.35
15	131.09	74.35	0.00	0.00	74.35	66.91	13.49	53.42
16	126.32	71.64	0.00	0.00	71.64	68.77	14.39	54.38
17	121.92	69.14	0.00	0.00	69.14	70.53	15.29	55.24
18	117.87	66.84	0.00	0.00	66.84	72.19	16.19	56.01
19	114.11	64.71	0.00	0.00	64.71	73.77	17.09	56.69
20	110.62	62.73	0.00	0.00	62.73	75.28	17.98	57.30
40	70.72	40.11	0.00	0.00	40.11	96.26	35.97	60.29
60	53.46	30.32	0.00	0.00	30.32	109.15	53.95	55.19
66	49.99	28.35	0.00	0.00	28.35	112.26	59.35	52.91
68	48.94	27.76	0.00	0.00	27.76	113.24	61.15	52.09
70	47.94	27.19	0.00	0.00	27.19	114.20	62.95	51.25
73	46.54	26.39	0.00	0.00	26.39	115.59	65.65	49.95
75	45.65	25.89	0.00	0.00	25.89	116.49	67.44	49.05
77	44.80	25.41	0.00	0.00	25.41	117.37	69.24	48.13
80	43.59	24.72	0.00	0.00	24.72	118.66	71.94	46.72

Required Storage (m^3):	**61.0**
Provided Storage (m^3):	**70.0**

Main SWM Tank - Storage Volume Calculation

Schaeffers Consulting Engineers

50-Year Storm Event Storage Calculation

Printed: 08-Jul-24

Project: 35 Plains Road

Modified Rational Method

Area (ha) =	0.204	
C =	1.00	0.90 x1.2
Allowable Release Rate (l/s) =	15.2	
Actual Release Rate (l/s) =	15.0	

Ground water allowance (l/s) =	0.00
Release from Roof 2 (l/s) =	0.00

100 Year Storm

Design Storm =	City of Burlington
A =	1172.3
B =	5.0
C =	0.761

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Runoff	Ground	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Roof 2	Water	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
6	189.04	107.21	0.00	0.00	107.21	38.60	5.40	33.20
7	176.93	100.34	0.00	0.00	100.34	42.14	6.29	35.85
8	166.47	94.41	0.00	0.00	94.41	45.32	7.19	38.12
9	157.34	89.23	0.00	0.00	89.23	48.19	8.09	40.09
10	149.30	84.67	0.00	0.00	84.67	50.80	8.99	41.81
11	142.14	80.61	0.00	0.00	80.61	53.20	9.89	43.31
12	135.73	76.98	0.00	0.00	76.98	55.42	10.79	44.63
13	129.95	73.70	0.00	0.00	73.70	57.49	11.69	45.80
14	124.72	70.73	0.00	0.00	70.73	59.41	12.59	46.82
15	119.94	68.02	0.00	0.00	68.02	61.22	13.49	47.73
16	115.57	65.54	0.00	0.00	65.54	62.92	14.39	48.53
17	111.55	63.26	0.00	0.00	63.26	64.53	15.29	49.24
18	107.84	61.16	0.00	0.00	61.16	66.05	16.19	49.86
19	104.40	59.21	0.00	0.00	59.21	67.50	17.09	50.41
20	101.21	57.40	0.00	0.00	57.40	68.88	17.98	50.89
40	64.71	36.70	0.00	0.00	36.70	88.07	35.97	52.10
60	48.91	27.74	0.00	0.00	27.74	99.86	53.95	45.91
66	45.73	25.94	0.00	0.00	25.94	102.71	59.35	43.36
68	44.78	25.39	0.00	0.00	25.39	103.61	61.15	42.46
70	43.87	24.88	0.00	0.00	24.88	104.49	62.95	41.54
73	42.58	24.15	0.00	0.00	24.15	105.76	65.65	40.11
75	41.76	23.69	0.00	0.00	23.69	106.58	67.44	39.14
77	40.99	23.24	0.00	0.00	23.24	107.39	69.24	38.15
80	39.88	22.62	0.00	0.00	22.62	108.56	71.94	36.62

Required Storage (m^3):	**53.0**

Provided Storage (m^3):	**70.0**

Main SWM Tank - Storage Volume Calculation

Schaeffers Consulting Engineers

25-Year Storm Event Storage Calculation

Printed: 08-Jul-24

Project: 35 Plains Road

Modified Rational Method

Area (ha) =	0.204	
C =	0.99	0.90 x1.1
Allowable Release Rate (l/s) =	15.2	
Actual Release Rate (l/s) =	15.0	

Ground water allowance (l/s) =	0.00
Release from Roof 2 (l/s) =	0.00

100 Year Storm

Design Storm =	City of Burlington
A =	1066.0
B =	5.0
C =	0.762

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Runoff	Ground	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Roof 2	Water	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
6	171.47	95.83	0.00	0.00	95.83	34.50	5.40	29.10
7	160.47	89.68	0.00	0.00	89.68	37.67	6.29	31.37
8	150.98	84.37	0.00	0.00	84.37	40.50	7.19	33.31
9	142.69	79.74	0.00	0.00	79.74	43.06	8.09	34.97
10	135.38	75.66	0.00	0.00	75.66	45.39	8.99	36.40
11	128.88	72.03	0.00	0.00	72.03	47.54	9.89	37.65
12	123.07	68.77	0.00	0.00	68.77	49.52	10.79	38.73
13	117.82	65.84	0.00	0.00	65.84	51.36	11.69	39.67
14	113.06	63.19	0.00	0.00	63.19	53.08	12.59	40.49
15	108.73	60.76	0.00	0.00	60.76	54.69	13.49	41.20
16	104.76	58.55	0.00	0.00	58.55	56.20	14.39	41.82
17	101.11	56.51	0.00	0.00	56.51	57.64	15.29	42.35
18	97.75	54.63	0.00	0.00	54.63	59.00	16.19	42.81
19	94.63	52.88	0.00	0.00	52.88	60.29	17.09	43.20
20	91.73	51.26	0.00	0.00	51.26	61.52	17.98	43.53
40	58.61	32.76	0.00	0.00	32.76	78.61	35.97	42.64
60	44.29	24.75	0.00	0.00	24.75	89.10	53.95	35.15
66	41.41	23.14	0.00	0.00	23.14	91.64	59.35	32.29
68	40.54	22.66	0.00	0.00	22.66	92.44	61.15	31.29
70	39.71	22.19	0.00	0.00	22.19	93.21	62.95	30.27
73	38.54	21.54	0.00	0.00	21.54	94.35	65.65	28.70
75	37.81	21.13	0.00	0.00	21.13	95.08	67.44	27.64
77	37.10	20.74	0.00	0.00	20.74	95.80	69.24	26.55
80	36.10	20.18	0.00	0.00	20.18	96.84	71.94	24.90

Required Storage (m^3):	**44.0**

Provided Storage (m^3):	**70.0**

Main SWM Tank - Storage Volume Calculation

Schaeffers Consulting Engineers

10-Year Storm Event Storage Calculation

Printed: 08-Jul-24

Project: 35 Plains Road

Modified Rational Method

Area (ha) =	0.204
C =	0.90
Allowable Release Rate (l/s) =	15.2
Actual Release Rate (l/s) =	15.0

Ground water allowance (l/s) =	0.00
Release from Roof 2 (l/s) =	0.00

100 Year Storm

Design Storm =	City of Burlington
A =	918.3
B =	5.0
C =	0.763

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Runoff	Ground	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Roof 2	Water	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
6	147.36	74.87	0.00	0.00	74.87	26.95	5.40	21.56
7	137.90	70.06	0.00	0.00	70.06	29.42	6.29	23.13
8	129.73	65.91	0.00	0.00	65.91	31.64	7.19	24.44
9	122.60	62.28	0.00	0.00	62.28	33.63	8.09	25.54
10	116.31	59.09	0.00	0.00	59.09	35.45	8.99	26.46
11	110.72	56.25	0.00	0.00	56.25	37.13	9.89	27.23
12	105.72	53.71	0.00	0.00	53.71	38.67	10.79	27.88
13	101.21	51.42	0.00	0.00	51.42	40.11	11.69	28.41
14	97.11	49.34	0.00	0.00	49.34	41.44	12.59	28.86
15	93.39	47.45	0.00	0.00	47.45	42.70	13.49	29.21
16	89.97	45.71	0.00	0.00	45.71	43.88	14.39	29.49
17	86.84	44.12	0.00	0.00	44.12	45.00	15.29	29.71
18	83.94	42.65	0.00	0.00	42.65	46.06	16.19	29.87
19	81.26	41.28	0.00	0.00	41.28	47.06	17.09	29.98
20	78.77	40.02	0.00	0.00	40.02	48.02	17.98	30.04
40	50.30	25.56	0.00	0.00	25.56	61.33	35.97	25.36
60	37.99	19.30	0.00	0.00	19.30	69.49	53.95	15.54
66	35.52	18.05	0.00	0.00	18.05	71.46	59.35	12.11
68	34.77	17.67	0.00	0.00	17.67	72.08	61.15	10.93
70	34.06	17.31	0.00	0.00	17.31	72.69	62.95	9.74
73	33.06	16.80	0.00	0.00	16.80	73.57	65.65	7.92
75	32.43	16.47	0.00	0.00	16.47	74.14	67.44	6.69
77	31.82	16.17	0.00	0.00	16.17	74.69	69.24	5.45
80	30.96	15.73	0.00	0.00	15.73	75.50	71.94	3.56

Required Storage (m^3):	**31.0**

Provided Storage (m^3):	**70.0**

Main SWM Tank - Storage Volume Calculation

Schaeffers Consulting Engineers

5-Year Storm Event Storage Calculation

Printed: 08-Jul-24

Project: 35 Plains Road

Modified Rational Method

Area (ha) =	0.204
C =	0.90
Allowable Release Rate (l/s) =	15.2
Actual Release Rate (l/s) =	15.0

Ground water allowance (l/s) =	0.00
Release from Roof 2 (l/s) =	0.00

100 Year Storm

Design Storm =	City of Burlington
A =	802.0
B =	5.0
C =	0.764

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Runoff	Ground	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Roof 2	Water	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
6	128.40	65.23	0.00	0.00	65.23	23.48	5.40	18.09
7	120.14	61.04	0.00	0.00	61.04	25.64	6.29	19.34
8	113.02	57.42	0.00	0.00	57.42	27.56	7.19	20.37
9	106.80	54.26	0.00	0.00	54.26	29.30	8.09	21.21
10	101.31	51.47	0.00	0.00	51.47	30.88	8.99	21.89
11	96.44	48.99	0.00	0.00	48.99	32.34	9.89	22.44
12	92.07	46.78	0.00	0.00	46.78	33.68	10.79	22.89
13	88.14	44.78	0.00	0.00	44.78	34.93	11.69	23.24
14	84.57	42.97	0.00	0.00	42.97	36.09	12.59	23.50
15	81.32	41.32	0.00	0.00	41.32	37.18	13.49	23.70
16	78.35	39.80	0.00	0.00	39.80	38.21	14.39	23.82
17	75.61	38.41	0.00	0.00	38.41	39.18	15.29	23.89
18	73.09	37.13	0.00	0.00	37.13	40.10	16.19	23.92
19	70.75	35.94	0.00	0.00	35.94	40.98	17.09	23.89
20	68.58	34.84	0.00	0.00	34.84	41.81	17.98	23.82
40	43.77	22.24	0.00	0.00	22.24	53.36	35.97	17.39
60	33.05	16.79	0.00	0.00	16.79	60.44	53.95	6.49
66	30.89	15.69	0.00	0.00	15.69	62.15	59.35	2.80
68	30.24	15.36	0.00	0.00	15.36	62.69	61.15	1.54
70	29.62	15.05	0.00	0.00	15.05	63.21	62.95	0.26
73	28.75	14.61	0.00	0.00	14.61	63.98	65.65	0.00
75	28.20	14.33	0.00	0.00	14.33	64.47	67.44	0.00
77	27.67	14.06	0.00	0.00	14.06	64.95	69.24	0.00
80	26.92	13.68	0.00	0.00	13.68	65.65	71.94	0.00

Required Storage (m^3):	**24.0**

Provided Storage (m^3):	**70.0**

Main SWM Tank - Storage Volume Calculation

Schaeffers Consulting Engineers

2-Year Storm Event Storage Calculation

Printed: 08-Jul-24

Project: 35 Plains Road

Modified Rational Method

Area (ha) =	0.204
C =	0.90
Allowable Release Rate (l/s) =	15.2
Actual Release Rate (l/s) =	15.0

Ground water allowance (l/s) =	0.00
Release from Roof 2 (l/s) =	0.00

100 Year Storm

Design Storm =	City of Burlington
A =	681.5
B =	6.0
C =	0.780

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Runoff	Ground	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Roof 2	Water	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
6	98.11	49.84	0.00	0.00	49.84	17.94	5.40	12.54
7	92.17	46.83	0.00	0.00	46.83	19.67	6.30	13.37
8	87.00	44.20	0.00	0.00	44.20	21.21	7.20	14.01
9	82.44	41.88	0.00	0.00	41.88	22.62	8.10	14.52
10	78.39	39.83	0.00	0.00	39.83	23.90	9.00	14.90
11	74.77	37.99	0.00	0.00	37.99	25.07	9.90	15.17
12	71.51	36.33	0.00	0.00	36.33	26.16	10.80	15.36
13	68.56	34.83	0.00	0.00	34.83	27.17	11.70	15.47
14	65.87	33.46	0.00	0.00	33.46	28.11	12.60	15.51
15	63.41	32.21	0.00	0.00	32.21	28.99	13.50	15.49
16	61.15	31.07	0.00	0.00	31.07	29.82	14.40	15.42
17	59.07	30.01	0.00	0.00	30.01	30.61	15.30	15.31
18	57.14	29.03	0.00	0.00	29.03	31.35	16.20	15.15
19	55.35	28.12	0.00	0.00	28.12	32.05	17.10	14.95
20	53.68	27.27	0.00	0.00	27.27	32.73	18.00	14.73
40	34.40	17.48	0.00	0.00	17.48	41.94	36.00	5.94
60	25.96	13.19	0.00	0.00	13.19	47.47	54.00	0.00
70	23.25	11.81	0.00	0.00	11.81	49.61	63.00	0.00
80	21.11	10.73	0.00	0.00	10.73	51.49	72.00	0.00
90	19.38	9.84	0.00	0.00	9.84	53.16	81.00	0.00
100	17.94	9.11	0.00	0.00	9.11	54.68	90.00	0.00
75	22.12	11.24	0.00	0.00	11.24	50.58	67.50	0.00
77	21.71	11.03	0.00	0.00	11.03	50.95	69.30	0.00
80	21.11	10.73	0.00	0.00	10.73	51.49	72.00	0.00

Required Storage (m^3):	**16.0**

Provided Storage (m^3):	**70.0**

HYDROGEOLOGICAL INVESTIGATION
35 PLAINS ROAD EAST
BURLINGTON, ONTARIO

REPORT NO.: 5860-21-HB
REPORT DATE: JULY 11, 2022
REVISION NO: 01

PREPARED FOR:
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8 Summary

A summary of the hydrogeological investigation is provided below:

- The Site falls within the Halton Region Source Protection Area (HRSPA) within the Halton-Hamilton Source Protection Region. The Site is not located within any vulnerable source water protection area.
- The Site is located within the West Aldershot Watershed, which are under the jurisdiction of the HRCA. The Site is not located within the HCRA regulated area.
- The Site is relatively flat with an approximate elevation of 100 masl. The nearest surface water feature is an unnamed stream located approximately 550 south of the Site.
- The Site is located within the Iroquois Plains physiographic region. Surficial geology is mapped as coarse-textured glaciolacustrine deposits.
- The overburden at the Site consists of up 0.45 m of granular/asphalt underlain by a layer of sand/silty sand up to 13.95 m thick, followed by clayey silt/silty clay to the terminal investigation depth of 15.85 mbgs.
- Groundwater levels were measured in August 2015, and between December 2021 and June 2022. Groundwater elevations varied from a low of 90.24 masl near the eastern corner of the Site in December 2021, to a high of 92.81 masl in June 2022 at the eastern western corner of the Site.
- Hydraulic conductivity estimates for soils, likely to be sand and clayey silt, at a screened depth of 12.19 to 15.24 mbgs ranged from 3.4×10^{-7} m/s to 5.2×10^{-7} m/s, with a geometric mean of 4.2×10^{-7} m/s.
- An unfiltered groundwater quality sample was collected from 21BH-1 (MW) on December 14, 2021. Additional samples were collected from 21BH-1 (MW) on May 24, 2022, and June 9, 2022. Parameters including Total Suspended Solids, Total Manganese, and Chloroform exceeded the discharge criteria outlined in the *Table 1 – Limits for Storm Sewer Discharge* of City of Burlington *Storm Sewer Discharge By-Law 086*-2002. All parameters met the criteria listed in both *Table 1 – Limits for Sanitary Sewers and Combined Sewers Discharge* of the Region of *Halton Sewer Discharge By-Law No. 2-03*.
- Dewatering for groundwater control is not anticipated during construction or long-term operation of the proposed development. Dewatering for stormwater control from incident precipitation may be required during construction and the rate is estimated to be 72,800 L/day. An EASR is not required for short-term construction dewatering that consists of stormwater only.
- Should short-term dewatering discharge for stormwater control need to be directed to a storm sewer of City of Burlington, a discharge permit will need to be obtained from the City.
- Site-specific ESC and Spill Prevention and Response Plans should be developed and implemented during construction. Where well designed and implemented environmental management plans are in place, short-term impacts to the groundwater system, other groundwater users, and the surface water system can be minimized.

