67 Beck Street
Residential Development

Functional Servicing and Stormwater Management Report

Project Location:
Beck Street and Charles Street, Baden, ON

Prepared for:
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MTE File No.: 41012-200

Engineers, Scientists, Surveyors.

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Existing Conditions Plan
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Functional Site Grading and ESC Plan
MTE Drawing No. C2.1 .....Appended

Functional Site Servicing Plan
MTE Drawing No. C2.2 .....Appended

Functional Site Grading and ESC Plan (Interim)
MTE Drawing No. C3.1 .....Appended

Functional Site Servicing Plan (Interim)
MTE Drawing No. C3.2 .....Appended

1.0 INTRODUCTION

MTE Consultants Inc. was retained by Schnurr Home Builders Inc to complete a Functional Servicing and Stormwater Management (FSSWM) Report for a new residential development to be constructed at lands located between Beck and Charles Streets in Baden (herein referred to as 'the Site' in the Township of Wilmot. The development is subject to an Official Plan Amendment and Zoning By-Law Amendment Application. The current zoning of the Site is Industrial. The property is proposed to be re-zoned as Urban Residential.

The property is bounded to the north by Beck Street, to the east by existing residential dwellings and a commercial building, to the south by Charles Street, and to the west by existing residential dwellings and green space. For the exact location of the Site refer to Figure 1.

The proposed development for the Site is the construction of two back-to-back stacked townhouse buildings and one stacked townhouse building with a total of 66 units, complete with associated surface parking and two driveway entrances from Charles Street and Beck Street. The development comprises three phases of buildout. Phase 1 includes Building 3 along Charles Street with 18 stacked units. Phase 2 includes Building 1 and 2 with 48 back-to-back units. Phase 3 includes the readjustment of the driveway connection to Beck Street and associated sidewalk and will only be constructed once the temporary cul-de-sac of Beck Street has been removed. Civil drawings C2.1 and C2.2 show the ultimate build out conditions of the Site. Civil drawings C3.1 and C3.2 show the interim building out conditions, prior to Phase 3. It is understood that the urbanization of the right-of-way and details for the temporary cul-de-sac (as it relates to civil) is a detailed design matter for SPA.

The purpose of this study is to support the applications for Official Plan Amendment and Zoning By-Law Amendment Applications. This will be accomplished by reviewing the opportunities and constraints for the subject property with respect to servicing, grading, and stormwater management; reviewing the requirements of the reviewing agencies; describing the development concept; and demonstrating the functional serviceability of the property. Pending approval of the Amendment application, detailed design of the Site will commence and be submitted to the Township in support of Site Plan Approval.

2.0 EXISTING CONDITION

2.1 Existing Topography

The Site encompasses a vacant area of 0.734ha and is generally covered with gravel with patches of grass along the east and west limits. In the existing condition, surface runoff from the Site drains from northeast to south and southwest. There is an elevation difference of approximately 2.75m. The highest northeast elevation is approximately 353.25mASL and the lowest southwest elevation at approximately 350.50mASL. The Site is approximately 76.9% impervious in the existing conditions.



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PROJECT
67 BECK ST RESIDENTIAL DEVELOPMENT

TITLE
SITE PLAN LOCATION

Drawn: GLC	Scale: N.T.S.	Figure: **F1**
Checked: JHN	Project No.: 41012-200	
Date: 2023-09-29	Rev No.: 0	

CAD: P:\P\41012\200\41012-200-F1.DWG

Plot Date: February 27, 2026 - 5:54 PM

2.2 Existing Servicing

2.2.1 Water

There is an existing 150mm diameter municipal watermain along Charles Street. The closest municipal fire hydrant on Charles Street is located near the southeast corner of the Site. There is an existing 150mm diameter municipal watermain along Beck Street. The closest municipal fire hydrant on Beck Street is located on the far side of Beck Street. There does not appear to be a water service to the property as the Site is vacant. If an existing water service is encountered during construction, it will be disconnected and capped at the municipal watermain as part of the redevelopment of the Site.

Two flow tests were performed by CFLS on existing hydrants on April 29, 2022. Refer to Table 2.1 and 2.2 below for a summary of flow test results.

Table 2.1 – Results of Flow Tests for hydrants on Beck Street (Completed August 24, 2023, by CFLS)

Test #	Outlet Inside Diameter (in.)	Number of Outlets	Pitot Pressure (psi)	Residual Pressure (psi)	Flow @ Residual (gal/min)
1	n/a	n/a	n/a	66	0
2	2.5	1	40	64	1,062
3	2.5	2	20+20	61	1,501

Table 2.2 – Results of Flow Tests for hydrants on Charles Street (Completed August 24, 2023, by CFLS)

Test #	Outlet Inside Diameter (in.)	Number of Outlets	Pitot Pressure (psi)	Residual Pressure (psi)	Flow @ Residual (gal/min)
1	n/a	n/a	n/a	66	0
2	2.5	1	44	63	1,113
3	2.5	2	18+18	60	1,424

Refer to Appendix A for further details.

2.2.2 Sanitary

There is a 200mm diameter municipal sanitary sewer along Beck Street which drains towards the east and then south along Mill Street. The closest municipal manhole is located at the existing west limits of Beck Street and is approximately 2.81m deep. There is a 200mm diameter municipal sanitary sewer along Charles Street which drains toward the east. The closest municipal manhole is located along the Site's frontage to Charles Street. This municipal manhole is approximately 4.8m deep. There does not appear to be any sanitary services to the vacant property. The sanitary sewer flowing south on Mill Street connects into the sanitary sewer on Charles Street. The sanitary sewer then flows east to the sanitary main on Foundry Street. It is understood that there are capacity constraints on the Foundry Street sanitary sewer. Refer to Section 3.2.2 for additional commentary. If an existing sanitary service is encountered during construction, it will be disconnected and capped at the municipal main as part of the re-development of the Site.

2.2.3 Storm

Information on existing storm sewers surrounding the Site is limited. There is no storm infrastructure on Beck Street along the Site's frontage. The nearest storm infrastructure north of the Site is located at the intersection of Beck Street and Mill Street. There are no record drawings indicating storm infrastructure along Charles Street; however, existing catchbasins and their inverts were surveyed as part of the topographic survey. There is an existing catchbasin on Charles Street near 88 Charles Street. This catchbasin contains 200mm diameter storm sewers draining south towards the centerline of Charles Street. There is a second existing catchbasin on Charles Street just past the southeast corner of the Site. This catchbasin has a 200mm diameter storm sewer draining south into a 400mm diameter storm sewer. The 400mm diameter storm sewer drains south towards the centerline of Charles Street. There is a third existing catchbasin at the northwest corner of Charles Street and Beck Street. This catchbasin has 450mm diameter storm sewers draining east towards Foundry Street. It is assumed that there is a 450mm diameter storm sewer on Charles Street that the first and second catchbasins blind connect into. Majority of the Site drains overland to the neighbouring residential properties southwest of the Site before flowing onto Charles Street under existing conditions.

2.3 Existing Soils Information

Geotechnical information for the property is currently not available. A geotechnical investigation will be required during detailed building design to determine the condition of the native soils and recommend appropriate construction methods for the Site development.

2.4 Reviewing Agencies

Grading, servicing, and stormwater management designs as well as this Functional Servicing Report will be required for submission to the Township of Wilmot and Region of Waterloo in support of the Official Plan Amendment, the Zoning By-Law Amendment and the Site Plan Applications. The Township will also be responsible for the review and approval of site plans, site grading, sanitary servicing, stormwater management, lighting and landscape design and ultimately issuing building permits. The Region of Waterloo will be responsible for reviewing the water servicing.

3.0 PROPOSED GRADING AND SERVICING STRATEGIES

Preliminary grading and servicing strategies for the proposed development have been developed based on the topographic survey, site investigation, plan and profile information, background studies and Conceptual Site Plan prepared by MHBC Planning Urban Design & Landscape Architecture, dated January 12, 2026.

There is a road allowance widening of 1.0m required for Beck Street. There is a road allowance widening of 5.0m required for Charles Street. Preliminary grading and servicing strategies for the proposed development are proposed to accommodate the road allowance widening required.

3.1 Proposed Grading

The proposed development will have three stacked townhouse buildings complete with associated driveway and parking areas. Proposed grading will respect existing Site constraints. The proposed grading strategy will maintain existing grades along the south, east, and west property lines and match into the existing Beck Street grades, while ensuring positive drainage toward the right-of-way. Regrading will involve raising the southwest of the property to direct storm overland runoff away from the neighboring southwest properties. The buildings along Beck Street will have a finished floor elevation of 354.29, with basement finished floor of 351.41.

Building 3 will have a finished floor elevation of 354.08, with basement finished floor of 351.08. All finished floor elevations are subject to change during detailed design.

As the Site is higher along Beck Street than Charles Street, overland flow for the Site is proposed to be through the driveway off Charles Street. Runoff generated along the north side of the buildings along Beck Street will sheet flow towards the right-of-way. Parking lots and driveways will generally be flat to accommodate surface ponding in order to meet the stormwater management criteria. The grading strategy has been developed to ensure that the drainage is directed to a series of storm structures through the Site. Accessible grading will be further detailed at the SPA stage.

Grading for the proposed Beck Street will generally follow existing grades and drainage patterns. There is an existing drainage split on Beck Street near the Site. Runoff at the west limits of Beck Street drains west towards landscape areas. Runoff at the east limits of Beck Street drains east towards existing storm infrastructure on Beck Street and Mill Street. Refer to labeled contours on MTE Drawings C1.1 and C2.1.

3.2 Proposed Servicing

The development is proposed to be broken into three phases with phased occupancy. Phase 1 includes Building 3 along Charles Street with 18 units. Phase 2 includes Building 1 and 2. Phase 3 includes modifications to the driveway entrance off Beck Street, to be implemented in conjunction with the full build-out of Beck Street. The intention is to construct majority of the underground civil infrastructure on the property as part of Phase 1 (with temporary caps for Phase 2 buildings). Civil servicing laterals to each unit stack will be shown at the SPA stage.

A new connection for storm, sanitary and water will be made to existing infrastructure fronting the Site as further detailed below.