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Rady-Pentek & Edward (R-PE) Surveying Ltd. 2017. Plan of Survey and Topographic Plan of Part of Lot 6, Concession 1 (Geographic Township of East Flamborough), City of Burlington, Regional Municipality of Halton. Dated January 26, 2017.

Schaeffers Associates Ltd. 2022. Site Servicing Plan. DWG No. SS-1. Dated September 2021. Issued for Regional Servicing Permit, June 9, 2022.

Toronto Inspection Limited (TIL), 2022. Geotechnical Investigation 35 Plains Road East, Burlington, Ontario. Dated July 6, 2022.

10 General Statement of Limitation

The comments presented in this report are based on the soil and groundwater samples gathered from the borehole/monitoring well locations indicated on the plan of this report. There is no warranty expressed or implied or representations made by Toronto Inspection Ltd. that this program has discovered all potential environmental risks or liabilities associated with the subject site.

Although we consider this report to be representative of the subsurface conditions at the subject property in the areas investigated, any interpretation of factual data or unexpected soil conditions which exhibit noticeable discolouration, odour, etc. in areas not investigated in this report, should be discussed in consultation with us prior to any initiation of activity. Our responsibility is limited to an accurate assessment of the soil condition prevailing at the locations investigated at the time of the study.

To the fullest extent permitted by law, the client's maximum aggregate recovery against Toronto Inspection Ltd., its directors, employees, sub-contractors and representatives, for any and all claims by Janik Group Inc. For all causes including, but not limited to, claims of breach of contract, breach of warranty and/or negligence, shall be the amount of fees paid to Toronto Inspection Ltd. for its professional engineering services rendered with respect to the particular site which is the subject of the claim by the client.

Any use and/or interpretation of the data presented in this report, and any decisions made on it by the third party are responsibility of the third party. Toronto Inspection Ltd. accepts no responsibility for loss of time and damages, if any, suffered by the third party as a result of decisions or actions based on this report.

Any legal actions arising directly or indirectly from this work and/or Toronto Inspection Ltd.'s performance of the services shall be filed no longer than two years from the date of Toronto Inspection Ltd.'s substantial completion of the services. Toronto Inspection Ltd. shall not be responsible to the client for lost revenues, loss of profits, cost of content, claims of customers, or other special indirect, consequential, or punitive damages.

Yours truly,

Toronto Inspection Ltd.



Sanjay Goel, B.E.S.
Environmental Scientist
Vice-President

Tabitha Lee, M.A.Sc., P.Eng.
Hydrogeologist

pg/rbc/tl

APPENDIX C

Sanitary Demand Calculations & Documentation

Hagop Sarkissian

From: Miguel Ibrahim
Sent: Tuesday, September 27, 2016 1:25 PM
To: Adam.Huycke@halton.ca
Cc: Anthony Maida; TAERK,CHARLES; Sol Mednick; SIGMUND SOUDACK AND ASSOCIATES; Len Radomski
Subject: 505-03/16 - 35 Plains Road East

Hi Adam,

As per our recent phone conversation, we can raise the proposed wastewater (sanitary sewer) connection lateral to account for the Region's future re-construction. We can raise the sanitary connection by approximately 1.30m in order to maintain a vertical clearance of approximately 0.50m from the existing gas main. If this is ok with you, we can update our FSR and supporting drawings accordingly.

Please let me know if you have any questions, or require any additional information.

Best regards,

SCHAEFFERS
CONSULTING ENGINEERS
Miguel Ibrahim, L.E.L.
PROJECT MANAGER
6 Ronrose Drive, Concord, Ontario, L4K 4R3
tel. 905.738.6100 (ext. 242) fax. 905.738.6875

From: Len Radomski [mailto:len@rvassociates.ca]
Sent: Friday, September 23, 2016 4:43 PM
To: Miguel Ibrahim <mIbrahim@schaeffers.com>
Cc: Anthony Maida <amaida@georgiangroup.com>; TAERK,CHARLES <ctaerk@faircourtassetmgt.com>; Sol Mednick <sol.mednick@gmail.com>; SIGMUND SOUDACK AND ASSOCIATES <soudack@ssanda.ca>
Subject: FW: 505-03/16 - 35 Plains Road East

Good Afternoon Miguel,

Please find below comments from Adam Huycke, Regional Planner, in relation to the servicing of the site. The Region is looking for some preparatory work in advance of a regional watermain replacement. Please review and address the comments with Adam.

Regards,

Ruth Victor & Associates
Len Radomski

481 North Service Road West, A-33,
Oakville, ON L6M2V6

P 905-257-3590
M 905 330 6949
E len@rvassociates.ca

From: "Huycke, Adam" <Adam.Huycke@halton.ca>
Date: September 23, 2016 at 1:28:32 PM EDT
To: "Ruth Victor (ruth@rvassociates.ca)" <ruth@rvassociates.ca>
Cc: "Lisa Stern (lisa.stern@burlington.ca)" <lisa.stern@burlington.ca>, "Kisneris, John" <John.Kisneris@halton.ca>
Subject: Re: 505-03/16 - 35 Plains Road East

Good Afternoon Ruth:

I trust all is well with you this morning. As I am sure you are aware, I am the Regional Planner handling your clients file Planning file for the redevelopment of 35 Plains Road East.

As part of the Region's review, and in an effort to provide a recommendation on submitted Local Official Plan Amendment and Zoning By-law Amendment applications to the City, Regional Staff have identified the following servicing related issue that requires further clarification/input from the Civil Engineer on this file. Specifically, Regional Staff request that as a result of the elevation of the existing wastewater main within Plains Road East, the proposed wastewater (sanitary sewer) connection lateral be raised in elevation to account for the Region's future re-construction of this main. Should the Region's wastewater main be replaced further away from the property in a different location, then more room for fall on the sanitary sewer connection lateral servicing these lands will be required. The report should be revised to speak to this issue as well as the accompanying draft site servicing plan drawing and draft servicing cross-sections plan drawing. Alternatively, an email acknowledgement addendum from the developer's consulting engineer will be satisfactory at this time, it will be attached to the FSR report.

Thank you for your time in considering the above. Please let me know if you have any questions or concerns on this request.

Sincerely,

Adam Huycke

Adam Huycke, MCIP, RPP, CPT
Intermediate Planner
Planning Services
Halton Region
905-825-6000, ext. 7604 | 1-866-442-5866

_ _

This message, including any attachments, is privileged and intended only for the person(s) named above. This material may contain confidential or personal information which may be subject to the provisions of the Municipal Freedom of Information & Protection of Privacy Act. Any other distribution, copying or disclosure is strictly prohibited. If you are not the intended recipient or have received this message in error, please notify us immediately by telephone, fax or e-mail and permanently delete the original transmission from us, including any attachments, without making a copy.

Thank you

SANITARY DEMAND CALCULATIONS (35 Plains Road, Burlington)

Residential Dry Weather Demand Calculation

Tenure Type	Population Persons per Ha	Area (m^2)	Units	Unit Density (ppu)	Population	Sanitary Demand (L/cap/d)	Average Demand (L/s)
Apartment (Over 6 stories high)	285	1980	161	1.655	267	275	0.850
Total			**161**		**267**		**0.850**

Residential Design Flow Calculation

Average Demand (L/s)	Total Population	M	Site Area (ha)	Infiltration* (L/s)	Residential Peak Flow (L/s)
0.85	267	4.10	0.20	0.057	**3.541**

* Based on 0.286 L/s/ha of gross area

$M = K_{AV} * (1 + 14/(4 + (\sqrt{(P/1000)}))$

K_{AV} = 1 for a conservative estimate

Retail Demand Calculation

Tenure Type	Population Persons per Ha	Area (Ha)	Units	Unit Density (ppu)	Population	Sanitary Demand (L/ha/d)	Average Demand (L/s)
Light Commercial Areas	90	0.05	n/a	n/a	4.1	24750	0.013
Total			**0**		**5**		**0.013**

Retail Design Flow Calculation

Average Demand (L/s)	Total Population	M	Site Area (ha)	Infiltration* (L/s)	Commercial Peak Flow (L/s)
0.013	5	3.55	0.05	0.013	**0.059**

* Based on 0.286 L/s/ha of gross area

$M = 0.80 * (1 + 14/(4 + (\sqrt{(P/1000)}))$

Total Population =	**272**
Total Peak Flow (L/s) =	**3.60**

APPENDIX D

Water Demand Calculations

Water Supply Calculation (Based on FUS)

Project No. 4362 - (35 Plains Road, Burlington)
Residential Development, City of Burlington

Fire Flow:	11,000	L/Minutes	**183.33** L/s
Average Day Demand	275	L/per capita/Day	
Light Commercial	24.75	m³/ha/day	

Residential Demands

Tenure Type	Population Persons per Ha	Area (m^2)	Units	Unit Density (ppu)	Population	Average Day Demand (L/s)
Apartment (Over 6 stories high)	285	1980	161	1.655	267	0.85
Total			**161**		**267**	**0.85**

Total Residential Demands

	Average Day Demand (L/s)	Max. Hour Demand Peaking Factor †	Max Hour Demand (L/s)	Max Day Demand Peaking Factor †	Max Day Demand (L/s)	Peak day demand (L/s)
TOTAL	**0.85**	4.0	**3.40**	2.25	**1.91**	**1.91**

† As per Region of Halton Design Guidelines

Commercial Demands

Site Area (m^2)	Unit Average Day Demand (m³/ha/day)	Average Day Demand (L/s)
453	24.75	**0.01**

Total Commercial Demands

	Average Day Demand (L/s)	Max. Hour Demand Peaking Factor †	Max Hour Demand (L/s)	Max Day Demand Peaking Factor †	Max Day Demand (L/s)	Peak day demand (L/s)
TOTAL	**0.01**	2.25	**0.03**	2.25	**0.03**	**0.03**

† As per Region of Halton Design Guidelines

Total Demands

	Demand (L/s)
Average Day Demand	**0.86**
Maximum Day Demand	**1.94**
Peak Hourly Demand	**3.43**
Peak Day Fire Flow	**185.27**

Schaeffers Consulting Engineers

Fire Flow (35 Plains Road, Burlington)

A = Type of Construction

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

Construction Coefficient:	**0.8**	

D = Fire Flow (000's)

GFA	6,478	square metres
Construction Type	0.8	
Fire Flow	14,166	L/min.

GFA includes 2 largest floors + 50% of next 8 floors (unprotected openings) =
= 941+1143+50% of (1143+1143+1143+1143+1143+1121+976+976)

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

E = Occupancy Factor

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

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

F = Sprinkler Factor

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

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

G = Exposure Factor

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

South = 35m
East = 25m
North = 9m
West > 45m

Exposure Factor	35%	(no more than 75%)

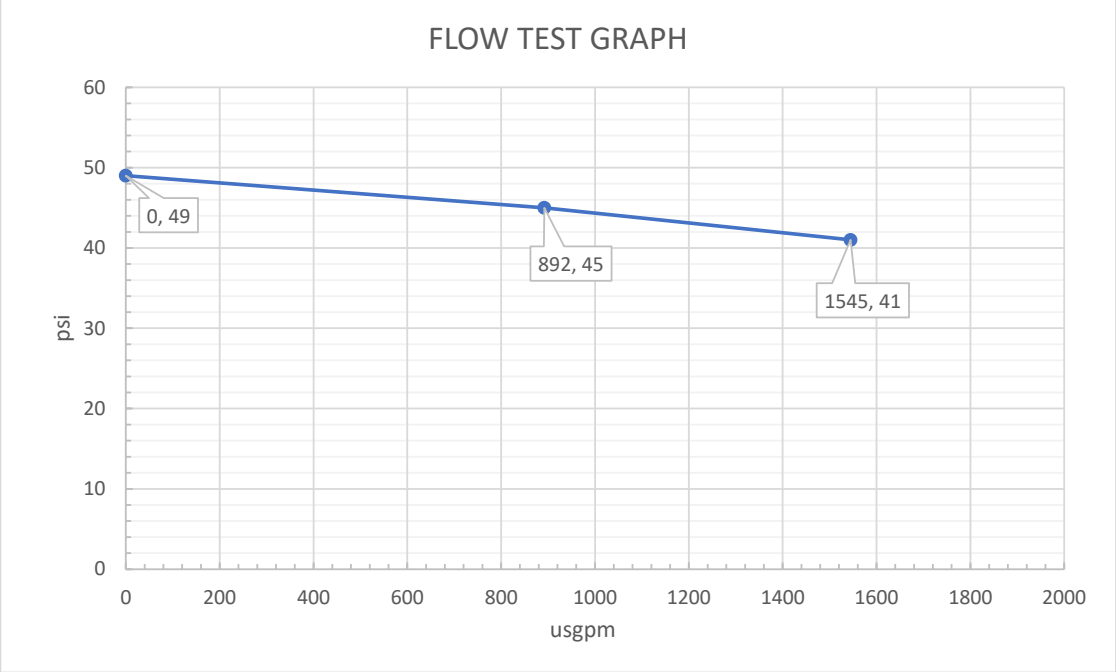
H - Net Fire Flow Required

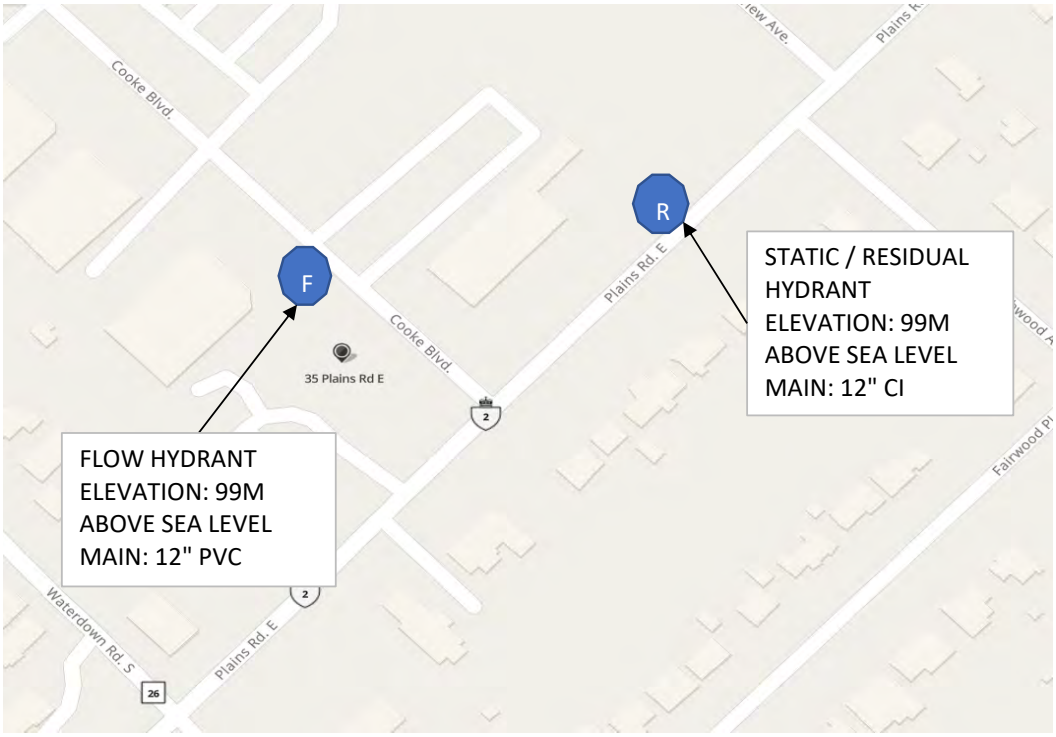
	Charge
F + G Factors	-5%

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

FLOW TEST REPORT

Project No:		24-F016							
Address		35 Plains Rd. East, Burlington							
Date:	2024-05-22			Time	9:15am		Size of Main		12"CI/12"PVC
Static	Pitot. 1 (2.5")	Flow 1	Res. Pres. 1	Pitot 2a (2.5")	Flow 2a	Pitot 2b (2.5")	Flow 2b	Flow 2a+2b	Res. pres. 2
49	28	**892**	**45**	22	791	20	754	**1545**	**41**





Note: Flow Test was performed as per NFPA 291.