3.2.1 Water

A new connection to the 150mm diameter municipal watermain along Charles Street will be required in order to service the proposed buildings. The required private watermain size on-site will also be 150mm diameter. The watermain will be extended along the common element roadways through the development and will branch off to service the proposed buildings. Each unit will be serviced off the main with a minimum 25mm diameter domestic water service. Plugs are currently shown on the functional servicing drawing; however, a water service will be shown connecting to each plug to service the end units. There will be no dead ends in the watermain and thus a looped system is not required.

Water Demand

Detailed domestic water demand calculations were completed for the proposed buildings and are included in Appendix A. The maximum day domestic demand for the Site was determined to be 1.15L/s. The average day demand for the Site was determined to be 0.42L/s.

Various guidelines and references exist for calculating the required water supply for firefighting purposes. In Ontario, there are two standards/guidelines that are most often referenced:

- Ontario Building Code (OBC) – provincial codes and guidelines published by the Ministry of Municipal Affairs and Housing for the Province of Ontario.
- The Fire Underwriters Survey (FUS) – an insurance industry guideline.

Many municipalities in Ontario use both the OBC and the FUS fire flow requirements for assessing firefighting water supply requirements. Ideally, fire flow demands for new developments are calculated based on the FUS criteria; however, it is not always reasonable to

expect that the local existing municipal infrastructure has the operational capacity to supply water at the rates prescribed in the FUS guidelines. As a result, at no time shall the available fire flow be less than that required by the Ontario Building Code.

It is anticipated that the existing fire hydrant located on Beck Street will be sufficient for the proposed units in Buildings 1 and 2 fronting Beck Street. A new hydrant is proposed to service units in Buildings 1 and 2 facing the internal driveway and Building 3 units. A fire flow analysis has been completed to ensure that adequate flow and pressure will be available at the proposed on-site hydrant. The worst-case scenario was considered using the calculated residual pressure after losses at the on-site hydrant.

The pressures and flows at the hydrant must be sufficient for firefighting conditions as established by the Ontario Building Code (2012). The minimum residual pressure under firefighting conditions is 140kPa (20.3psi) per OBC 2012 A-3.2.5.7 3(b).

For this design, information obtained from hydrant flow testing on the municipal hydrant located on Charles Street (as detailed in Section 2.2.1) was utilized. The analysis will determine if the theoretical pressure of the proposed on-site fire hydrant is acceptable for firefighting. Volumes were estimated using preliminary building schematics. Buildings 1 and 2 are anticipated to be 3-storeys with basements. Building 3 is anticipated to be 2-storeys with basements. Building volumes are subject to change during detailed design. Fire flow analysis was completed with the understanding that firewalls will be designed into Building 1 and 2. Firewalls will separate the Building 1 into 8- and 12-unit blocks and Building 2 into 16- and 12-unit blocks in order for each building to meet the minimum required allowable pressure of 140kPa per OBC 2012.

Using the OBC 2012:

- Building Classification: Group C
- Calculate: $Q = KVS_{tot}$ (Table 1 of OBC 2012 Appendix A-3.2.5.7.(3) & Table 2)
  K = water supply coefficient (A-3.2.5.7 Table 1)
  V = volume of building (m^3)
  S_{tot} = 1 + total spatial coefficients

Table 3.1 – Fire Water Demand

Building	Total Floor Area (m^2)	Building Volume (m^3)[1]	K	S_{tot}	Q (litres)	Required Minimum Water Supply Flow Rate (litres/min)[2]
Building 1 – Stacked Townhouse 12-unit block with firewall	1,336	4,008	23	1.81	167,130	5,400
Building 2 – Stacked Townhouse 16-unit block with firewall	1,737	5,331	23	1.81	222,160	6,300
Building 3 – Stacked Townhouse	1,541	4,624	23	1.92	204,184	6,300

[1] Building 1 and 2 are to have firewalls as shown on Functional Site Grading and Servicing Drawings.
[2] from Table 2 of OBC 2012 Appendix A-3.2.5.7

Therefore, the worst-case scenario is the required minimum water supply flow rate of 6,300L/min for Building 2 16-unit block and Building 3. This is the maximum flow rate specified by the Ontario Building Code.

The residual pressure at the proposed hydrant was calculated to be 176kPa for a flow rate of 6,369L/min (6,300L/min fire + 69L/min domestic), which is greater than the minimum allowable pressure of 140kPa per OBC 2012. Refer to Appendix A for calculations.

3.2.2 Sanitary

A sanitary flow design sheet has been prepared to determine the flows anticipated to be generated by the proposed development. Buildings 1, 2 and 3 are expected to generate 0.74L/s, 1.03L/s, and 0.67L/s, respectively. The total extraneous flow is expected to be 0.18L/s. The combined development of all four buildings will result in an expected total flow of 2.56L/s, including extraneous flow. Refer to Appendix B for calculations.

It is proposed that the Site will be serviced by a new 200mm diameter sanitary sewer complete with a new doghouse manhole installed at the municipal sewer on Charles Street. The 200mm diameter sanitary sewer will enter the Site through the driveway entrance off Charles Street. Each unit will have a minimum 100mm diameter service off the main at 2%. The private on-site sanitary sewer is to be installed at a slope that provides sufficient depth for the servicing of the buildings while maintaining adequate capacity. The service sizes and inverts will be confirmed at detailed design.

2.56L/s represents 12.72% of the full flow capacity of the 200mm diameter sanitary sewer on Charles Street. It is understood that this sewer connects into a 200mm diameter sanitary sewer on Foundry Street which is experiencing surcharging conditions.

MTE reviewed the PCSSWMM summary file for the Foundry Street sanitary sewer network provided by Wilmot Township and the Baden-New Hamburg Water and Wastewater Servicing Review Report (prepared by Stantec dated March, 2023). The following observations are made on the PCSSWMM summary file:

- The Charles Street sanitary sewer discharges into SANMH551 on Foundry Street.
- The leg upstream of SANMH551 is SANL1028. The leg downstream of SANMH551 is SANL1029.
- The following table summaries relevant numbers taken from the PCSWMM summary file and profiles. The hydraulic grade lines from the PCSWMM summary file provide a visual representation and are included in Appendix C.

Table 3.2 – Extracts from PCSWMM Sanitary Model

	SANL1028		SAN1029	
	Max Flow	Max / Full Flow Ratio	Max Flow	Max / Full Flow Ratio
DWF	10.16L/s	0.23	13.68L/s	0.24
2-Year Profile	87.58L/s	1.97	95.69L/s	1.68
5-Year Profile	93.59L/s	2.11	100.97L/s	1.78
100-Year Profile	94.5L/s	2.13	101.31L/s	1.78

Under dry weather flow, the Foundry Street sewer appears to be functioning reasonably. As soon as extraneous flows from wet weather conditions enter Foundry Street sewer, the network exceeds its capacity. During the 10-year storm event, SANMH562 surcharges near the surface as illustrated by the hydraulic grade line. SANMH562 is located upstream near the intersection of Foundry Street and Synder's Road.

The following observations are made regarding the Baden-New Hamburg Water and Wastewater Servicing Review Report:

- The Baden Pumping Station was identified as having insufficient capacity under the future growth scenarios under wet weather conditions (Executive Summary, Page ii).
- A new Baden sanitary pumping station with twin forcemains to direct flow to the New Hamburg Wastewater Treatment Plant is proposed (Executive Summary, Page iii).
- Construction of the Baden Pumping Station upgrade is tentatively planned for 2025 (Executive Summary, Page v).
- The Township of Wilmot is currently undergoing an inflow and infiltration study focused on reducing wet weather flows (Main Report, Page 43).

Furthermore, it is understood that a sanitary trunk sewer is proposed 300m to 400m west of the Site. The sanitary truck sewer will generally follow Baden Creek towards the existing Baden wastewater pumping station south of the Gingerich Road and Foundry Street intersection. The purpose of the trunk sewer is to accommodate future growth and development in Baden. An added benefit of the sanitary truck sewer is that it proposes to intercept and redirect some sanitary flows from existing residential properties west of Christian Street and from Waterloo Oxford Secondary School before they can flow into the Foundry Street sanitary sewer.

The trunk sewer project has progressed significantly since the initial submission of this report/development application. Progress of the trunk sewer progress will be monitored as this project moves forward through Site Plan Approval and Building Permit.

Therefore, servicing the proposed development for sanitary should be feasible. The surcharging condition during wet weather conditions on Foundry Street is occurring upstream of the proposed development's entry point into the Foundry Street sanitary network and there are various projects planned to improve of the overall conditions of the network. It is anticipated that there will be sufficient capacity in the municipal system to accommodate this development by the time of construction and occupancy.

3.2.3 Storm

A private storm sewer system will be installed on-site to collect rooftop runoff from the buildings and runoff from the common driveway and parking areas. Each building will be serviced by storm laterals. The runoff collected in the storm sewers will be directed to the OGS unit located near the driveway entrance to the Site off Charles Street and into the municipal storm sewer in the Charles Street right-of-way. The connection to the municipal storm sewer will be facilitated by installing a new manhole in the Charles Street right-of-way, so as to avoid proposed infrastructure crossing neighbouring property lines. Runoff from the frontage of the property, and green space will flow towards the Charles Street and Beck Street rights-of-way.

4.0 PRELIMINARY STORMWATER MANAGEMENT DESIGN

4.1 SWM Criteria

The stormwater management design criteria for the subject site, as established by the Township of Wilmot, are as follows:

- Attenuation of the post-development peak flows for the 2-, 5- and 100-year storm event to the 2-year pre-development (existing) peak flow.
- Implementation of Enhanced (80% TSS Removal) water quality controls.
- Implementation of Erosion and Sediment Control measures.

4.2 Water Quantity Control

In order to successfully complete the preliminary stormwater management design for the Site, the following specific tasks were undertaken:

- Calculate the allowable runoff rates using MIDUSS NET.
- Determine the percent impervious of the Site and catchment parameters for inclusion in MIDUSSS modeling.
- Calculate post-development runoff hydrographs using MIDUSS NET.

The following table summarizes the catchments used in modeling of the Site. The pre-development condition was separated into two catchments: area draining towards the southwest neighbouring properties and areas draining towards Charles Street. The post-development condition was separated into three catchment areas: the controlled area, the uncontrolled areas draining to Beck Street, and the uncontrolled areas draining to Charles Street. Figure 2 illustrates the limits of the pre-development catchment area. Figure 3 illustrates the limits of the post-development catchment areas.

Table 4.1 – Catchment Parameters

#	Catchment	Area (ha)	% Impervious	Pervious CN	Impervious CN	Slope (%)	Flow Length (m)
Pre-Development Catchment Area							
101	Area draining towards the southwest neighbouring properties	0.370	77.8	75	98	2.0	36.0
102	Areas draining towards Charles St	0.36	76.0	75	98	2.0	30.0
Post-Development Catchment Area							
201	Controlled Areas	0.524	92.0	75	98	2.0	13.0
202	Uncontrolled Flow to Beck Street	0.088	26.0	75	98	3.0	8.0
203	Uncontrolled Flow to Charles Street Areas	0.122	4.6	75	98	17.0	8.0

A geotechnical investigation was not available for this development at the time this report was published. Therefore, a value of 75 was used for the pervious CN.

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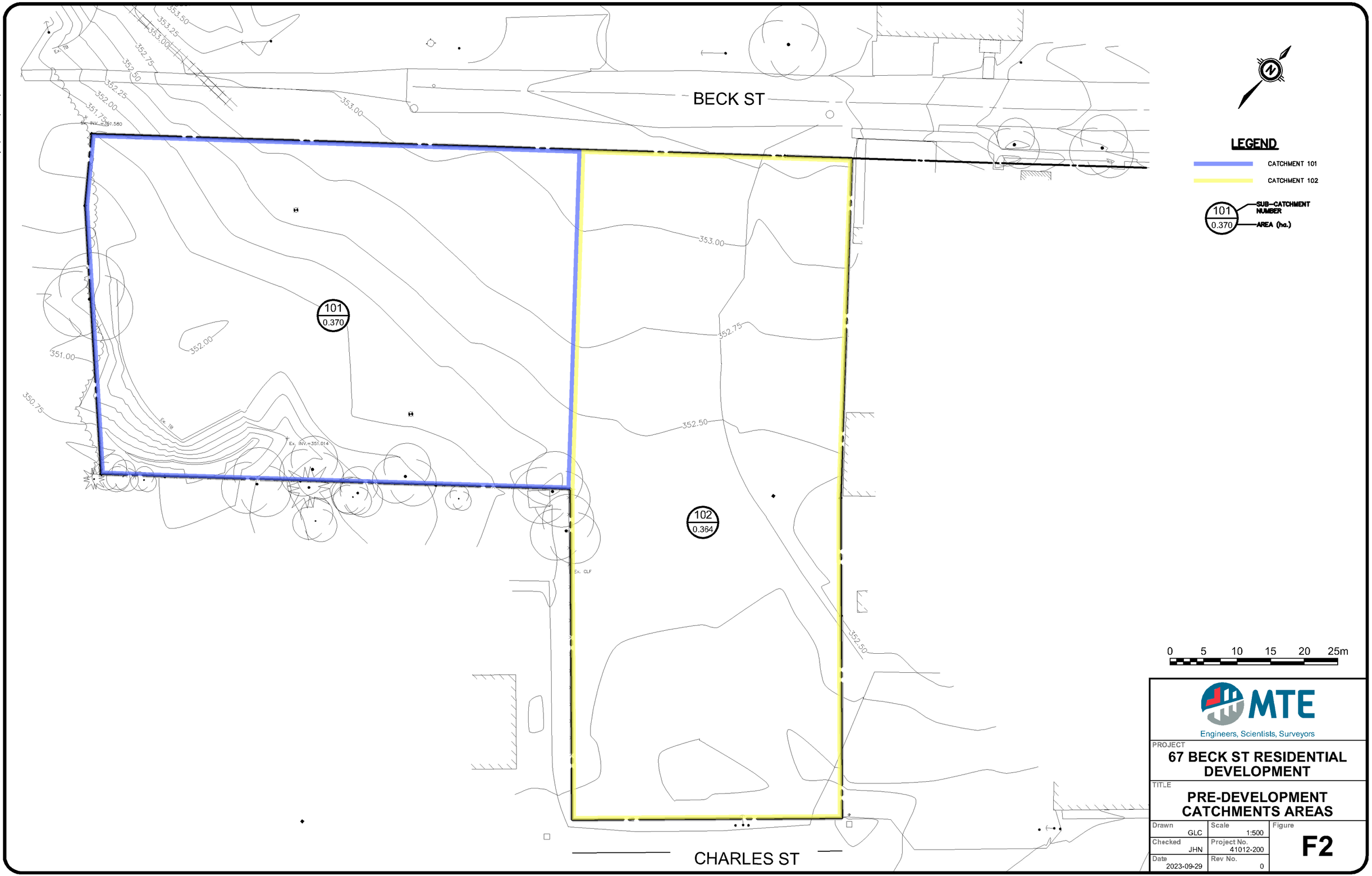

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PROJECT
67 BECK ST RESIDENTIAL DEVELOPMENT

TITLE
PRE-DEVELOPMENT CATCHMENTS AREAS

Drawn: GLC	Scale: 1:500	Figure: **F2**
Checked: JHN	Project No.: 41012-200	
Date: 2023-09-29	Rev No.: 0	

Plot Date: February 27, 2026 - 5:37 PM

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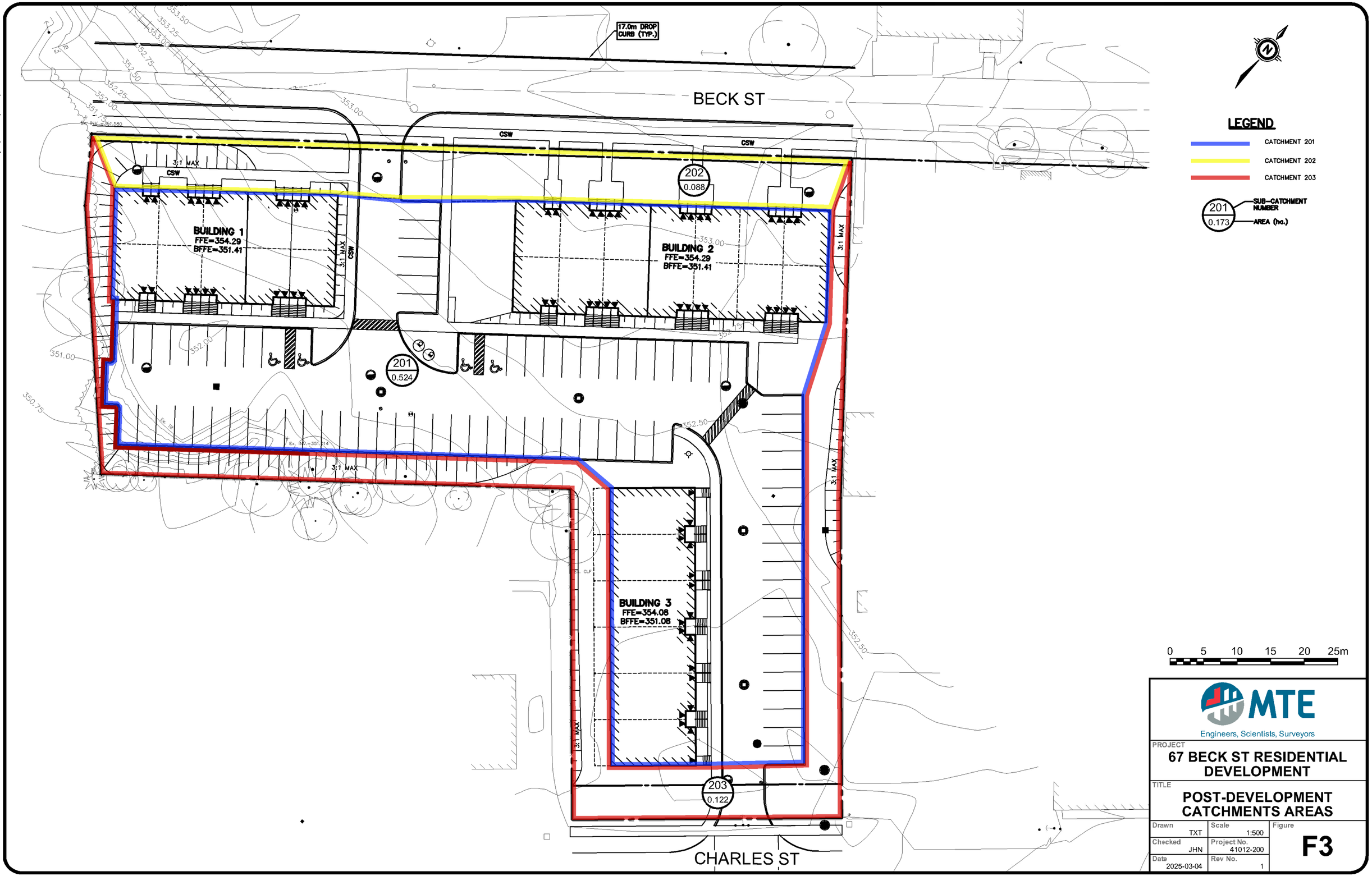

LEGEND

- CATCHMENT 201
- CATCHMENT 202
- CATCHMENT 203

201 / 0.173 — SUB-CATCHMENT NUMBER / AREA (ha.)

0 5 10 15 20 25m

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PROJECT
67 BECK ST RESIDENTIAL DEVELOPMENT

TITLE
POST-DEVELOPMENT CATCHMENTS AREAS

Drawn: TXT	Scale: 1:500	Figure: F3
Checked: JHN	Project No.: 41012-200	
Date: 2025-03-04	Rev No.: 1	

Plot Date: March 6, 2026 - 2:56 PM

Although pre-consultation comments indicate that DGMSS rainfall intensity parameters should be used in the model, DGMSS only publishes rainfall intensities for the 5-year storm event and advises that local municipalities should be contacted for additional rainfall intensities. As a result, MIDUSS IDF curve fit function was used with MTO IDF Curve Lookup parameters as inputs. MTO IDF Curve Lookup is a typical source for IDF parameters in smaller municipalities that don't have their own published IDF parameters.