Note: Hydrant's elevation is obtained from Google Earth.

35 Plains Road E

Project No. 5107

Test 1

Flow Test Results of June 9th, 2016

Location: Residual: 15 Plains Rd E

Flow: 1026 Cooke Blvd.

Test Results			
Flow US. GPM	Residual Pressure psi	Flow L/s	Residual Presure kPa
0	49	0	338
892	45	56	311
1545	41	97	283

For a flow demand of 185 l/s (Max Day + Fire) the equivalent residual pressure is

157 **kPa**

23 **psi**

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

195 **L/s**

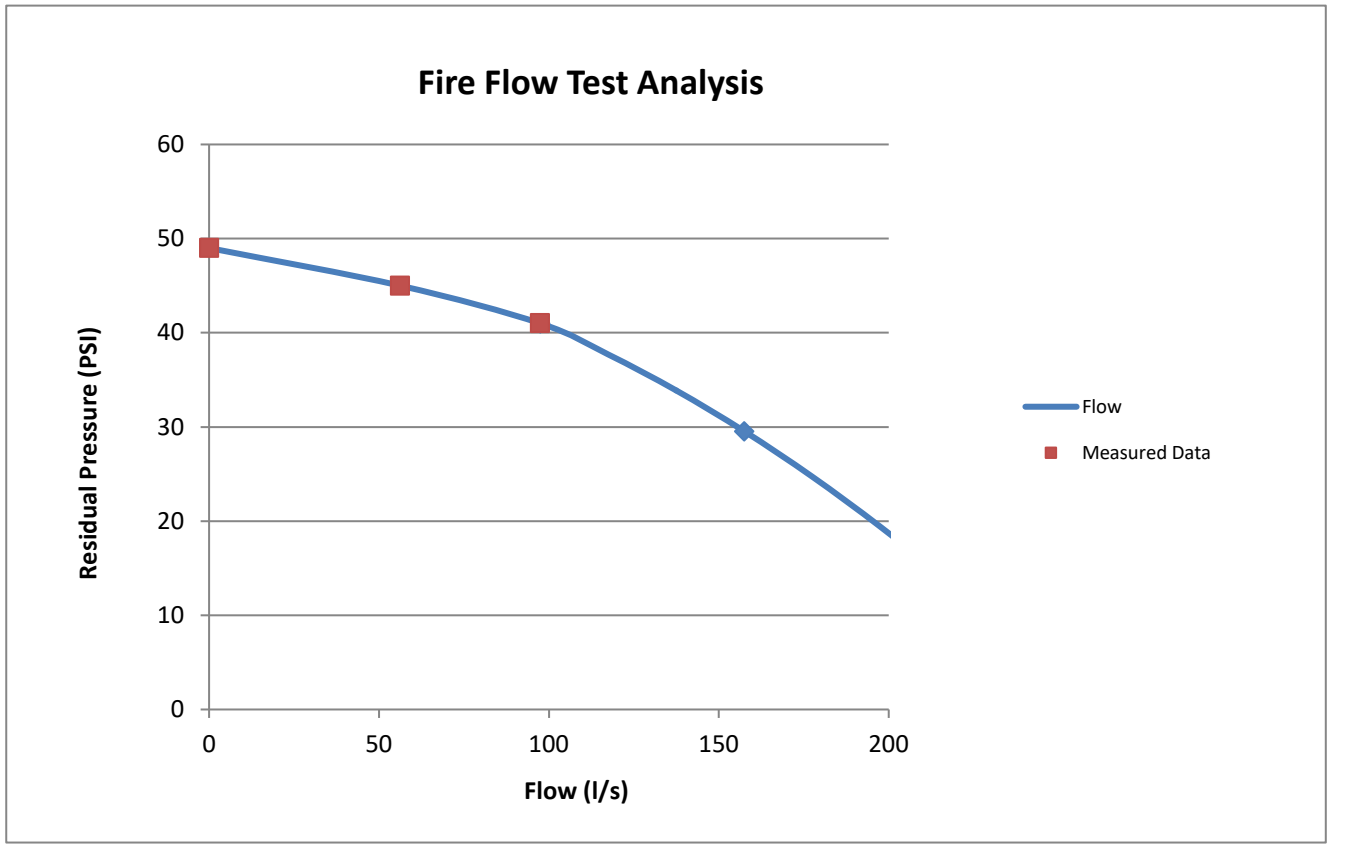
3097 **USGPM**

2579 **IGPM**

1 USG = 3.785 litres

1 IG = 4.546 litres

1 psi = 6.9 kpa

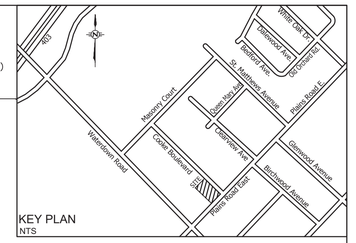


APPENDIX E

Civil Drawings

LEGAL DESCRIPTION

PLAN OF SURVEY AND
TOPOGRAPHIC PLAN OF
PART OF LOT 6 CONCESSION 1
(GEOGRAPHIC TOWNSHIP OF EAST FLAMBOROUGH)
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON



MUNICIPAL NOTES:

1. WORK WITHIN THE MUNICIPAL RIGHT OF WAY REQUIRES A MUNICIPAL CONSENT PERMIT, CONTACT engpermitrequests@burlington.ca FOR DETAILS.
2. RESTORATION OF THE MUNICIPAL RIGHT OF WAY SHALL BE AS PER S-114, S-114A, S-114B FOR FLEXIBLE PAVEMENT STRUCTURE, AND S-115, S-115A AND S-115B FOR RIGID PAVEMENT STRUCTURE. LIMITS OF RESTORATION SHALL BE MARKED OUT BY THE CITY INSPECTOR, AND SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY IMSPECTOR.

PLUMBING NOTES:

1. ALL AD/CB/TRENCH DRAINS DESIGNED TO CAPTURE 100 YR STM. EVENT AND DIRECTED TO INTERNAL PLUMBING SYSTEM – PLUMBING TO BE DESIGNED BY MECHANICAL ENGINEER.
2. THE BUILDING SANITARY AND STORM SYSTEM MUST BE DESIGNED TO BE ABLE TO OPERATE UNDER MUNICIPAL SEWER SURCHARGE CONDITIONS.
3. ALL AREA DRAINS TO BE CONNECTED TO SWM TANK – PLUMBING TO BE DESIGNED BY MECHANICAL ENGINEER.
4. ROOF DRAINS TO BE CONNECTED TO RWH TANK – PLUMBING TO BE DESIGNED BY MECHANICAL ENGINEER.

NOTES

1. THE LOCATION OF ALL UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
2. ANY CONFLICTS WITH EXISTING SERVICES AND/OR UTILITIES SHALL BE REPORTED TO THE ENGINEER FOR REVIEW AND ADVICE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. INFORMATION REGARDING ANY EXISTING SERVICES AND/OR UTILITIES SHOWN ON THIS DRAWING ARE FURNISHED AS THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER, ENGINEER AND CITY DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND/OR SUFFICIENCY.
4. THE CONTRACTOR SHALL PROVIDE DETAILS FOR SUPPORT OF Ex. SERVICES AND/OR UTILITIES FOR ENGINEER'S APPROVAL PRIOR TO START OF CONSTRUCTION.

LEGEND

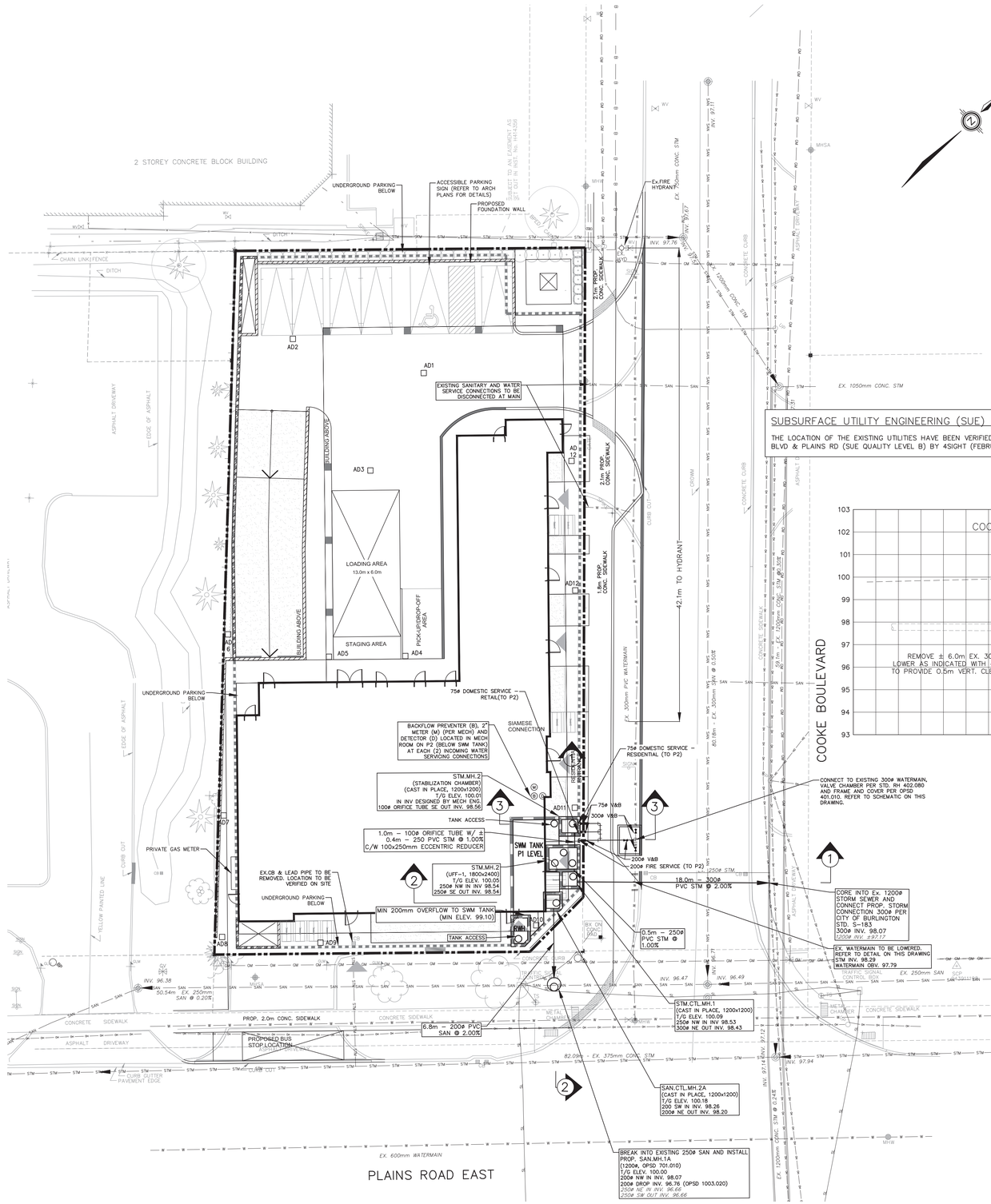
- DENOTES Ex. HYDRANT
- AD — DENOTES AREA DRAIN
- DENOTES Ex. SANITARY MANHOLE
- DENOTES Ex. STORM MANHOLE
- DENOTES STORM MANHOLE
- DENOTES SANITARY MANHOLE
- DENOTES VALVE & BOX
- DENOTES EXISTING PROPERTY LINE
- DENOTES PROPOSED PROPERTY LINE
- DENOTES LINE OF U/G
- OH — DENOTES EXISTING OVERHEAD HYDRO
- DENOTES EXISTING GAS MAIN
- B — DENOTES EXISTING BELL CABLE
- R — DENOTES EXISTING ROGERS CABLE
- H — DENOTES EXISTING HYDRO CABLE
- DENOTES LANDSCAPE FEATURE (REFER TO LANDSCAPING DRAWINGS PREPARED BY ADESSO DESIGN INC. DATED JULY 8, 2024 FOR DETAILS)
- (M) PROPOSED DOMESTIC WATER METER
- (B) PROPOSED BACKFLOW PREVENTOR
- (D) PROPOSED DETECTOR ASSEMBLY

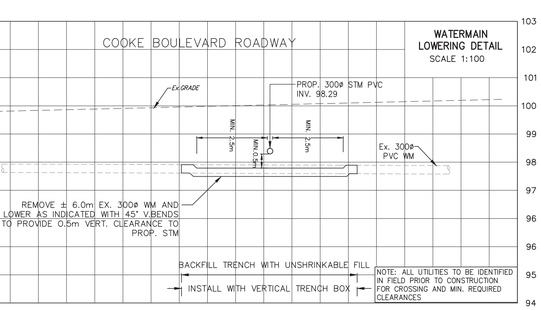
STORM WATER MANAGEMENT SUMMARY

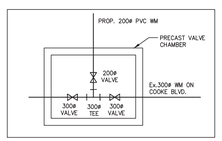
MAXIMUM ALLOWABLE RELEASE RATE	15.2 L/sec
UNCONTROLLED RELEASE RATE	0.00 L/sec
MAXIMUM ALLOWABLE CONTROLLED RELEASE RATE	15.2 L/sec
ACTUAL RELEASE RATE FROM STM CTL. MH.	15.0 L/sec
TOTAL REQUIRED STORAGE	61 m^3
TOTAL AVAILABLE STORAGE AT SWM TANK	70 m^3
REQUIRED STORAGE FOR WATER BALANCE	6.36 m^3
AVAILABLE STORAGE FOR WATER BALANCE	6.80 m^3
100 YR. HWL AT ORIFICE	98.90 m
RWH TANK SPILL ELEVATION	99.10 m
MAX. SURFACE PONDING DEPTH	0.00 mm

SUBSURFACE UTILITY ENGINEERING (SUE) NOTE:

THE LOCATION OF THE EXISTING UTILITIES HAVE BEEN VERIFIED ALONG COOKE BLVD & PLAINS RD (SUE QUALITY LEVEL B) BY 4SIGHT (FEBRUARY 2022)







SCHEMATIC DETAIL –
WM CONNECTION ON COOKE BLVD.,
PER HALTON STD. RH 402.080

NOTE:
FOR CROSS-SECTIONS REFER TO DRAWING SEC-1

SPECIAL NOTE:

1) THE LOCATION OF ALL UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. PRIOR TO COMMENCING THE CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
2) ANY CONFLICTS WITH EXISTING SERVICES AND/OR UTILITIES SHALL BE REPORTED TO THE ENGINEER FOR REVIEW AND ADVICE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3) INFORMATION REGARDING ANY EXISTING SERVICES AND/OR UTILITIES SHOWN ON THE DWGS. ARE FURNISHED AS THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER, ENGINEER AND CITY DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND/OR SUFFICIENCY.
4) THE CONTRACTOR SHALL PROVIDE DETAILS TO SUPPORT EX. SERVICES AND/OR UTILITIES FOR ENGINEER'S APPROVAL PRIOR TO START OF CONSTRUCTION.