In order to achieve the stormwater management requirements for the Site, runoff generated from the parking areas will be controlled with a 120mm diameter orifice plate installed on the outlet of CBMH3. Storage volume for the orifice will be provided within storm sewer pipes, structures, and surface ponding within the parking lot. In addition, a 4.0m wide weir will be incorporated into the grading of the Site, at the drainage split that separates flow into the Site and flow towards Charles Street. It is anticipated that the maximum ponding depth during the 100-year storm event will be approximately 18.0cm. The following table summarizes the expected flows that will be generated by the whole site. Post-development flows are over attenuated relative to the allowable pre-development flow as there is not enough information on the existing downstream storm sewer system at this time. Please note that these flows are subject to change at the detailed design stage.

Table 4.2 – Summary of Flows

Modelling Condition	2-Year Storm Event (m^3/s)	5-Year Storm Event (m^3/s)	100-Year Storm Event (m^3/s)
Allowable Rate (2-Year Pre-Development Rate)	0.133	0.133	0.133
Post-Development	0.046	0.055	0.117

Refer to Appendix D for the MIDUSS output.

Please note that SWM modeling was only completed for the ultimate build out condition (Beck Street Extension with cul-de-sac removed) as the drainage patterns/catchment parameters are essentially identical. The only difference is the slight increase in percent imperviousness of Beck Street cul-de-sac asphalt limits versus the driveway limits shown in final building out. Given the available margin between pre and post development flow rates in Table 4.2 above, this difference is negligible in the grand scheme. Should SWM modeling for the interim cul-de-sac condition be required, MTE can complete this during Site Plan Approval stage.

4.3 Water Quality Control

A Stormceptor Model EFO4 will be installed on the storm sewer system to provide water quality control for the Site. The chosen unit is expected to provide 82% TSS removal, meeting the required Enhanced Level of water quality control. (Refer to Appendix E for the sizing output from the Stormceptor Expert program). The Stormceptor will require regular annual maintenance to ensure it is operating properly. The owner may be required to enter into a maintenance agreement with a suitable contractor to complete this work. In addition, all the storm structures will have a 600mm sump.

4.4 Erosion and Sediment Control

Precautions will need to be taken during construction to limit erosion and sedimentation. Typically, the following measures are recommended during construction for erosion and sedimentation control:

- Erosion and sedimentation facilities are to be installed prior to any area grading operations.
- All erosion control measures are to be inspected and monitored by the contractor and repairs are to be completed as required.
- All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance from leaving the Site.
- Re-vegetation of completed areas as soon as possible after construction, including those areas not slated for construction, within 60 days of rough grading.
- To minimize the amount of mud being tracked onto the roadway, a mud mat should be installed at the primary construction entrance.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing analysis, it is concluded that:

- The proposed grading design will respect the natural topography of the Site where possible.
- Existing infrastructure for water, sanitary and storm is available along Charles Street.
- The anticipated domestic water demand is 1.15L/s.
- The existing municipal fire hydrants along Beck Street and Charles Street along with the proposed on-site hydrant will provide adequate fire protection for the proposed buildings.
- The anticipated peak sanitary flow rate for the development is 2.56L/s.
- The proposed stormwater management design provides adequate attenuation of the 2- to 100-year storm event to the allowable 2-year storm event pre-development flow rate with an OGS for quality control.
- Erosion and sediment control measures can be implemented during construction.

All of which is respectfully submitted,

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Appendix A

Water and Fire Flow Design Sheets

CLASSIC FIRE + LIFE SAFETY

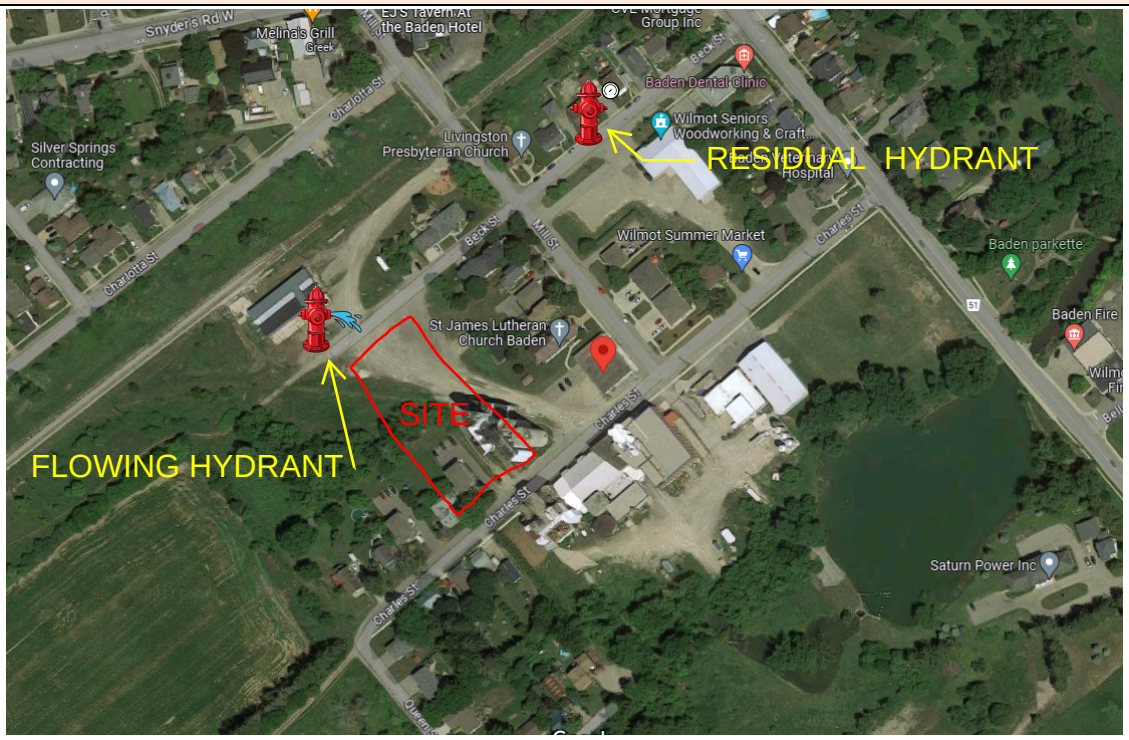
FLOW TEST REPORT

Form SD-003B RevDate: Nov 29, 2021

PROJECT INFORMATION			
Project Name:	#1 76 Mill St. Flow Test Baden ON	Const. Project #:	23-CAM-690-0701
Site Address:	76 Mill St. Baden ON	Design Project #:	2023-CFLS-483
City Contact:	Wilmot Township (Cody x 9401)	Phone #:	519-634-8525
CFLS Contact:	Dan Smaglinski	Phone #:	226-971-0170
Technical Contact:	**Andy Coghlin**	Phone #:	**519-476-0761**

SITE INFORMATION

SITE MAP



Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

ITEMS TO LABEL ON MAP	HYDRANTS USED	MAIN SIZE
☑ Static / Residual & Flow Hydrants	☑ City Hydrant(s)	City:
☐ Flow Direction (if the main is dead end)	☐ Site Hydrant(s)	Site:

SITE NOTES

CLASSIC FIRE + LIFE SAFETY

FLOW TEST REPORT

Form SD-003B RevDate: Nov 29, 2021

TEST INFORMATION			
Minimum Required Flow:	NA	Min Ports:	2
CFLS Personnel Present:	Dan Smaglinski	Test Date:	2023-08-24
City / External Company:	Wilmot Township	Test Time:	8:00am

TEST EQUIPMENT	
☐ Hose Monsters with built in Pitot	Hose length used:
☐ Hand held pitot gauge	☑ Pollard diffuser elbow with built in Pitot
☐ Other:	

TEST RESULTS

Number of Ports	Outlet Size (IN)	Discharge Coefficient	Pitot Reading (PSI)				Total Flow (GPM)	Static / Residual Pressure (PSI)
0 Ports								66
1 Port	2.5	0.9	40				1,062	64
2 Ports	2.5	0.9	20	20			1,501	61
3 Ports	2.5	0.9					0	
4 Ports	2.5	0.9					0	
0 Ports	STATIC RE-CHECK							

TEST NOTES

HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)			
ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)			
Reservoir HGL (m):		Site Elevation (m):	
Theoretical Static Head (PSI):	0	PSI to subtract from test pressures:	66
OTHER HYDRAULIC ADJUSTMENTS			
Other adjustment as required by the City / AHJ:			