BENCH MARK AND LAYOUT INFORMATION

ELEVATIONS AREA GEODETIC AND ARE REFERRED TO CITY OF BURLINGTON BENCHMARK NUMBER 298 HAVING AN ELEVATION OF 97.915 METERS. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1228:1978).

BEARINGS ARE UTM GRID, DERIVED FROM SPECIFIED CONTROL POINTS 04219900017 AND 04219900097, UTM ZONE 17, NAD83 (ORIGINAL)

No.	Date	Issued for
5.	FEB.04.2025	ISSUED FOR OPA & ZBA SUBMISSION
4.	JUL.21.2023	ISSUED TO CLIENT – REVISED PER UPDATED LANDSCAPE PLAN
3.	JUL.26.2022	ISSUED FOR SPA SUBMISSION
2.	JUN.09.2022	ISSUED FOR REGIONAL SERVICING PERMIT
1.	NOV.11.2021	ISSUED FOR SPA SUBMISSION

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
FEB. 04, 2025
PROVINCE OF ONTARIO

35 PLAINS ROAD
MIXED-USE BUILDING DEVELOPMENT

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

CITY OF Burlington

SITE SERVICING PLAN

DRAWN BY: D.C.	DESIGNED BY: D.C.	CHECKED BY: H.S.
SCALE: 1:200		DATE: SEPTEMBER 2021
PROJECT No. 2021-5107		DRAWING No. SS-1

RECOMMENDED PAVEMENT THICKNESS – HEAVY DUTY ROADWAY

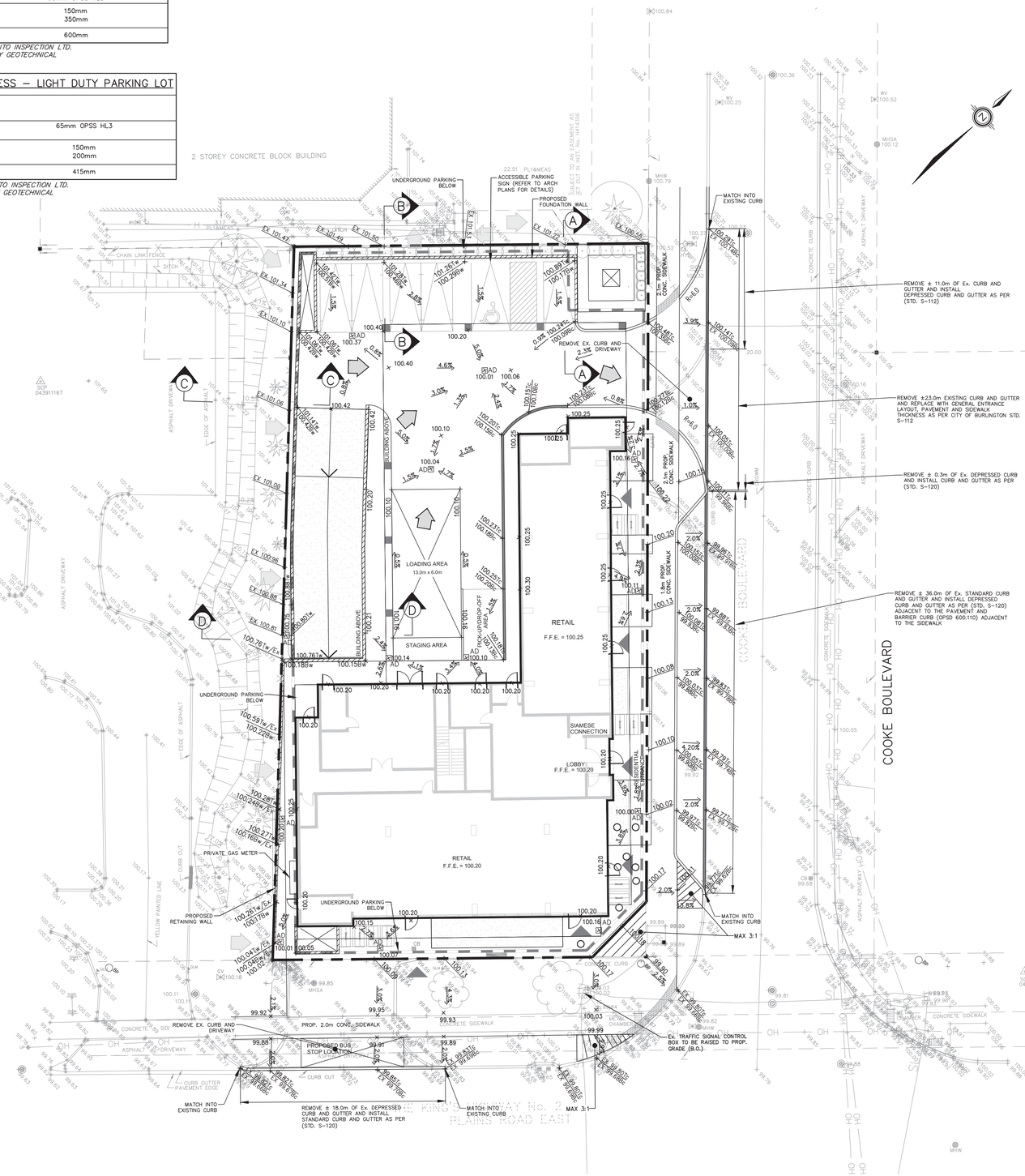
PAVEMENT LAYER	HEAVY DUTY (BUS/TRUCK/FIRE ROUTE)
ASPHALT	40mm OPSS HL3 60mm OPSS HL8
BASE COURSE – OPSS GRANULAR A OR EQUIV. SUB-BASE – OPSS GRANULAR B OR EQUIV.	150mm 350mm
TOTAL MINIMUM PAVEMENT DEPTH	600mm

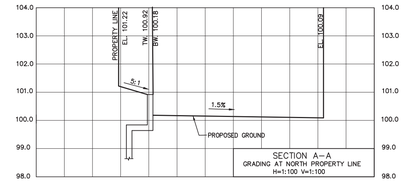
PER GEOTECHNICAL REPORT PREPARED BY TORONTO INSPECTION LTD.
DATED JULY 2022 – TO BE VERIFIED ON-SITE BY GEOTECHNICAL

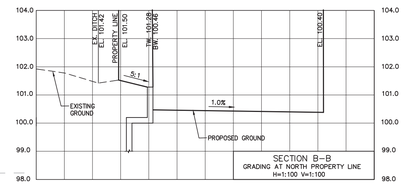
RECOMMENDED PAVEMENT THICKNESS – LIGHT DUTY PARKING LOT

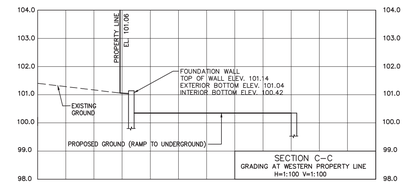
PAVEMENT LAYER	
ASPHALT	65mm OPSS HL3
BASE COURSE – OPSS GRANULAR A OR EQUIV. SUB-BASE – OPSS GRANULAR B OR EQUIV.	150mm 200mm
TOTAL MINIMUM PAVEMENT DEPTH	415mm

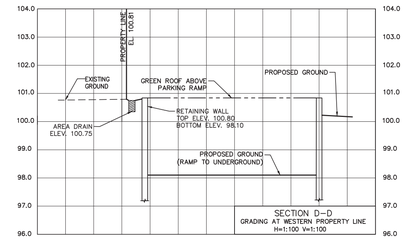
PER GEOTECHNICAL REPORT PREPARED BY TORONTO INSPECTION LTD.
DATED JULY 2022 – TO BE VERIFIED ON-SITE BY GEOTECHNICAL





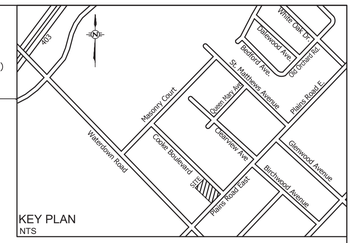






LEGAL DESCRIPTION

PLAN OF SURVEY AND
TOPOGRAPHIC PLAN OF
PART OF LOT 6 CONCESSION 1
(GEOGRAPHIC TOWNSHIP OF EAST FLAMBOROUGH)
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON



NOTES

1. THE LOCATION OF ALL UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
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4. THE CONTRACTOR SHALL PROVIDE DETAILS FOR SUPPORT OF Ex. SERVICES AND/OR UTILITIES FOR ENGINEER'S APPROVAL PRIOR TO START OF CONSTRUCTION.

LEGEND

- DENOTES Ex. HYDRANT
- AD DENOTES AREA DRAIN
- DENOTES Ex. SANITARY MANHOLE
- DENOTES Ex. STORM MANHOLE
- DENOTES STORM MANHOLE
- DENOTES SANITARY MANHOLE
- DENOTES VALVE & BOX
- DENOTES EXISTING PROPERTY LINE
- DENOTES PROPOSED PROPERTY LINE
- DENOTES LINE OF U/G
- OH DENOTES EXISTING OVERHEAD HYDRO
- + 131.48BC DENOTES PROPOSED BOTTOM OF CURB
- + *EX130.29* DENOTES EXISTING ELEVATION
- + 131.48 DENOTES PROPOSED ELEVATION
- + 131.48TC DENOTES PROPOSED TOP OF CURB
- DENOTES EMERGENCY OVERLAND FLOW ARROW
- DENOTES EXTERNAL OVERLAND FLOW ARROW
- DENOTES LANDSCAPE FEATURE (REFER TO LANDSCAPING DRAWINGS PREPARED BY ADESSO DESIGN INC. DATED JULY 8, 2024 FOR DETAILS)

BENCH MARK AND LAYOUT INFORMATION

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No.	Date	Issued for
4.	FEB.04.2025	ISSUED FOR OPA & ZBA SUBMISSION
3.	JUL.21.2023	ISSUED TO CLIENT – REVISED PER UPDATED LANDSCAPE PLAN
2.	JUL.26.2022	ISSUED FOR SPA SUBMISSION
1.	NOV.11.2021	ISSUED FOR SPA SUBMISSION

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
FEB.04.2025
PROVINCE OF ONTARIO

SPECIAL NOTES FOR SIDEWALK/CONCRETE WALKWAYS AT BUILDING PERIMETER

IN ORDER TO AVOID FROST HEAVING AND RELATED PROBLEMS, THE FOLLOWING SHALL BE STRICTLY IMPLEMENTED:

1. COMPACTION OF SUB-GRADE TO BE INSPECTED AND APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF THE GRANULAR BASE.
2. DEPTH OF GRANULAR BASE TO BE INCREASED IF RECOMMENDED BY THE GEOTECHNICAL ENGINEER AFTER INSPECTION OF THE SUB-GRADE.
3. SUB-DRAINS TO BE INSTALLED AROUND THE BUILDING WALL FOUNDATION. IF RECOMMENDED BY THE GEOTECHNICAL ENGINEER, ADDITIONAL SUB-DRAINS SHALL BE INSTALLED BELOW BARRIER CURBS. ALL SUB-DRAINS TO HAVE POSITIVE OUTLET TO STORM SEWERS.
4. ALTERNATIVE SOLUTIONS ENDORSED BY THE GEOTECHNICAL ENGINEER MAY BE IMPLEMENTED.

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35 PLAINS ROAD
MIXED-USE BUILDING DEVELOPMENT

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

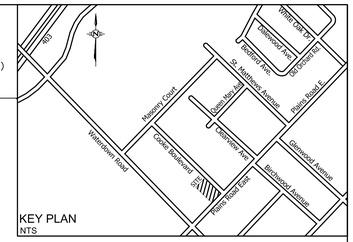
CITY OF Burlington

SITE GRADING PLAN

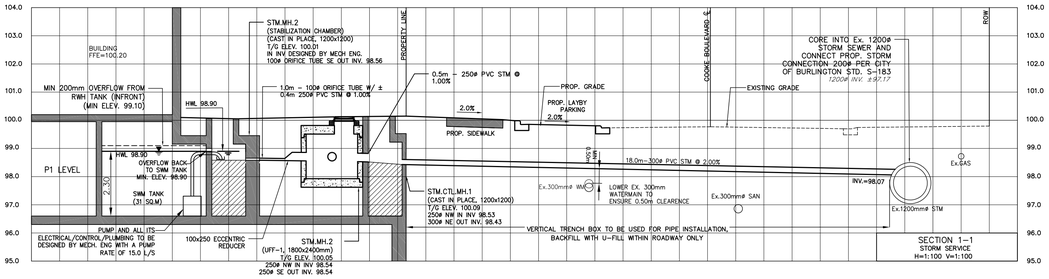
DRAWN BY: D.C.	DESIGNED BY: D.C.	CHECKED BY: H.S.
SCALE: 1:200		DATE: SEPTEMBER 2021
PROJECT No. 2021-5107		DRAWING No. SG-1

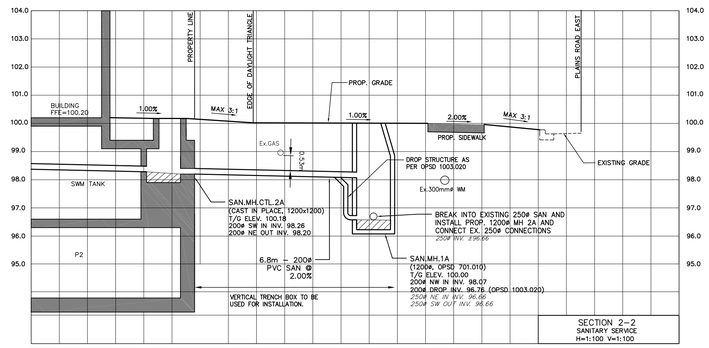
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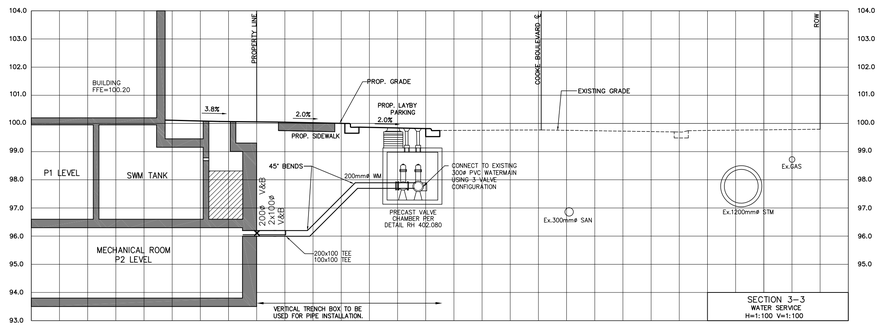
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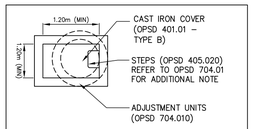


KEY PLAN
NTS









ACCESS HATCH SCHEMATIC
N.T.S.

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2– THE THICKNESS SHOWN ON THIS DRAWING IS PRELIMINARY. FOR DETAIL PLEASE REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS.

NOTES:
1. FOR CROSS–SECTION LOCATIONS REFER TO DWG. SS–1

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35 PLAINS ROAD
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CITY OF Burlington

SECTIONS

DRAWN BY: D.C.	DESIGNED BY: D.C.	CHECKED BY: H.S.
SCALE: 1:200		DATE: SEPTEMBER 2021
PROJECT No. 2021-5107		DRAWING No. SEC-1

APPENDIX F

Downstream Sanitary Analysis

SANITARY CAPACITY ANALYSIS

35 PLAINS ROAD EAST

RESIDENTIAL DEVELOPMENT

CITY OF BURLINGTON
Project: 2024-5107 **JULY 2024**

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.	First Submission	P.W.	Jul 2024	K.S.	Jul 2024

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CONSULTING ENGINEERS
6 Ronrose Drive
Concord, Ontario L4K 4R3

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Attachment A: Population Estimates

Attachment B: Diurnal Curves

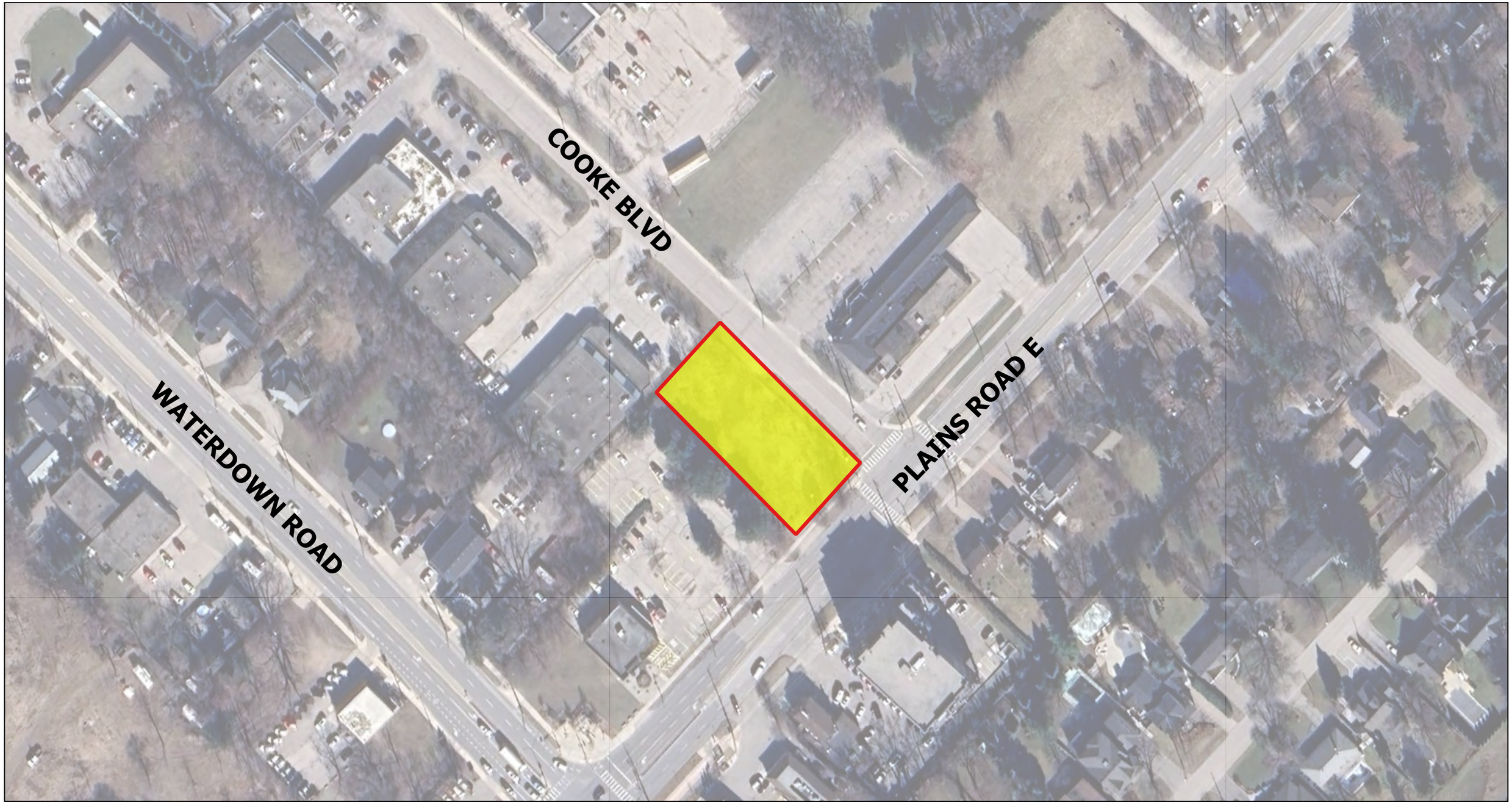
Attachment C: InfoWorks Results

1.0 Introduction

Schaeffer and Associates Ltd. (SCE) has been retained to analyze the capacity of the existing sanitary sewer network downstream of the proposed development at 35 Plains Road East in the City of Burlington, Region of Halton. In support of the site plan, a Functional Servicing and Stormwater Management Report has been prepared by SCE. The purpose of this report is to assess the sanitary sewer servicing options, determine if the downstream network has sufficient capacity and if any sewer upgrades are required.

The subject site is approximately 0.20ha and is bound by Cooke Boulevard to the east, Plains Road East to the south and commercial buildings to the west and north. The subject site currently consists of a gravel and landscape area, which will be developed into a high-rise residential building with retail space. Please refer to **Figure 1-1** for the location plan of the subject site.

This report addresses the sanitary capacity analysis for the sanitary sewer network downstream of the proposed development under pre-development and post-development Dry Weather Flow (DWF) and Wet Weather Flow (WWF) conditions. The analysis completed in this report is based on dynamic computer modelling – InfoWorks ICM. The InfoWorks model was provided by the Region.



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Legend

SUBJECT SITE

FIGURE 1-1 - LOCATION PLAN

2021-5107	JULY 2024	SCALE: N.T.S

2.0 Sanitary Capacity Analysis

2.1 Sanitary Servicing Design Criteria

As per the Halton Region's Water and Wastewater Linear Design Manual (October 2019), the following is a summary of the guidelines that were used in this analysis:

Table 2-1 –Design Parameters

Single-family dwelling	55	pp/ha
Semi-detached, duplex and 4-plex	100	pp/ha
Townhouses, Maisonette (6 storey apt. or less)	135	pp/unit
Apartment (over 6 stories)	285	pp/unit
Light Commercial	90	pp/ha
Community	40	pp/ha
Light Industrial	125	pp/ha
Hospitals	4	pp/bed
Generation Rate	275	litres/capita/day
Infiltration Allowance	0.286	litre/second/ha

It is noted that the Region's model included WWF analysis with 2-year and 10-year storm events. For this analysis, the 10-year storm event in the Region's model has been considered for the WWF simulation. Since the Region's sanitary guideline did not outline the criteria under WWF condition, it is suggested that a minimum of 1.8m freeboard in each of the manholes within the downstream network should be maintained to reduce the risk of basement flooding issue.

2.2 Existing Conditions

2.2.1 Existing Sanitary Network

The existing downstream sanitary sewer network was characterized based on the InfoWorks model provided by the Region. The following describes the existing sanitary infrastructure within the vicinity of the subject site:

- 300mm sanitary sewer on Cooke Boulevard, which runs south and connects to 250mm sanitary sewer on Plains Road East
- 250mm sanitary sewer on Plains Road East, which runs west and connects to 675mm sanitary trunk sewer on Lasalle Park Road

The existing sanitary sewer network and routing to the trunk sewer are illustrated in **Figure 2-1**.

2.2.2 Existing Sewershed

The City's Development Application Map has been consulted as of 9 July 2024 to identify any expected new developments, constructions, and zoning changes within the sewershed area. Reference can be made to **Table 2-2** for the new developments within the subject area, which have been included in the InfoWorks model to characterize the pre-development and post-development conditions of the sewershed.

Table 2-2 – Development Applications

Development Application	Total Population
1120 Cooke Boulevard	3,602
1074 Cooke Boulevard	1,704
1029-1033 Waterdown Road	480
53-71 Plains Road East	322
40-70 Plains Road East	1,090
92 Plains Road East	154
1026 Cooke Boulevard	704

* Population of the new development applications is extracted from their Functional Servicing Report, detailed calculation shall refer to their FSR.



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Legend

- SUBJECT SITE
- EXISTING SANITARY SEWER
- EXISTING SANITARY MANHOLE
- ANALYZED DOWNSTREAM SANITARY MANHOLE
- ANALYZED DOWNSTREAM SANITARY SEWER
- EXISTING SANITARY TRUNK SEWER

FIGURE 2-1 - EXISTING SANITARY NETWORK

2021-5107	JULY 2024	SCALE: N.T.S

2.3 Proposed Development

The proposed development plan is approximately 0.20ha, which includes a high-rise building building with 161 residential units and retail space with 459m^2. The total population of the proposed development is 271 persons. The population breakdown and proposed sanitary flow are presented in **Table 2-3 and Table 2-4** below. It is noted that the residential population is based on a population density of 1.655 persons per unit for high density housing type as per the Region of Halton 2022 Development Charges Background Study.

Table 2-3 – Population Estimate

Unit Type	Number of Units / Area (ha)	Population Rate	Population
Apartment (over 6 stories)	161	1.655 pp/unit	267
Commercial	0.05	90 pp/ha	4
		Total Residential Population	**271**

Table 2-4 – Proposed Sanitary Demand

Average Demand (L/s)	Total Population	Peaking Factor	Site Area (ha)	Infiltration (L/s)	Peak Flow (L/s)
0.86	271	4.1	0.05	0.013	**3.60**

2.3.1 Proposed Servicing

It is proposed that the subject site will be serviced by the 250mm sanitary sewer on Plains Road East. Reference can be made to FSR for further servicing details.

2.4 Method of Analysis

This sanitary analysis uses the InfoWorks ICM dynamic model to simulate hydraulic performance and analyze the capacity of the existing sewer network downstream of the subject site. To analyze the impact of the proposed development on the existing sanitary infrastructure and assess the available capacity of the downstream sewers, the model was analyzed under pre-development and post-development DWF and WWF conditions.

The pre-development scenario presented the existing condition with new development applications, except the proposed development while the post-development included the proposed development in addition to the pre-development scenario.

The subsequent sections below summarize the methodology used in this analysis in further detail. These details have been considered and analyzed in this report to ensure that the InfoWorks model correctly reflects any changes that have occurred since the creation of the model to date.

2.4.1 New Developments & Population Updates

As discussed in **Section 2.2.2**, the City's Development Application Map has been reviewed as of 9 July 2024 to determine if there are any expected new developments within the sewershed area. These developments have been considered in the pre-development and post-development scenarios. All the development applications within the sewer network are summarised in **Table 2-2**.

2.4.2 Generation Rates & Theoretical Trends

Average wastewater flows for new development applications have been calculated according to the estimated population considering 275 L/c/d for residential and non-residential developments.

Theoretical wastewater profiles have been created based on the Harmon Peaking Factor and have been assigned to each development application in the model. To create an unsteady flow and simulate the fluctuation of the generated sanitary flows during the course of a day, a sanitary flow trend has been used in the model to generate the peak flow. The figure below presents one of the synthetic trends, which have been used in the analysis for the proposed residential development. All the tables for the modelled diurnal curves are presented in **Attachment B**.

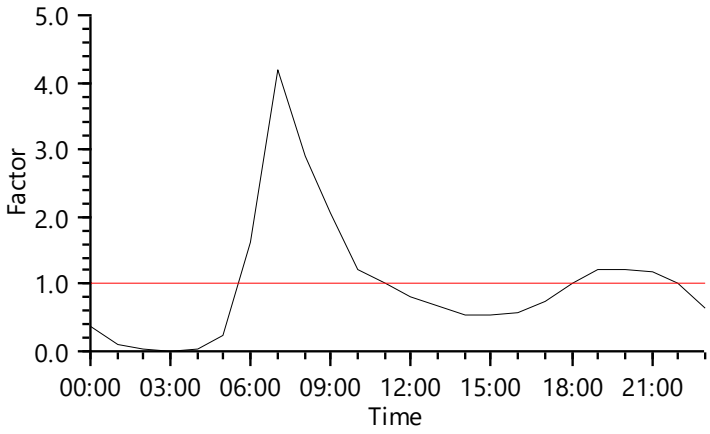


Figure 2-2 – Residential Development Sample Diurnal Sanitary Flow Trend

2.4.3 Inflow / Infiltration (I/I) Allowance

As per the Region's design criteria, I/I allowance of 0.286L/ha/s was applied to the new development applications.

2.4.4 Analyzed Scenarios

The following scenarios have been analyzed to determine the capacity of the downstream sewers within the network:

1. DWF Existing Condition
2. DWF Pre-Development Condition
3. DWF Post-Development Condition
4. WWF Pre-Development Condition
5. WWF Post-Development Condition

2.5 Dry Weather Flow Analysis

The subject site and associated sanitary sewer network have been simulated in InfoWorks during the existing, pre-development and post-development DWF conditions. The pre-development condition scenario has been used as a baseline to analyse the impacts of the post-development condition scenario.

2.5.1 Existing Condition

The sewer profile figures for the existing condition has been presented in **Figure 2-3.**

The results indicate that the existing downstream sewer had a residual capacity of receiving 24.9L/s (i.e. 30L/s – 5.1L/s = 24.9L/s) sanitary flow. As described in **Section 2.3**, the peak flow from the proposed development is 3.60L/s. It is anticipated the existing downstream sewer could service the proposed development under existing condition without any other development applications.

2.5.2 Pre-and Post-Development Conditions

Table 2-5 summarises the flow and depth of flow results for the sewers within the downstream network during the pre-development and post-development DWF. The detailed results are provided in **Attachment C**. The sewer profile figures for the scenarios have been presented in **Figure 2-4** and **Figure 2-5**.

As per the results, three sewers were expected to be surcharged during pre-development and post-development scenarios under DWF condition. Since the DWF results demonstrate surcharge conditions along the downstream sewers, sanitary upgrades are required to accommodate the proposed development. It is proposed to upgrade 3 existing 250mm sewers on Plains Road East to 375mm for servicing the proposed development and other development applications. The proposed sanitary upgrade is displayed in **Figure 2-6**.

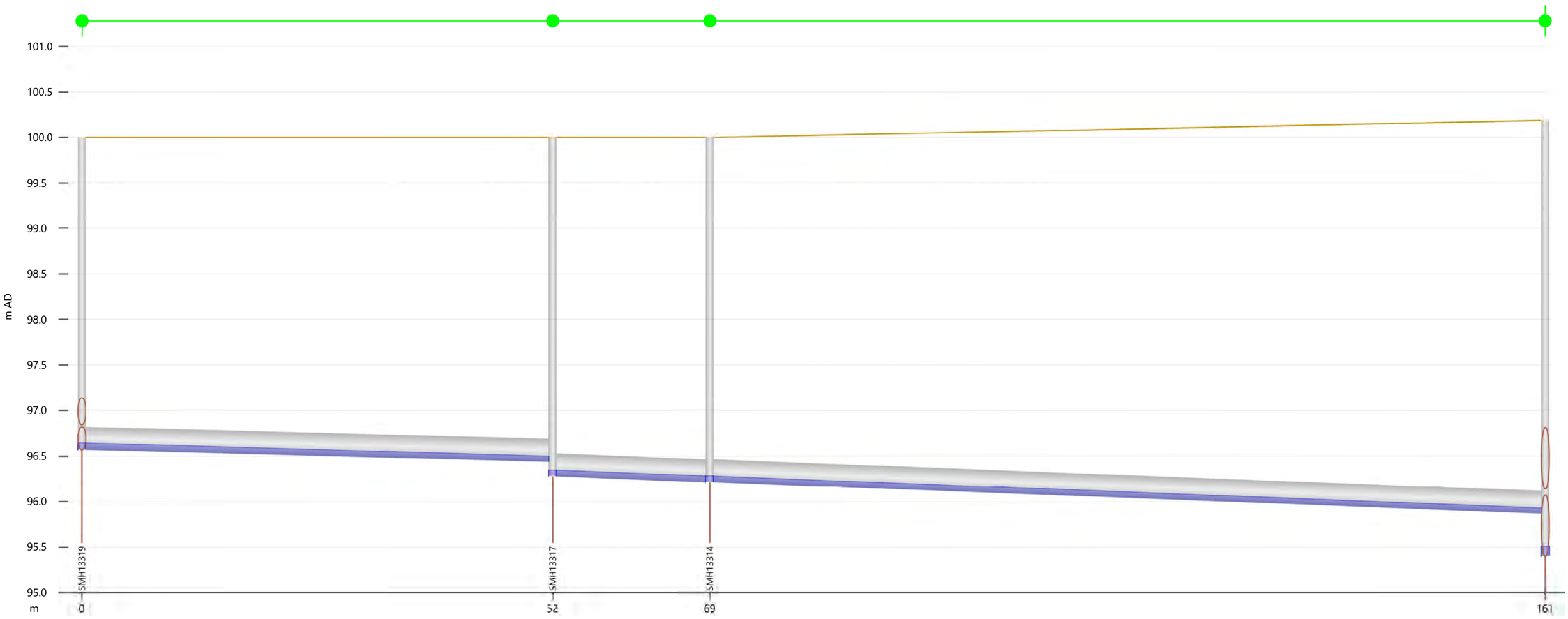
2.5.3 Post-Development Condition with the Proposed Sanitary Upgrades

Table 2-5 summarises the flow and depth of flow results for the sewers within the downstream network during the post-development DWF condition after the implementation of the proposed sanitary upgrades. The detailed results are provided in **Attachment C**. The sewer profile with the proposed upgrades is illustrated in **Figure 2-7**.