CLASSIC FIRE + LIFE SAFETY

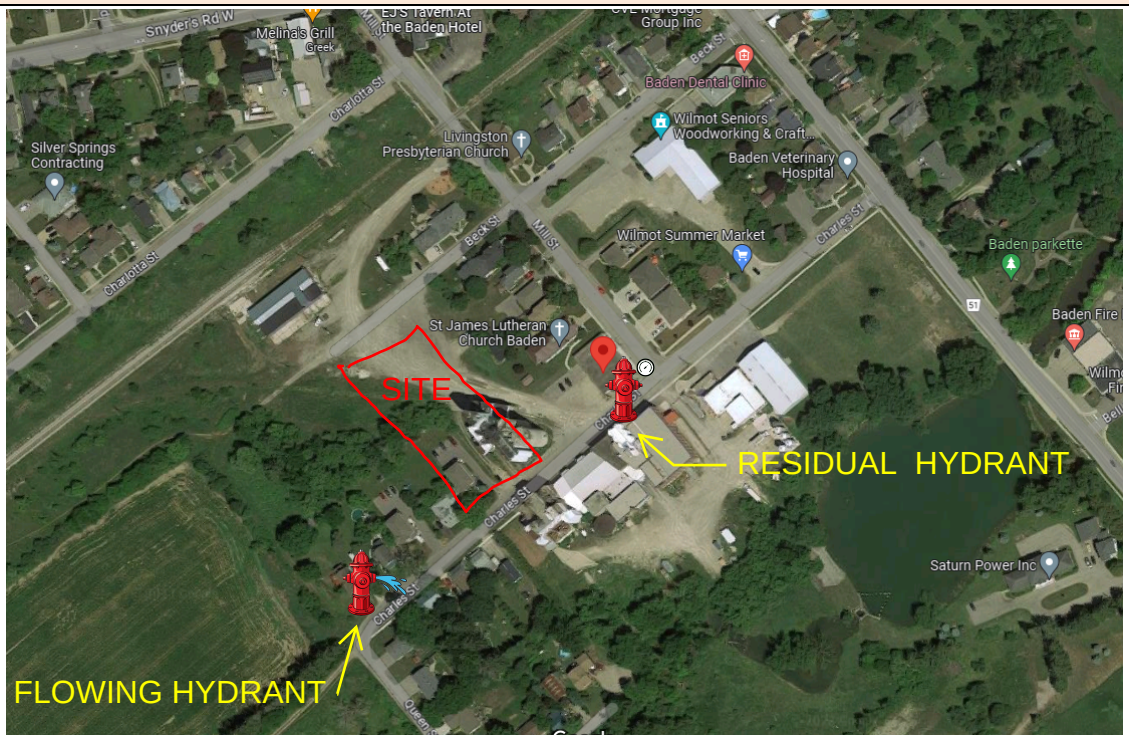
FLOW TEST REPORT

Form SD-003B RevDate: Nov 29, 2021

PROJECT INFORMATION			
Project Name:	#2 76 Mill St. Flow Test Baden ON	Const. Project #:	
Site Address:	76 Mill St. Baden ON	Design Project #:	2023-CFLS-483
City Contact:	Wilmot Township (Cody x 9401)	Phone #:	519-634-8525
CFLS Contact:	Dan Smaglinski	Phone #:	226-971-0170
Technical Contact:	**Andy Coghlin**	Phone #:	**519-476-0761**

SITE INFORMATION

SITE MAP



Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

ITEMS TO LABEL ON MAP	HYDRANTS USED	MAIN SIZE
☑ Static / Residual & Flow Hydrants	☑ City Hydrant(s)	City:
☐ Flow Direction (if the main is dead end)	☐ Site Hydrant(s)	Site:

SITE NOTES

CLASSIC FIRE + LIFE SAFETY

FLOW TEST REPORT

Form SD-003B RevDate: Nov 29, 2021

TEST INFORMATION			
Minimum Required Flow:	NA	Min Ports:	2
CFLS Personnel Present:	Dan Smaglinski	Test Date:	2023-08-24
City / External Company:	Wilmot Township	Test Time:	8:00am

TEST EQUIPMENT	
☐ Hose Monsters with built in Pitot	Hose length used:
☐ Hand held pitot gauge	☑ Pollard diffuser elbow with built in Pitot
☐ Other:	

TEST RESULTS

Number of Ports	Outlet Size (IN)	Discharge Coefficient	Pitot Reading (PSI)				Total Flow (GPM)	Static / Residual Pressure (PSI)
0 Ports								66
1 Port	2.5	0.9	44				1,113	63
2 Ports	2.5	0.9	18	18			1,424	60
3 Ports	2.5	0.9					0	
4 Ports	2.5	0.9					0	
0 Ports	STATIC RE-CHECK							

TEST NOTES

HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)			
ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)			
Reservoir HGL (m):		Site Elevation (m):	
Theoretical Static Head (PSI):	0	PSI to subtract from test pressures:	66
OTHER HYDRAULIC ADJUSTMENTS			
Other adjustment as required by the City / AHJ:			

67 Beck Street

FIRE FLOW ANALYSIS

Baden, Ontario

Project Number: 41012-200
Date: February 24, 2026
Design By: JHN
File: Q:\41012\200\Fire\2026-02\Site Fire Flow Analysis _ Rev 5.xlsx

CALCULATION OF RESIDUAL PRESSURE AT EXISTING HYDRANT

1. Boundary Conditions (Based on Fire Flow Test Results):					
	Metric		**Imperial**		
P0 - Starting Pressure	46.41	*m*	66	*psi*	
P1 - Pressure at Q1	42.90	*m*	61	*psi*	
Q1 - From Fire Flow Test	5682	*L/min*	1501	*U.S. gal/min*	
Q2 - Required Flow	6300	*L/min*	1664	*U.S. gal/min*	From: Water Demand calculations by MTE
P-loss 1	3.52	*m*	5	*psi*	
P-loss 2	4.26	*m*	6	*psi*	
P2 - Residual Pressure	**42.16**	***m***	**60**	***psi***	Extrapolated from Fire Flow Test Results

ANALYSIS SUMMARY					
Total Losses	**0.000**	**m**			
	0.00	**kPa**	**0.0**	**psi**	
Residual Pressure after Losses	**42.16**	**m**			
	414	**kPa**	**60.0**	**psi**	**PASS**
Allowable Residual Pressure	*140*	*kPa*	*20.3*	*psi*	

67 Beck Street

FIRE FLOW ANALYSIS

Baden, Ontario

Project Number: 41012-200
Date: February 24, 2026
Design By: JHN
File: Q:\41012\200\Fire\2026-02\Site Fire Flow Analysis _ Rev 5.xlsx

CALCULATION OF RESIDUAL PRESSURE AT ON-SITE HYDRANT _WTM EXTENDING FROM CHARLES ST

1. Boundary Conditions (Based on Fire Flow Test Results):

	Metric		Imperial		
P0 - Starting Pressure	46.41	*m*	66	*psi*	
P1 - Pressure at Q1	42.19	*m*	60	*psi*	
Q1 - From Fire Flow Test	5390	*L/min*	1424	*U.S. gal/min*	
Q2 - Required Flow	6300	*L/min*	1664	*U.S. gal/min*	From: Water Demand calculations by MTE
P-loss 1	4.22	*m*	6	*psi*	
P-loss 2	5.63	*m*	8	*psi*	
P2 - Residual Pressure	**40.78**	***m***	**58**	***psi***	Extrapolated from Fire Flow Test Results

2. Friction Losses Through Water Service:

Hazen-Williams Equation	Metric		Imperial	
C_{hw} = Pipe Friction Factor	150		150	
k = conversion factor	10.675		4.727	
n = constant	1.852		1.852	
m = constant	4.8704		4.8704	
Q = Flow	6300	L/min	1664	*U.S. gal/min*
150mm dia.				
d = Pipe Diameter	150	mm	5.91	in
p = Loss/Length	0.1579	m/m	0.0684	psi/ft
Length	76.5	m	251	ft
Loss	**12.08**	**m**	**17.2**	**psi**
Total Loss	**12.08**	**m**	**17.17**	**psi**

3. Friction Losses Through Appurtenances:

Appurtenances		Number	K	Velocity	Head Loss	Total Loss	
Dia. (mm)	*Type*			*m/s*	*m*	*m*	*psi*
200	Tee (Branch)	0	0.840	3.342	0.478	0.000	0.000
150	Tee (Branch)	3	0.900	5.942	1.619	4.858	6.909
150	Gate Valve	4	0.120	5.942	0.216	0.864	1.228
150	90° bend	0	0.450	5.942	0.810	0.000	0.000
150	WMC	1	2.180	5.942	3.923	3.923	5.578
Total Minor Losses						**9.645**	**13.715**

4. Elevation - Elevational differences from existing hydrant to proposed hydrant

	Metric	Imperial
Elevation at Boundary (i.e. Residual Hydrant):	351.6 m	1154 ft
Elevation at Site Hydrant:	352.6 m	1157 ft
Elevation Difference = Loss/Gain	**1 m**	**1.4 psi**

ANALYSIS SUMMARY

Total Losses	**22.721 m**		
	222.89 kPa	**32.3 psi**	
Residual Pressure after Losses	**18.06 m**		
	177 kPa	**25.7 psi**	**PASS**
Allowable Residual Pressure	*140 kPa*	*20.3 psi*	

67 Beck Street
FIRE FLOW ANALYSIS
Baden, Ontario

Project Number: 41012-200
Date: March 6, 2026
Design By: JHN

File: Q:\41012\200\Fire\2026-02\Site Fire Flow Analysis _ Rev 5.xlsx

BLOCK 2 - 8 UNITS
Step 1: Determining Water Supply Coefficient

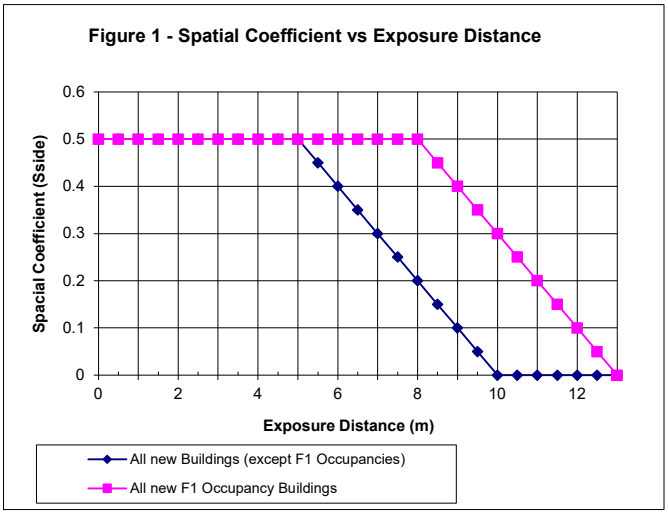
	Table 1 from OBC 2012 A3.2.5.7												
	Type of Construction	Classification by group or division in Accordance with Table 3.1.2.1 of the Ontario Building Code											
		A2	B1	B2	B3	C	D	A4	F3	A1	A3	E	F2	F1
1	Building is of Noncombustible construction with fire separation and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches						10	12		14		17		23
2	Building is of Noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6 of the OBC. Floor assemblies are fire separations but no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						16	19		22		27		37
3	Building is of Combustible Construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire resistance rating where permitted in subsection 3.2.2 of the OBC						18	22		25		31		41
4	Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						23	28		32		39		53

Type of Construction	Building Classification	Water Supply Coefficient (K)
4	C	**23**

Step 2: Determine the Spacial Coefficient

	Distance	S_{side}
Exposure Distance 1 (m)	6.87	0.31
Exposure Distance 2 (m)	25.00 *	0.00
Exposure Distance 3 (m)	21.70	0.00
Exposure Distance 4 (m)	3.00	0.50
Exposure Distance 5 (m)		
	S_{tot}	**1.81**