The results indicate that there will be no surcharge condition along the downstream sewer after the implementation of the proposed upsizing. Hence, the downstream sewer could safely accommodate the proposed development and other development applications with the proposed upgrades.

Table 2-5 – DWF Sewer Pipe Flow and Depth Results

Location	Manhole		Pipe							Flow (q) (m^3/s)			Flow (q/Q_{full}) [%]			Depth (d) (m)			Depth (d/D) [%]		
	U/S	D/S	Size (m)	Length (m)	Slope (%)	Asset ID	Q_{full} (m^3/s)	Upg Size (m)	Upg Q_{full} (m^3/s)	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg
Plains Road East	SMH13319	SMH13317	0.250	51.90	0.25	0	0.030	0.375	0.088	0.06	0.06	0.06	192.63	200.23	72.23	1.11	1.24	0.23	445.20	497.60	61.60
Plains Road East	SMH13317	SMH13314	0.250	17.30	0.38	0	0.036	0.375	0.107	0.06	0.06	0.06	160.53	166.83	59.39	0.88	0.97	0.21	350.80	386.40	56.27
Plains Road East	SMH13314	SMH19205	0.250	92.10	0.38	0	0.036	0.375	0.107	0.06	0.06	0.06	160.50	166.83	59.39	0.75	0.82	0.21	299.60	329.20	55.73

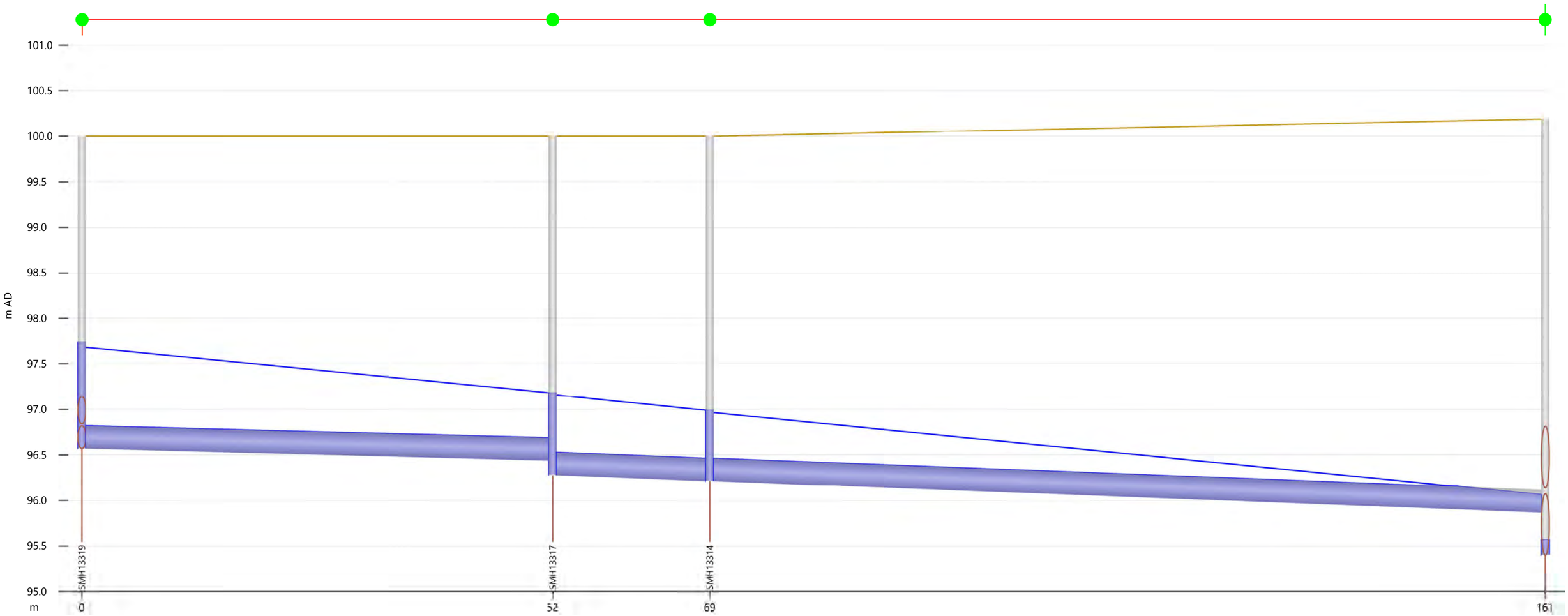


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height (mm)	250	250	250
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.030	0.036	0.036
surc	0.29	0.26	0.26
DS flow (m3/s)	0.00509	0.00509	0.00509

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
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level (m AD)	96.643	96.346	96.281	95.508
expr:Freeboard	3.357330	3.653938	3.718910	4.683294

Figure 2-3 - DWF Sanitary Sewer Profile - Existing Condition

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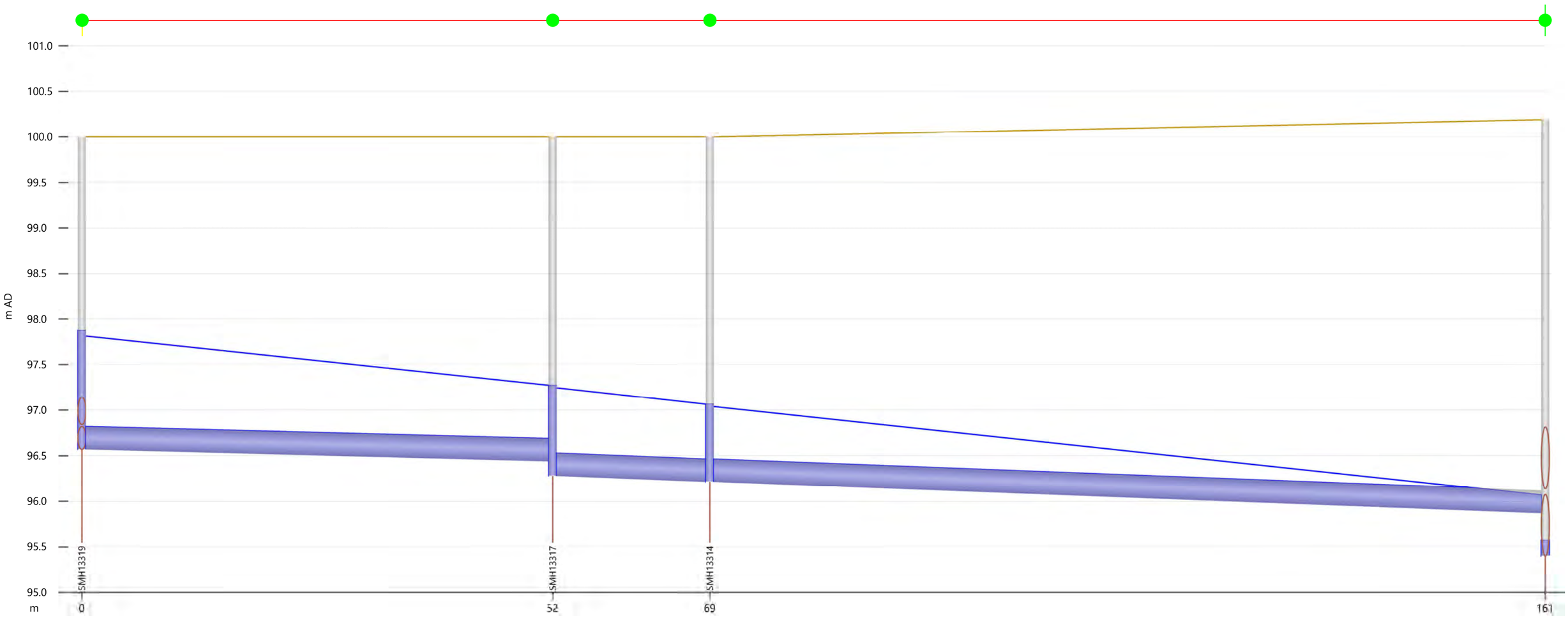


Link	SMH13319.1	SMH13317.1	SMH13314.1
length (m)	51.9	17.3	92.1
Shape ID	CIRC	CIRC	CIRC
width (mm)	250	250	250
height (mm)	250	250	250
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.030	0.036	0.036
surc	2.00	2.00	2.00
DS flow (m3/s)	0.05779	0.05778	0.05778

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
ground (m AD)	100.000	100.000	100.000	100.191
level (m AD)	97.739	97.180	96.988	95.568
expr:Freeboard	2.261314	2.819588	3.012367	4.623449

Figure 2-4 - DWF Sanitary Sewer Profile - Pre-Development

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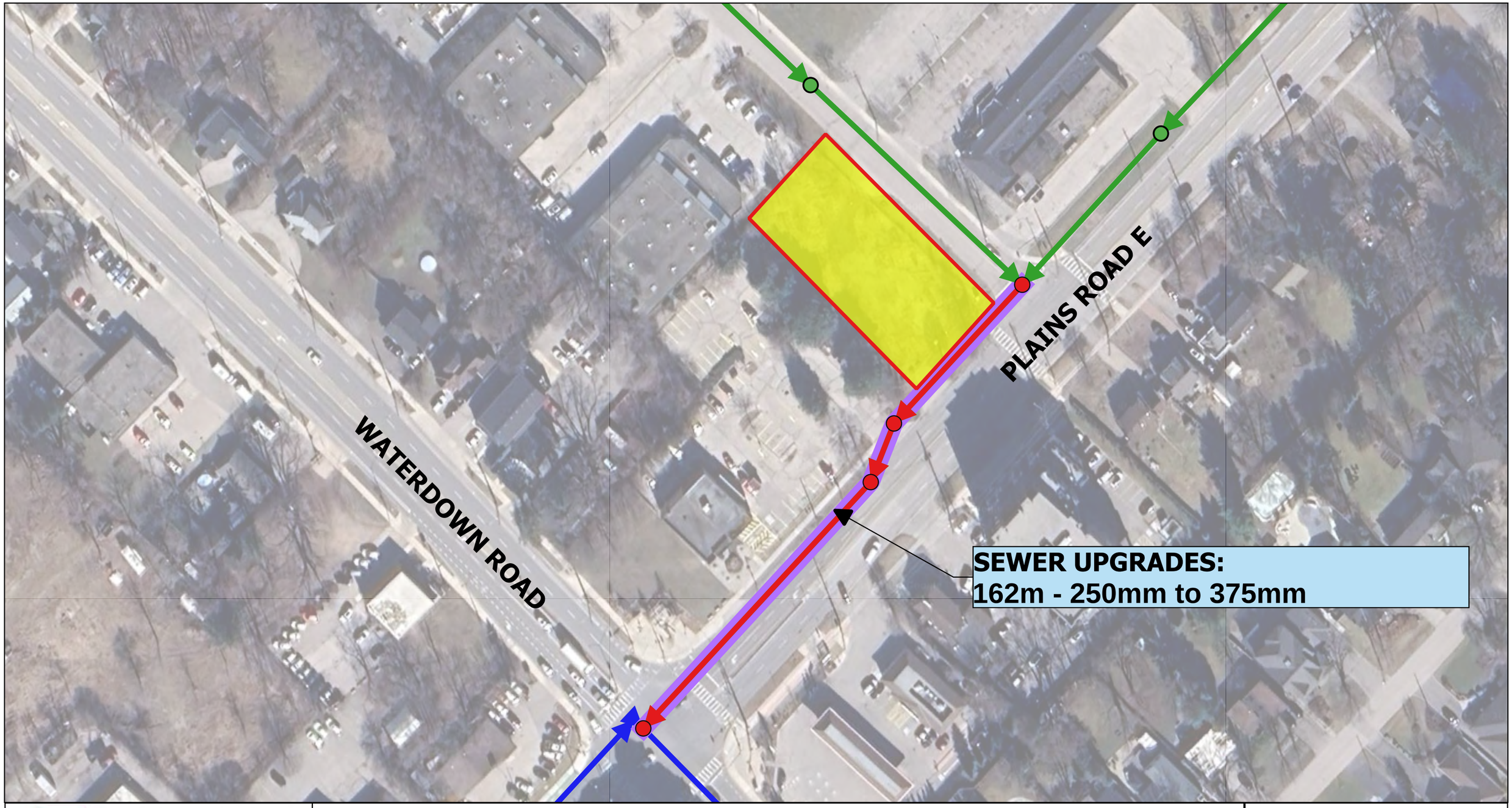


Link	SMH13319.1	SMH13317.1	SMH13314.1
length (m)	51.9	17.3	92.1
Shape ID	CIRC	CIRC	CIRC
width (mm)	250	250	250
height (mm)	250	250	250
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.030	0.036	0.036
surc	2.00	2.00	2.00
DS flow (m3/s)	0.06007	0.06006	0.06006

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
ground (m AD)	100.000	100.000	100.000	100.191
level (m AD)	97.873	97.271	97.063	95.570
expr:Freeboard	2.127495	2.729225	2.937065	4.621130

Figure 2-5 - DWF Sanitary Sewer Profile - Post-Development

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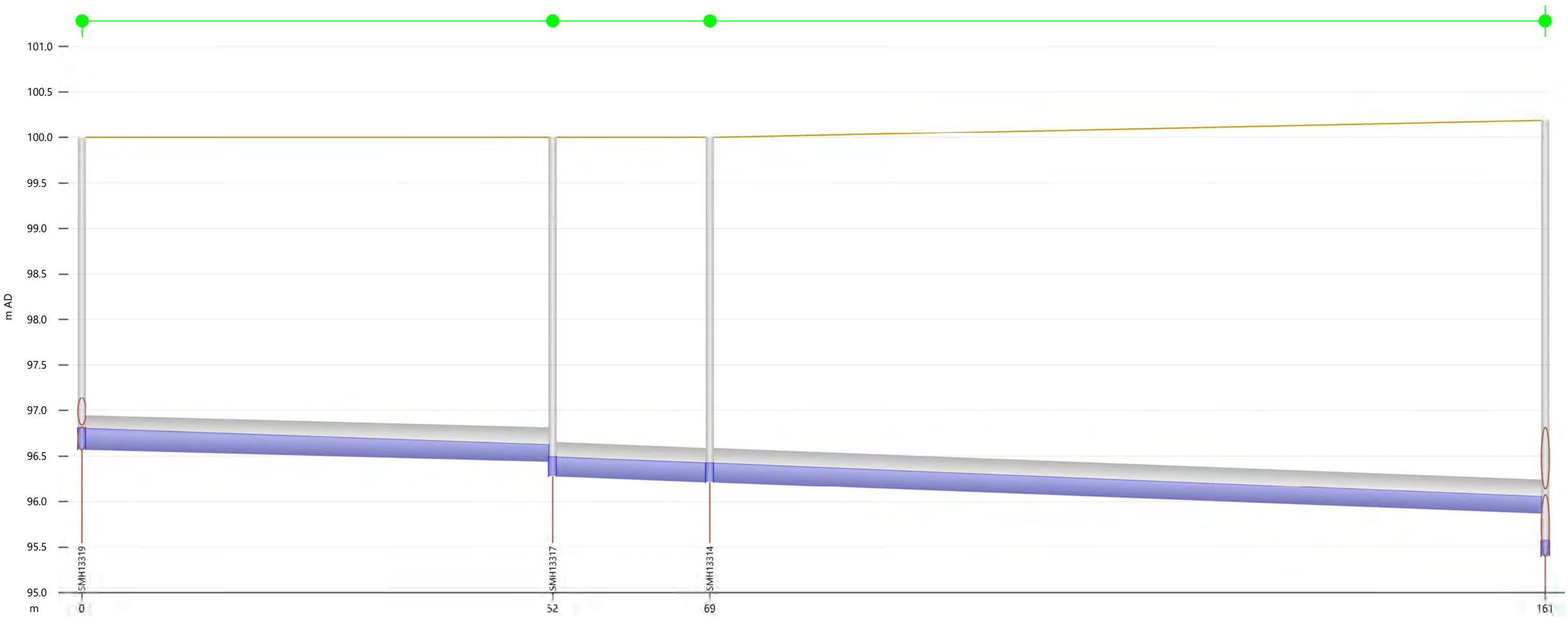
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Legend

- SUBJECT SITE
- EXISTING SANITARY SEWER
- EXISTING SANITARY MANHOLE
- ANALYZED DOWNSTREAM SANITARY MANHOLE
- ANALYZED DOWNSTREAM SANITARY SEWER
- EXISTING SANITARY TRUNK SEWER
- SEWERS REQUIRED TO BE UPGRADED

FIGURE 2-6
PROPOSED SANITARY UPGRADE

2021-5107	JULY 2024	SCALE: N.T.S



Link	SMH13319.1	SMH13317.1	SMH13314.1
length (m)	51.9	17.3	92.1
Shape ID	CIRC	CIRC	CIRC
width (mm)	375	375	375
height (mm)	375	375	375
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.088	0.107	0.107
surc	0.62	0.56	0.56
DS flow (m3/s)	0.06355	0.06355	0.06354

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
ground (m AD)	100.000	100.000	100.000	100.191
level (m AD)	96.809	96.491	96.426	95.573
expr:Freeboard	3.191422	3.508804	3.574471	4.618139

Figure 2-7 - DWF Sanitary Sewer Profile - Post-Development with Proposed Sanitary Upgrades

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2.6 Wet Weather Flow Analysis

The 10-year storm event in the Region's model has been considered to analyze the WWF conditions. Since the Region's sanitary guideline did not outline the criteria under WWF condition, it is suggested that a minimum of 1.8m freeboard in each of the manholes within the downstream network should be maintained to reduce the risk of basement flooding issue. This 1.8m represents the elevation between the HGL and the ground surface level.

The section below summarizes the results obtained for the WWF pre-development and post-development conditions. Please refer to **Table 2-6** for the HGL results during the pre-and post-development WWF conditions and **Attachment C** for the detailed results during the pre-and post-development WWF conditions. The sewer profile figures for the respective scenarios have been presented in **Figure 2-8** and **Figure 2-9**.

2.6.1 Pre-and Post-Development Conditions

As per the WWF results shown in **Table 2-6**, 3 manholes showed a freeboard of less than 1.8m during pre-development and post-development scenarios under WWF condition. Hence, it is anticipated that the existing downstream sewer could not accommodate the proposed development and other development applications under WWF condition. As described in **Section 2.5.1,** it is proposed to upsize 3 existing sewers from 250mm to 375mm for servicing the proposed development.

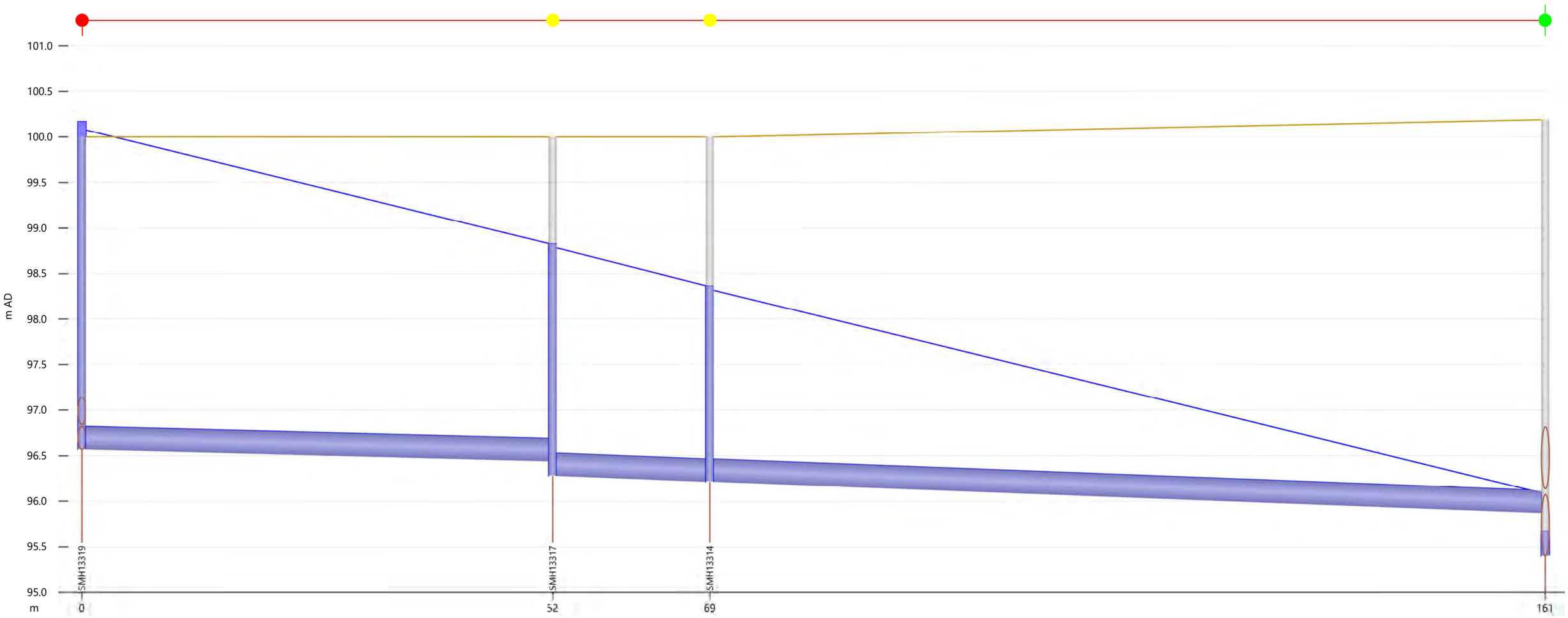
2.6.2 Post-Development Condition with the Proposed Sanitary Upgrades

Table 2-6 summarises the flow and depth of flow results for the sewers within the downstream network during the post-development WWF condition after the implementation of the proposed Sanitary Upgrades. The detailed results are provided in **Attachment C**. The sewer profile with the proposed upgrades is illustrated in **Figure 2-10**.

The results indicate that the downstream sewer could provide more than a freeboard of 1.8m and the HGL issues along the downstream sewer were addressed after the implementation of the proposed sanitary upsizing under WWF condition. Therefore, it is concluded that the downstream sewer with proposed sanitary upgrades could safely accommodate the proposed development and other development applications under WWF condition.

Table 2-6 – WWF Sewer HGL Results

Location	MH	T/G (m)	Max Allowable HGL (m)	Minimum Pipe Obvert (m)	Pre-Dev		Post-Dev		Post-Dev Upg	
					Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Plains Road East	SMH13319	100.000	98.200	96.570	100.17	-0.17	100.20	-0.20	97.46	2.54
Plains Road East	SMH13317	100.000	98.200	96.530	98.83	1.17	98.85	1.15	97.02	2.98
Plains Road East	SMH13314	100.000	98.200	96.120	98.36	1.64	98.38	1.62	96.85	3.15

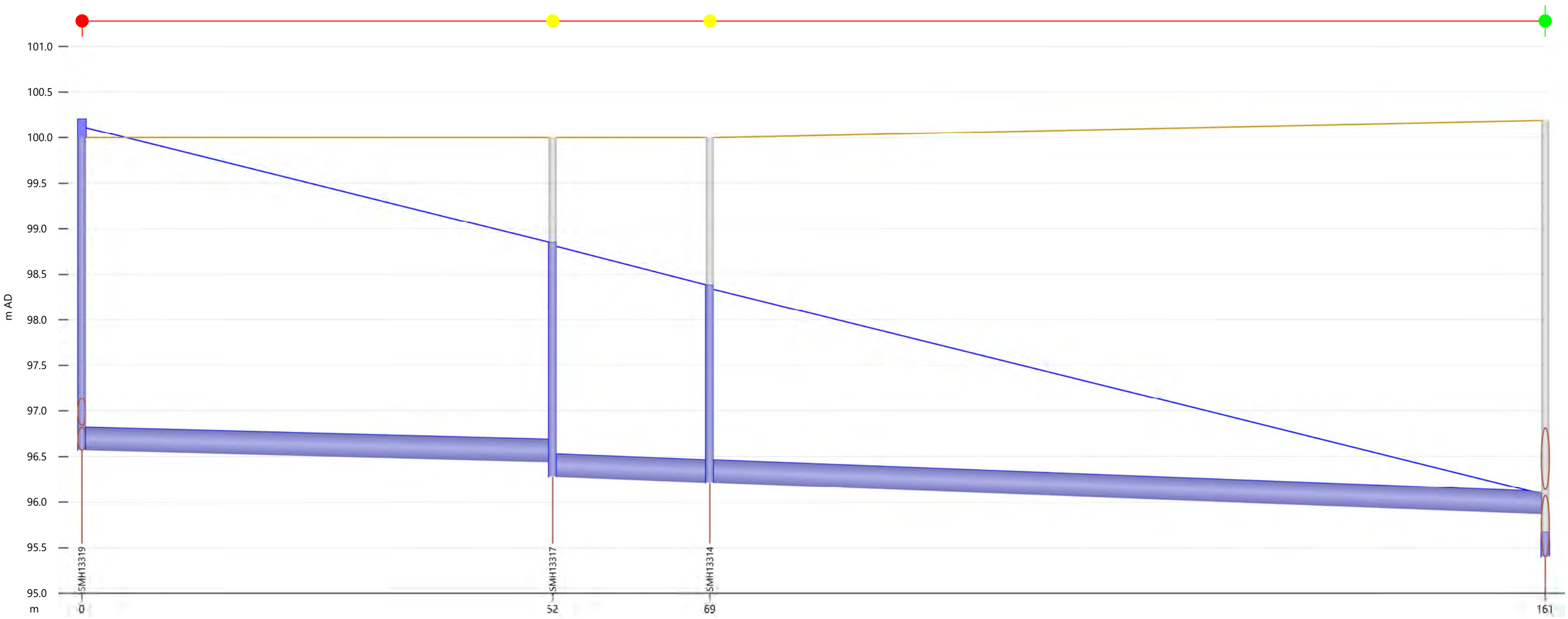


Link	SMH13319.1	SMH13317.1	SMH13314.1
length (m)	51.9	17.3	92.1
Shape ID	CIRC	CIRC	CIRC
width (mm)	250	250	250
height (mm)	250	250	250
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.030	0.036	0.036
surc	2.00	2.00	2.00
DS flow (m3/s)	0.09102	0.09101	0.09101

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
ground (m AD)	100.000	100.000	100.000	100.191
level (m AD)	100.168	98.828	98.364	95.668
expr:Freeboard	-0.168182	1.172241	1.636368	4.522688

Figure 2-8 - WWF Sanitary Sewer Profile - Pre-Development

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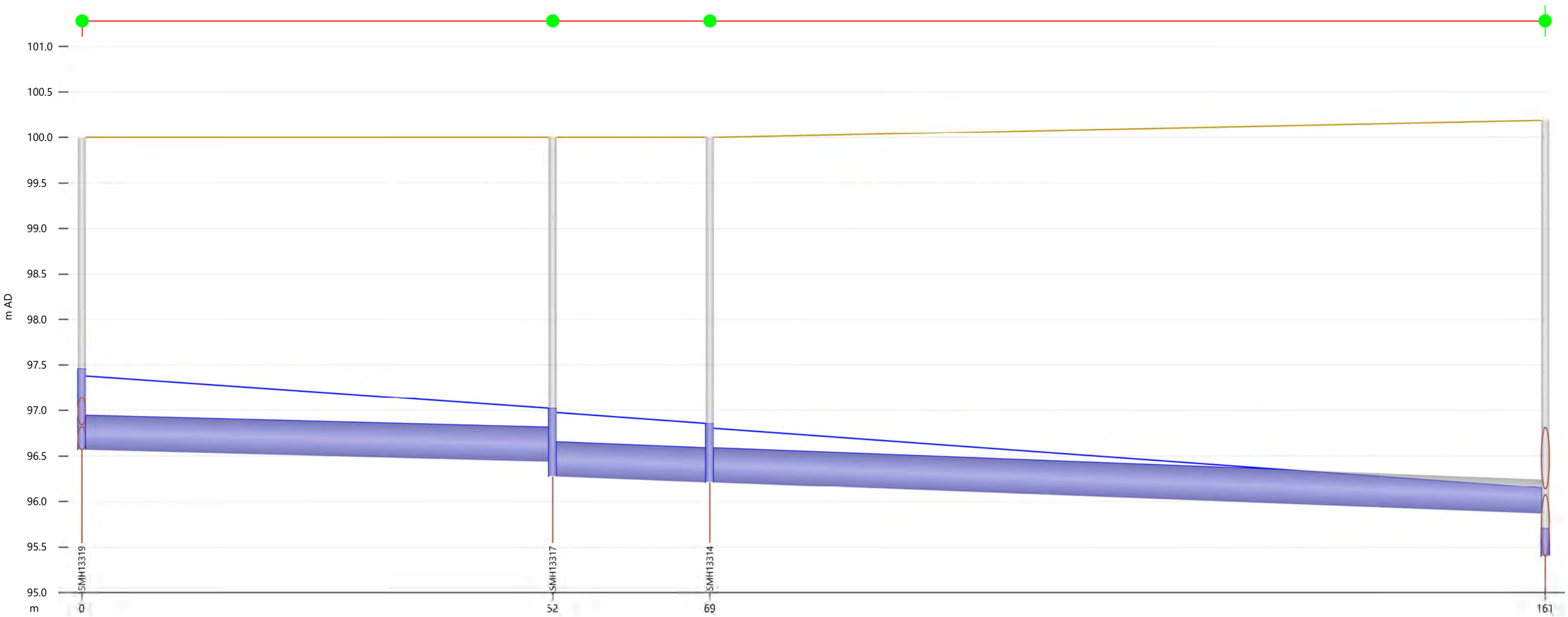


Link	SMH13319.1	SMH13317.1	SMH13314.1
length (m)	51.9	17.3	92.1
Shape ID	CIRC	CIRC	CIRC
width (mm)	250	250	250
height (mm)	250	250	250
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.030	0.036	0.036
surc	2.00	2.00	2.00
DS flow (m3/s)	0.09141	0.09141	0.09141

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
ground (m AD)	100.000	100.000	100.000	100.191
level (m AD)	100.203	98.851	98.383	95.669
expr:Freeboard	-0.202675	1.148796	1.616753	4.522169

Figure 2-9 - WWF Sanitary Sewer Profile - Post-Development

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Link	SMH13319.1	SMH13317.1	SMH13314.1
length (m)	51.9	17.3	92.1
Shape ID	CIRC	CIRC	CIRC
width (mm)	375	375	375
height (mm)	375	375	375
us inv (m AD)	96.570	96.280	96.215
ds inv (m AD)	96.440	96.215	95.870
grad (m/m)	0.00250	0.00375	0.00375
r.pfc (m3/s)	0.088	0.107	0.107
surc	2.00	2.00	2.00
DS flow (m3/s)	0.14443	0.14443	0.14442

Node	SMH13319	SMH13317	SMH13314	SMH19205
Node ID	SMH13319	SMH13317	SMH13314	SMH19205
ground (m AD)	100.000	100.000	100.000	100.191
level (m AD)	97.457	97.019	96.853	95.704
expr:Freeboard	2.543297	2.981392	3.147110	4.486815

Figure 2-10 - WWF Sanitary Sewer Profile - PostDevelopment with Proposed Sanitary Upgrades

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3.0 Conclusions

This Sanitary Capacity Analysis report has been prepared for the proposed development at 35 Plains Road East. This analysis presents the impact of the proposed development for DWF and WWF under pre-development and post-development conditions. The purpose of this report is to assess the sanitary sewer servicing options, determine if the existing downstream network has sufficient capacity and if any sewer upgrades are necessary.