* Firewall Proposed as shown on MTE Functional Grading/Servicing Plan, dated March 2026



Step 3: Determine Volume of Building

Building Length(m)	Building Width (m)	Building Height to the underside of roof deck (m)	Volume (m^3)
20.00	16.70	12.00	4008.00

Number of Stories	3

Step 4: Calculate Minimum Water Supply

$$Q = KVS_{tot}$$

Minimum Water Supply (L)	167129.59

Step 5: Calculate Minimum Supply Flow Rate

Table 2 from OBC 2012 A3.2.5.7			
Minimum Water Supply Flow Rates			
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min)		
One Storey Building with building area not exceeding 600 m2 (excluding F1 occupancy)	1800		
All Other Buildings	if Q> and	Q<=	
		108000	2700
	108000	135000	3600
	135000	162000	4500
	162000	190000	5400
	190000	270000	6300
	270000		9000

Minimum Water Supply Flow Rate (L/min)	5400

Step 6: Is a private fire reservoir required? **No**

67 Beck Street
FIRE FLOW ANALYSIS
Baden, Ontario

Project Number: 41012-200
Date: March 6, 2026
Design By: JHN

File: Q:\41012\200\Fire\2026-02\Site Fire Flow Analysis _ Rev 5.xlsx

BLOCK 1 - 6 UNITS
Step 1: Determining Water Supply Coefficient

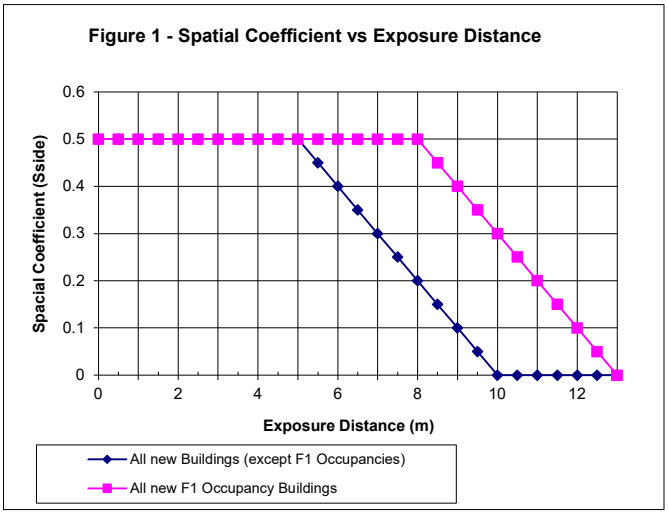
	Table 1 from OBC 2012 A3.2.5.7												
	Type of Construction	Classification by group or division in Accordance with Table 3.1.2.1 of the Ontario Building Code											
		A2	B1	B2	B3	C	D	A4	F3	A1	A3	E	F2	F1
1	Building is of Noncombustible construction with fire separation and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches						10	12		14		17		23
2	Building is of Noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6 of the OBC. Floor assemblies are fire separations but no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						16	19		22		27		37
3	Building is of Combustible Construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire resistance rating where permitted in subsection 3.2.2 of the OBC						18	22		25		31		41
4	Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						23	28		32		39		53

Type of Construction	Building Classification	Water Supply Coefficient (K)
4	C	**23**

Step 2: Determine the Spacial Coefficient

	Distance	S_{side}
Exposure Distance 1 (m)	3.00	0.50
Exposure Distance 2 (m)	6.88	0.31
Exposure Distance 3 (m)	25.00 *	0.00
Exposure Distance 4 (m)	25.40	0.00
Exposure Distance 5 (m)		
	S_{tot}	**1.81**

* Firewall Proposed as shown on MTE Functional Grading/Servicing Plan, dated March 2026



Step 3: Determine Volume of Building

Building Length(m)	Building Width (m)	Building Height to the underside of roof deck (m)	Volume (m^3)
26.60	16.70	12.00	5330.64

Number of Stories	3

Step 4: Calculate Minimum Water Supply

$$Q = KVS_{tot}$$

Minimum Water Supply (L)	222159.75

Step 5: Calculate Minimum Supply Flow Rate

Table 2 from OBC 2012 A3.2.5.7			
Minimum Water Supply Flow Rates			
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min)		
One Storey Building with building area not exceeding 600 m2 (excluding F1 occupancy)	1800		
All Other Buildings	if Q> and	Q<=	
		108000	2700
	108000	135000	3600
	135000	162000	4500
	162000	190000	5400
	190000	270000	6300
	270000		9000

Minimum Water Supply Flow Rate (L/min)	6300

Step 6: Is a private fire reservoir required? **No**

67 Beck Street
FIRE FLOW ANALYSIS
Baden, Ontario

Project Number: 41012-200
Date: March 6, 2026
Design By: JHN

File: Q:\41012\200\Fire\2026-02\Site Fire Flow Analysis _ Rev 5.xlsx

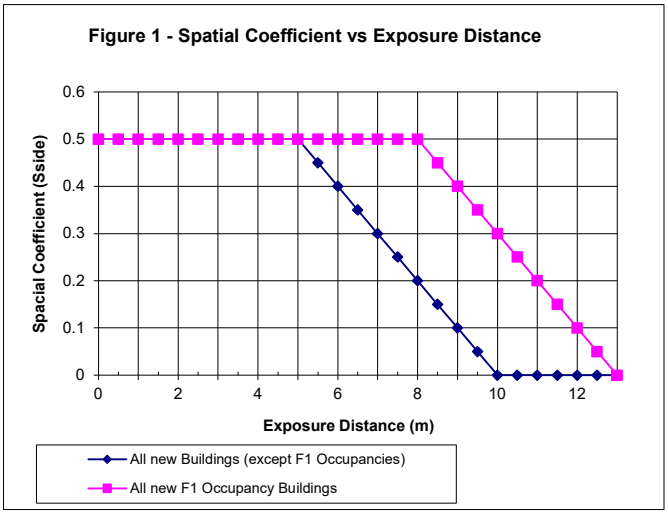
BLOCK 3
Step 1: Determining Water Supply Coefficient

	Table 1 from OBC 2012 A3.2.5.7												
	Type of Construction	Classification by group or division in Accordance with Table 3.1.2.1 of the Ontario Building Code											
		A2	B1	B2	B3	C	D	A4	F3	A1	A3	E	F2	F1
1	Building is of Noncombustible construction with fire separation and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches						10	12		14		17		23
2	Building is of Noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6 of the OBC. Floor assemblies are fire separations but no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						16	19		22		27		37
3	Building is of Combustible Construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire resistance rating where permitted in subsection 3.2.2 of the OBC						18	22		25		31		41
4	Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						23	28		32		39		53

Type of Construction	Building Classification	Water Supply Coefficient (K)
4	C	**23**

Step 2: Determine the Spacial Coefficient

	Distance	S_{side}
Exposure Distance 1 (m)	2.91	0.50
Exposure Distance 2 (m)	5.80	0.42
Exposure Distance 3 (m)	21.80	0.00
Exposure Distance 4 (m)	25.40	0.00
Exposure Distance 5 (m)		
	S_{tot}	**1.92**



Step 3: Determine Volume of Building

Building Length(m)	Building Width (m)	Building Height to the underside of roof deck (m)	Volume (m^3)
41.10	12.50	9.00	4623.75

Number of Stories	3

Step 4: Calculate Minimum Water Supply

$$Q = KVS_{tot}$$

Minimum Water Supply (L)	204184.80

Step 5: Calculate Minimum Supply Flow Rate

Table 2 from OBC 2012 A3.2.5.7			
Minimum Water Supply Flow Rates			
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min)		
One Storey Building with building area not exceeding 600 m2 (excluding F1 occupancy)	1800		
All Other Buildings	if Q> and	Q<=	
		108000	2700
	108000	135000	3600
	135000	162000	4500
	162000	190000	5400
	190000	270000	6300
	270000		9000

Minimum Water Supply Flow Rate (L/min)	6300

Step 6: Is a private fire reservoir required? **No**

Appendix B

Sanitary Design Sheet

67 Beck Street Residential Development
Township of Wilmot

Project Number: 41012-200
Date: February 24, 2026
Design By: JHN
Checked By: AXT
File: Q:\41012\200\San\Sanitary Sewer Design Sheet (SSMS) Rev7_MARCH 2026.xls

SANITARY SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Drainage Area Plan No: n/a