A summary of the analysis is presented as follows:

- The proposed development has an estimated population of 271 persons.
- The Halton Region's Water and Wastewater Linear Design Manual (October 2019) has been considered to assess the capacity of the existing sanitary sewer system.
- Dynamic hydraulic analysis with InfoWorks ICM, provided by the Region has been used to analyze the capacity of the existing sewer under DWF and WWF conditions.
- Results indicate that the existing downstream sewer could not accommodate the proposed development as well as other new developments under DWF and WWF condition. Therefore, sanitary upgrades are required to address the DWF and WWF issues.
- It is proposed to upsize 3 existing sewers from 250mm to 375mm to service the proposed developments and other development applications. The results indicate that there will be no surcharge condition under DWF and no HGL issues under WWF after the implementation of the proposed sanitary upsizing. It is anticipated that the downstream sewer could safely support the proposed development as well as other development applications after the implementation of the proposed sanitary upgrades under DWF and WWF conditions.
- This analysis also reveals that the surcharge condition along the existing downstream sewers was not caused by the proposed development. It was caused as a commulative effect of considering all available development applications in the sewershed. Since the proposed upgrades would also benefit other developments (Current and future development applications) contributing to this downstream sewer, it is recommended that the proposed upgrades shall be funded through DC or cost-sharing.

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

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.



Paul Wong, E.I.T.
Water Resources Analyst

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

Sanitary Capacity Analysis Report

Attachment A – Population Estimate

City of Burlington

Population Estimate

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design@schaeffers.com

PROJECT NO.: 3107
PROJECT NAME: 35 Plains Road E
LOCATION: 35 Plains Road E
DATE: 10-May-24
DESIGNED BY: P.W.
CHECKED BY: K.S.

Location	Lot Area (ha)	FSI comm	Area (ha) ICI	Area (ha) Units / ha	Population Rate	Population Unit	Population Total Pop	Infiltration L/s	Trade Flow L/s
35 Plains Road East (Subject Site)									
Apartment (over 6 stories high)				161	1.655	pp/unit	267		
Light Commercial Area			0.05		90	pp/ha	4		
Sub Total - Area	0.20		0.05	161			271	0.06	-

Sanitary Capacity Analysis Report

Attachment B – Diurnal Curves

Scaled Peaking Factor Diurnal Profiles

Profile ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Pop	100-500	100-500	500-800	500-800	800-1100	800-1100	1100-1600	1100-1600	1600-2200	1600-2200	2300-2900	2300-2900	3000-3800	3000-3800	3900-4900	3900-4900	5000-6300	5000-6300	6300-8000	6300-8000	8000-10100
PF																					
0:00	4	4	3.9	3.9	3.8	3.8	3.7	3.7	3.6	3.6	3.5	3.5	3.4	3.4	3.3	3.3	3.2	3.2	3.1	3.1	3
1:00	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378
2:00	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089
3:00	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024
4:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5:00	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035
6:00	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252
7:00	1.597	0.334	1.577	0.334	1.557	0.334	1.537	0.334	1.517	0.334	1.497	0.334	1.477	0.334	1.457	0.334	1.437	0.334	1.417	0.334	1.397
8:00	4.000	0.993	3.900	1.007	3.800	1.021	3.700	1.035	3.600	1.048	3.500	1.062	3.400	1.076	3.300	1.090	3.200	1.104	3.100	1.118	3.000
9:00	2.814	1.269	2.774	1.283	2.734	1.297	2.694	1.311	2.654	1.325	2.614	1.339	2.574	1.352	2.534	1.366	2.494	1.380	2.454	1.394	2.414
10:00	2.012	2.200	1.992	2.180	1.972	2.160	1.952	2.140	1.932	2.120	1.912	2.100	1.892	2.080	1.872	2.060	1.852	2.040	1.832	2.020	1.812
11:00	1.259	4.000	1.271	3.900	1.284	3.800	1.297	3.700	1.309	3.600	1.322	3.500	1.335	3.400	1.347	3.300	1.360	3.200	1.373	3.100	1.386
12:00	1.047	2.619	1.059	2.579	1.072	2.539	1.085	2.499	1.097	2.459	1.110	2.419	1.123	2.379	1.135	2.339	1.148	2.299	1.161	2.259	1.174
13:00	0.836	2.051	0.848	2.031	0.861	2.011	0.874	1.991	0.886	1.971	0.899	1.951	0.912	1.931	0.924	1.911	0.937	1.891	0.950	1.871	0.963
14:00	0.717	1.249	0.729	1.263	0.742	1.276	0.755	1.290	0.767	1.304	0.780	1.318	0.793	1.332	0.805	1.346	0.818	1.360	0.831	1.373	0.844
15:00	0.581	1.160	0.593	1.174	0.606	1.188	0.619	1.202	0.631	1.215	0.644	1.229	0.657	1.243	0.669	1.257	0.682	1.271	0.695	1.285	0.708
16:00	0.556	0.970	0.568	0.984	0.581	0.998	0.594	1.012	0.606	1.026	0.619	1.040	0.632	1.053	0.644	1.067	0.657	1.081	0.670	1.095	0.683
17:00	0.614	0.890	0.626	0.904	0.639	0.918	0.652	0.931	0.664	0.945	0.677	0.959	0.690	0.973	0.702	0.987	0.715	1.001	0.728	1.015	0.741
18:00	0.779	0.906	0.791	0.920	0.804	0.934	0.817	0.948	0.829	0.962	0.842	0.976	0.855	0.989	0.867	1.003	0.880	1.017	0.893	1.031	0.906
19:00	1.032	0.954	1.044	0.968	1.057	0.982	1.070	0.995	1.082	1.009	1.095	1.023	1.108	1.037	1.120	1.051	1.133	1.065	1.146	1.078	1.159
20:00	1.229	0.962	1.241	0.976	1.254	0.990	1.267	1.004	1.279	1.017	1.292	1.031	1.305	1.045	1.317	1.059	1.330	1.073	1.343	1.087	1.356
21:00	1.254	0.997	1.266	1.011	1.279	1.025	1.292	1.039	1.304	1.053	1.317	1.066	1.330	1.080	1.342	1.094	1.355	1.108	1.368	1.122	1.381
22:00	1.219	0.836	1.231	0.850	1.244	0.864	1.257	0.878	1.269	0.892	1.282	0.906	1.295	0.919	1.307	0.933	1.320	0.947	1.333	0.961	1.346
23:00	1.044	0.622	1.056	0.636	1.069	0.650	1.082	0.663	1.094	0.677	1.107	0.691	1.120	0.705	1.132	0.719	1.145	0.733	1.158	0.746	1.171
	0.661	0.193	0.673	0.207	0.686	0.221	0.699	0.234	0.711	0.248	0.724	0.262	0.737	0.276	0.749	0.290	0.762	0.304	0.775	0.317	0.788
	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
8000-10100	10100-12700	10100-12700	12700-16000	12700-16000	16000-20100	16000-20100	20100-25300	20100-25300	25300-31900	25300-31900	31900-40500	31900-40500	40500-51800	40500-51800	51800-66800	51800-66800	66800-78100	66800-78100	87100-100000	87100-100000
3	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2	2
0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390	0.378	0.390
0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177	0.089	0.177
0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066	0.024	0.066
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018	0.035	0.018
0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144	0.252	0.144
0.334	1.377	0.334	1.357	0.334	1.337	0.334	1.317	0.334	1.297	0.334	1.277	0.334	1.257	0.334	1.237	0.334	1.217	0.334	1.197	0.334
1.131	2.900	1.145	2.800	1.159	2.700	1.173	2.600	1.187	2.500	1.201	2.400	1.215	2.300	1.228	2.200	1.242	2.100	1.256	2.000	1.270
1.408	2.374	1.422	2.334	1.436	2.294	1.449	2.254	1.463	2.214	1.477	2.174	1.491	2.134	1.505	2.094	1.519	2.054	1.532	2.014	1.546
2.000	1.792	1.980	1.772	1.960	1.752	1.940	1.732	1.920	1.712	1.900	1.692	1.880	1.672	1.860	1.652	1.840	1.632	1.820	1.612	1.800
3.000	1.398	2.900	1.411	2.800	1.424	2.700	1.436	2.600	1.449	2.500	1.462	2.400	1.474	2.300	1.487	2.200	1.500	2.100	1.513	2.000
2.219	1.186	2.179	1.199	2.139	1.212	2.099	1.224	2.059	1.237	2.019	1.250	1.979	1.262	1.939	1.275	1.899	1.288	1.859	1.301	1.819
1.851	0.975	1.831	0.988	1.811	1.001	1.791	1.013	1.771	1.026	1.751	1.039	1.731	1.051	1.711	1.064	1.691	1.077	1.671	1.090	1.651
1.387	0.856	1.401	0.869	1.415	0.882	1.429	0.894	1.443	0.907	1.456	0.920	1.470	0.932	1.484	0.945	1.498	0.958	1.512	0.971	1.526
1.299	0.720	1.312	0.733	1.326	0.746	1.340	0.758	1.354	0.771	1.368	0.784	1.382	0.796	1.395	0.809	1.409	0.822	1.423	0.835	1.437
1.109	0.695	1.123	0.708	1.136	0.721	1.150	0.733	1.164	0.746	1.178	0.759	1.192	0.771	1.206	0.784	1.220	0.797	1.233	0.810	1.247
1.028	0.753	1.042	0.766	1.056	0.779	1.070	0.791	1.084	0.804	1.098	0.817	1.111	0.829	1.125	0.842	1.139	0.855	1.153	0.868	1.167
1.045	0.918	1.059	0.931	1.073	0.944	1.086	0.956	1.100	0.969	1.114	0.982	1.128	0.994	1.142	1.007	1.156	1.020	1.169	1.033	1.183
1.092	1.171	1.106	1.184	1.120	1.197	1.134	1.209	1.148	1.222	1.162	1.235	1.175	1.247	1.189	1.260	1.203	1.273	1.217	1.286	1.231
1.101	1.368	1.114	1.381	1.128	1.394	1.142	1.406	1.156	1.419	1.170	1.432	1.184	1.444	1.197	1.457	1.211	1.470	1.225	1.483	1.239
1.136	1.393	1.149	1.406	1.163	1.419	1.177	1.431	1.191	1.444	1.205	1.457	1.219	1.469	1.233	1.482	1.246	1.495	1.260	1.508	1.274
0.975	1.358	0.989	1.371	1.002	1.384	1.016	1.396	1.030	1.409	1.044	1.422	1.058	1.434	1.072	1.447	1.086	1.460	1.099	1.473	1.113
0.760	1.183	0.774	1.196	0.788	1.209	0.802	1.221	0.816	1.234	0.830	1.247	0.843	1.259	0.857	1.272	0.871	1.285	0.885	1.298	0.899
0.331	0.800	0.345	0.813	0.359	0.826	0.373	0.838	0.387	0.851	0.401	0.864	0.414	0.876	0.428	0.889	0.442	0.902	0.456	0.915	0.470
Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia	Residential	Non-Residentia

Sanitary Capacity Analysis Report

Attachment C – InfoWorks Results

Flow and depth results

Dry Weather Flow - Pre, Post and Post Upgrade Comparison

Location	Manhole		Pipe									Flow (q) (m^3/s)			Flow (q/Q_{full}) [%]			Depth (d) (m)			Depth (d/D) [%]		
	U/S	D/S	Size (m)			Length (m)	Slope (%)	Asset ID	Q_{full} (m^3/s)	Upg Size (m)	Upg Q_{full} (m^3/s)	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg
Plains Road East	SMH13319	SMH13317	0.250			51.90	0.25	0	0.030	0.375	0.088	0.06	0.06	0.06	192.63	200.23	72.23	1.11	1.24	0.23	445.20	497.60	61.60
Plains Road East	SMH13317	SMH13314	0.250			17.30	0.38	0	0.036	0.375	0.107	0.06	0.06	0.06	160.53	166.83	59.39	0.88	0.97	0.21	350.80	386.40	56.27
Plains Road East	SMH13314	SMH19205	0.250			92.10	0.38	0	0.036	0.375	0.107	0.06	0.06	0.06	160.50	166.83	59.39	0.75	0.82	0.21	299.60	329.20	55.73

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Maximum Hydraulic Gradeline

Dry Weather Flow - Pre, Post and Post Upgrade Comparison

Location	MH	Asset ID	T/G (m)	Max Allowable HGL (m)	Minimum Pipe Obvert (m)	Pre-Dev		Post-Dev		Post-Dev Upg	
						Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Plains Road East	SMH13319	0	100.000	98.200	96.570	97.74	2.26	97.87	2.13	96.81	3.19
Plains Road East	SMH13317	0	100.000	98.200	96.530	97.18	2.82	97.27	2.73	96.49	3.51
Plains Road East	SMH13314	0	100.000	98.200	96.120	96.99	3.01	97.06	2.94	96.43	3.57

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Flow and depth results

Wet Weather Flow - Pre, Post and Post Upgrade Comparison

Location	Manhole			Pipe							Flow (q) (m^3/s)			Flow (q/Q_{full}) [%]			Depth (d) (m)			Depth (d/D) [%]		
	U/S	Link Suffix	D/S	Size (m)	Length (m)	Slope (%)	Asset ID	Q_{full} (m^3/s)	Upg Size (m)	Upg Q_{full} (m^3/s)	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg	Pre-Dev	Post-Dev	Post-Dev Upg
Plains Road East	SMH13319	1	SMH13317	0.250	51.90	0.25	0	0.030	0.375	0.088	0.09	0.09	0.14	303.40	304.70	164.13	3.51	3.54	0.81	1402.00	1416.00	216.27
Plains Road East	SMH13317	1	SMH13314	0.250	17.30	0.38	0	0.036	0.375	0.107	0.09	0.09	0.14	252.81	253.92	134.98	2.51	2.53	0.70	1002.00	1011.20	185.87
Plains Road East	SMH13314	1	SMH19205	0.250	92.10	0.38	0	0.036	0.375	0.107	0.09	0.09	0.14	252.81	253.92	134.98	2.10	2.12	0.59	840.80	848.80	157.07

Maximum Hydraulic Gradeline

Wet Weather Flow - Pre, Post and Post Upgrade Comparison

Location	MH	T/G (m)	Max Allowable HGL (m)	Minimum Pipe Obvert (m)	Pre-Dev		Post-Dev		Post-Dev Upg	
					Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)	Maximum HGL (m)	Freeboard (m)
Plains Road East	SMH13319	100.000	98.200	96.570	100.17	-0.17	100.20	-0.20	97.46	2.54
Plains Road East	SMH13317	100.000	98.200	96.530	98.83	1.17	98.85	1.15	97.02	2.98
Plains Road East	SMH13314	100.000	98.200	96.120	98.36	1.64	98.38	1.62	96.85	3.15

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