Design Parameters

Average Daily Flow

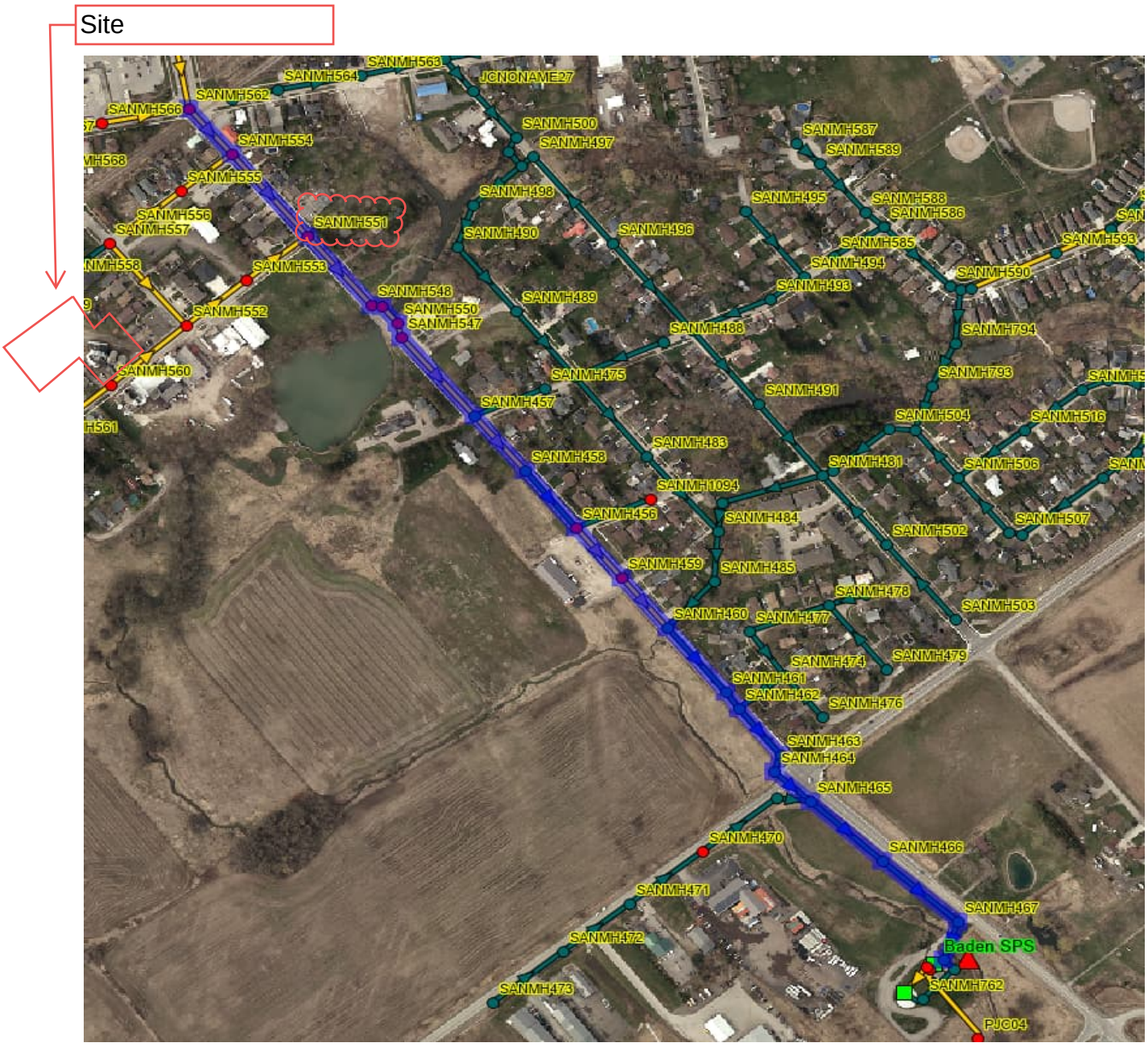
Residential	0.00353	L/s/c	305.00	L/d/c	
Commercial		L/s/ha			
Industrial		L/s/ha			
Inst. / School		L/s/ha			

Mannings "*n*" 0.013
Min. Velocity 0.6 m/sec
Max. Velocity 3.0 m/sec
Residential Harmon Peaking Factor (F) $F = 1 + 14/(4 + P^{0.5})$
Commercial Peaking Factor = 2.5
Residential Areas Infiltration 0.25 L/s/ha

LOCATION				RESIDENTIAL AREAS AND POPULATION							SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN						
											HECTARES AND FLOW OF EACH ZONING																			
											0.00 *L/s/ha*			0.00 *L/s/ha*			0.00 *L/s/ha*												
STREET	AREA NO.	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA	No. UNITS @ PPU	No. UNITS @ 2.44 PPU	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	TOTALS-C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	LENGTH	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY
				ha			*1000s*	*1000s*		*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*m*	*%*	*mm*	*L/sec.*	*m/s*
By Block																													
Block 1						20	0.049	0.049	4.317	0.7437																			
Block 2						28	0.068	0.068	4.285	1.0335																			
Block 3						18	0.044	0.044	4.326	0.6707																			
Total Site																													
Charles Street		2A	1A	0.734		66	0.161	0.161	4.181	2.3768										0.0000	0.73	0.73	0.1835	2.5603	16.1	1.00	200	32.7818	1.044
Right of Way		1A	EX. MH																					2.5603	77.0	0.38	200	20.0956	0.640

Appendix C

PCSWMM Extracts (By Others)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SANMH473
Baden SPS
SANMH762
PJC04
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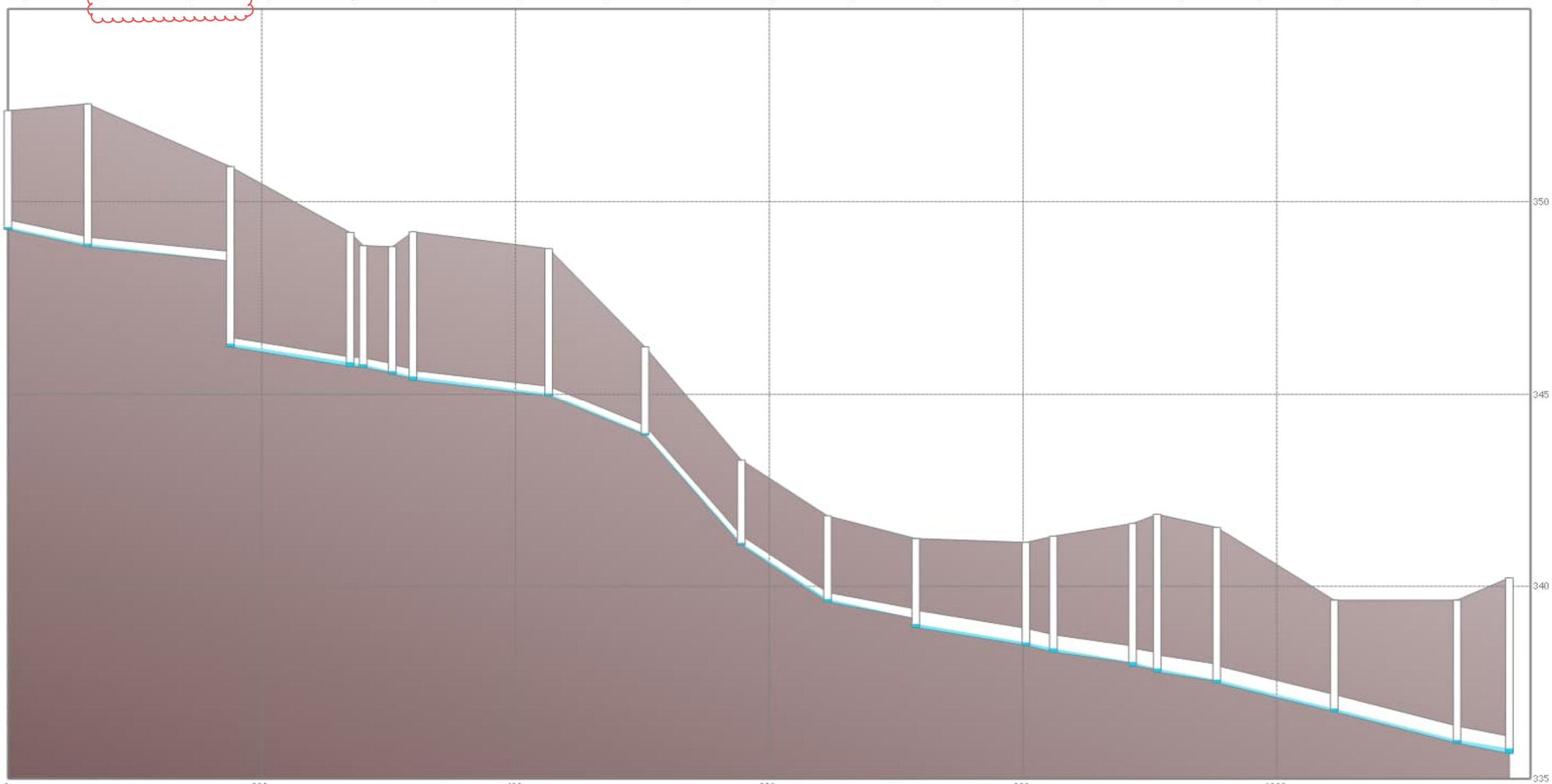
SANMH794
SANMH793
SANMH491
SANMH504
SANMH516
SANMH481
SANMH506
SANMH502
SANMH507
SANMH478
SANMH503
SANMH474
SANMH479

HGL

Peak values

Links:	SANL1033 Q=8.329 L/s	SANL1028 Q=10.064 L/s	SANL1029 Q=13.657 L/s	SANL1031 Q=13.681 L/s	SANL1030 Q=13.694 L/s	SANL1032 Q=13.704 L/s	SANL1034 Q=13.714 L/s	SANL1042 Q=13.786 L/s	SANL1041 Q=13.795 L/s	SANL1040 Q=13.891 L/s	SANL1039 Q=13.952 L/s	SANL1161 Q=23.615 L/s	SANL1160 Q=23.619 L/s	SANL1159 Q=23.88 L/s	SANL1157 Q=23.88 L/s	SANL1156 Q=23.941 L/s	SANL1158 Q=24.78 L/s	SANL1155 Q=24.93 L/s	SANL1154 Q=25.058 L/s



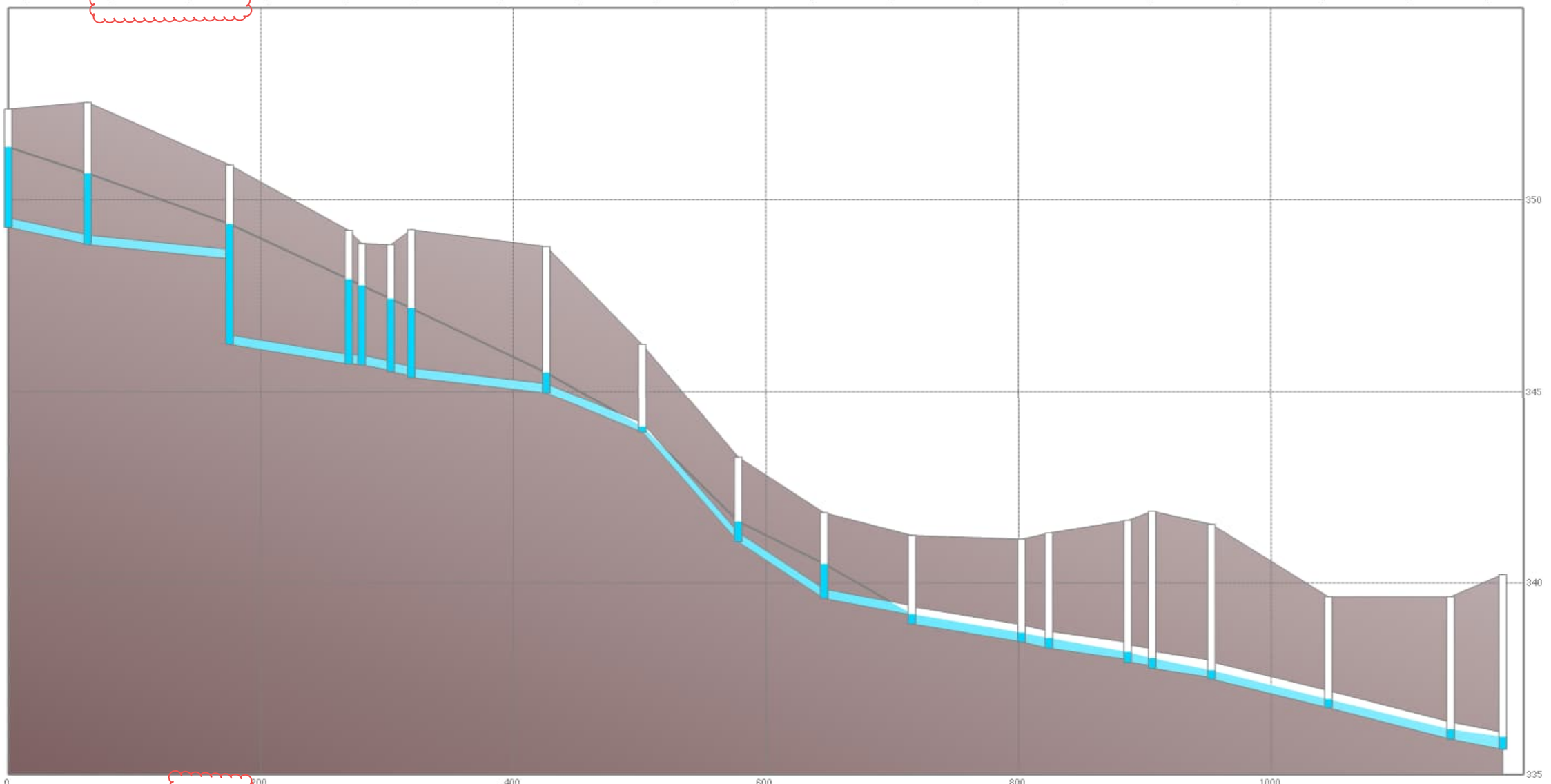
Nodes:	SANMH562 H=349.3406 m	SANMH554 H=348.9111 m	SANMH551 H=346.3135 m	SANMH548 H=345.83 m	SANMH549 H=345.7794 m	SANMH550 H=345.5988 m	SANMH547 H=345.4651 m	SANMH457 H=345.0292 m	SANMH458 H=343.9812 m	SANMH456 H=341.1289 m	SANMH459 H=339.6714 m	SANMH460 H=339.0207 m	SANMH461 H=338.5417 m	SANMH462 H=338.3835 m	SANMH463 H=338.029 m	SANMH464 H=337.8614 m	SANMH465 H=337.5732 m	SANMH466 H=336.8223 m	SANMH467 H=336.0083 m	SANMH468 H=335.786 m

HGL

Peak values

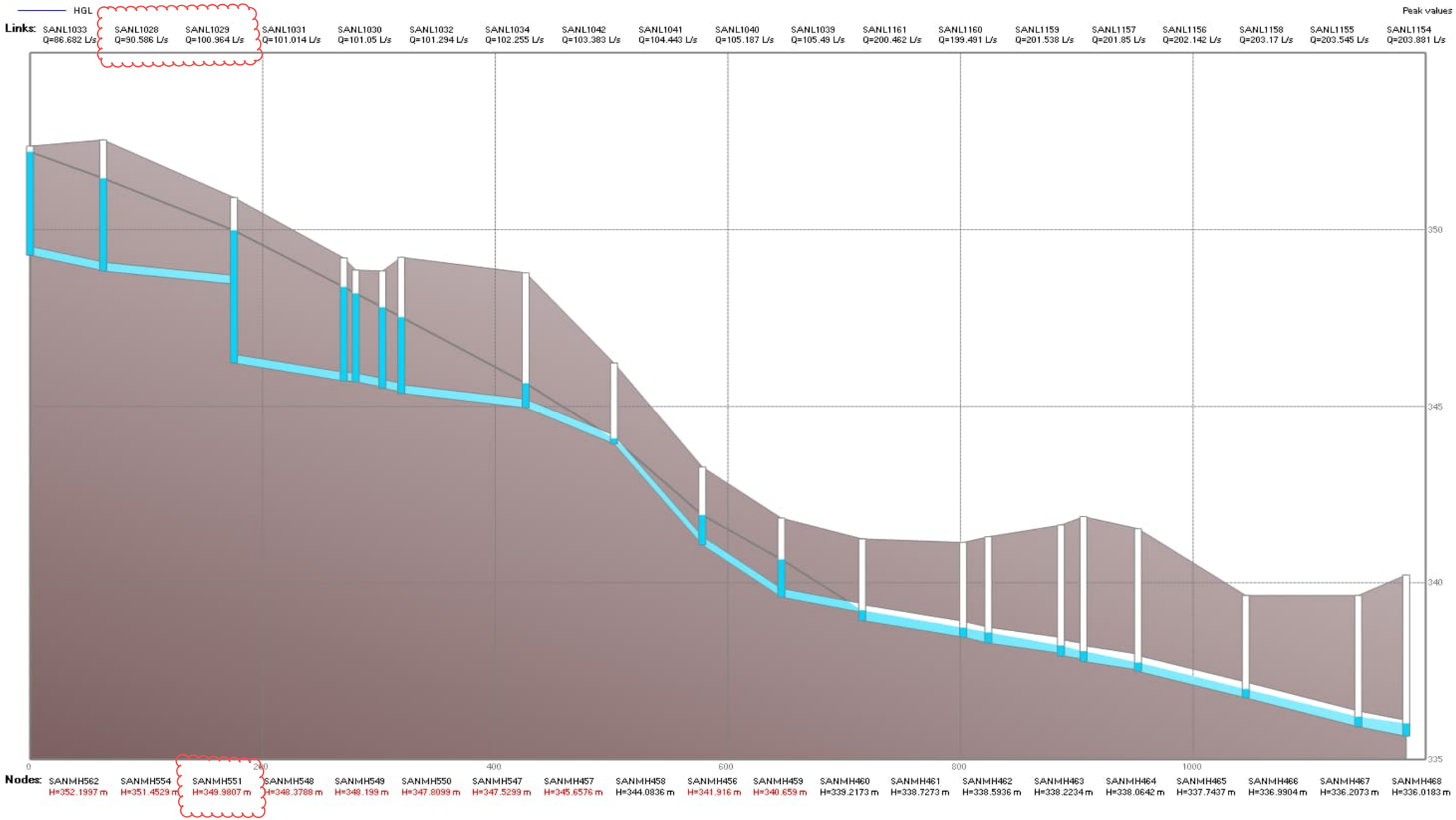
Links:

SANL1033	SANL1028	SANL1029	SANL1031	SANL1030	SANL1032	SANL1034	SANL1042	SANL1041	SANL1040	SANL1039	SANL1161	SANL1160	SANL1159	SANL1157	SANL1156	SANL1158	SANL1155	SANL1154
Q=83.348 L/s	Q=86.831 L/s	Q=95.616 L/s	Q=95.615 L/s	Q=95.62 L/s	Q=95.838 L/s	Q=96.656 L/s	Q=97.544 L/s	Q=98.349 L/s	Q=98.573 L/s	Q=98.829 L/s	Q=170.829 L/s	Q=170.897 L/s	Q=173.009 L/s	Q=173.199 L/s	Q=173.319 L/s	Q=174.206 L/s	Q=174.274 L/s	Q=174.33 L/s



Nodes:

SANMH562	SANMH554	SANMH551	SANMH548	SANMH549	SANMH550	SANMH547	SANMH457	SANMH458	SANMH456	SANMH459	SANMH460	SANMH461	SANMH462	SANMH463	SANMH464	SANMH465	SANMH466	SANMH467	SANMH468
H=351.3733 m	H=350.6897 m	H=349.3699 m	H=347.9287 m	H=347.7661 m	H=347.4194 m	H=347.1722 m	H=345.4958 m	H=344.0776 m	H=341.6011 m	H=340.4969 m	H=339.1886 m	H=338.7 m	H=338.5635 m	H=338.1964 m	H=338.0354 m	H=337.7212 m	H=336.968 m	H=336.1793 m	H=335.9882 m


HGL
Peak values
Links: SANL1033 Q=86.682 L/s
SANL1028 Q=90.586 L/s
SANL1029 Q=100.964 L/s
SANL1031 Q=101.014 L/s
SANL1030 Q=101.05 L/s
SANL1032 Q=101.294 L/s
SANL1034 Q=102.255 L/s
SANL1042 Q=103.383 L/s
SANL1041 Q=104.443 L/s
SANL1040 Q=105.187 L/s
SANL1039 Q=105.49 L/s
SANL1161 Q=200.462 L/s
SANL1160 Q=199.491 L/s
SANL1159 Q=201.538 L/s
SANL1157 Q=201.85 L/s
SANL1156 Q=202.142 L/s
SANL1158 Q=203.17 L/s
SANL1155 Q=203.545 L/s
SANL1154 Q=203.881 L/s
350
345
340
335
0
200
400
600
800
1000
Nodes: SANMH562 H=352.1997 m
SANMH554 H=351.4529 m
SANMH551 H=349.9807 m
SANMH548 H=348.3788 m
SANMH549 H=348.199 m
SANMH550 H=347.8099 m
SANMH547 H=347.5293 m
SANMH457 H=345.6576 m
SANMH458 H=344.0836 m
SANMH456 H=341.916 m
SANMH459 H=340.659 m
SANMH460 H=339.2173 m
SANMH461 H=338.7273 m
SANMH462 H=338.5936 m
SANMH463 H=338.2234 m
SANMH464 H=338.0642 m
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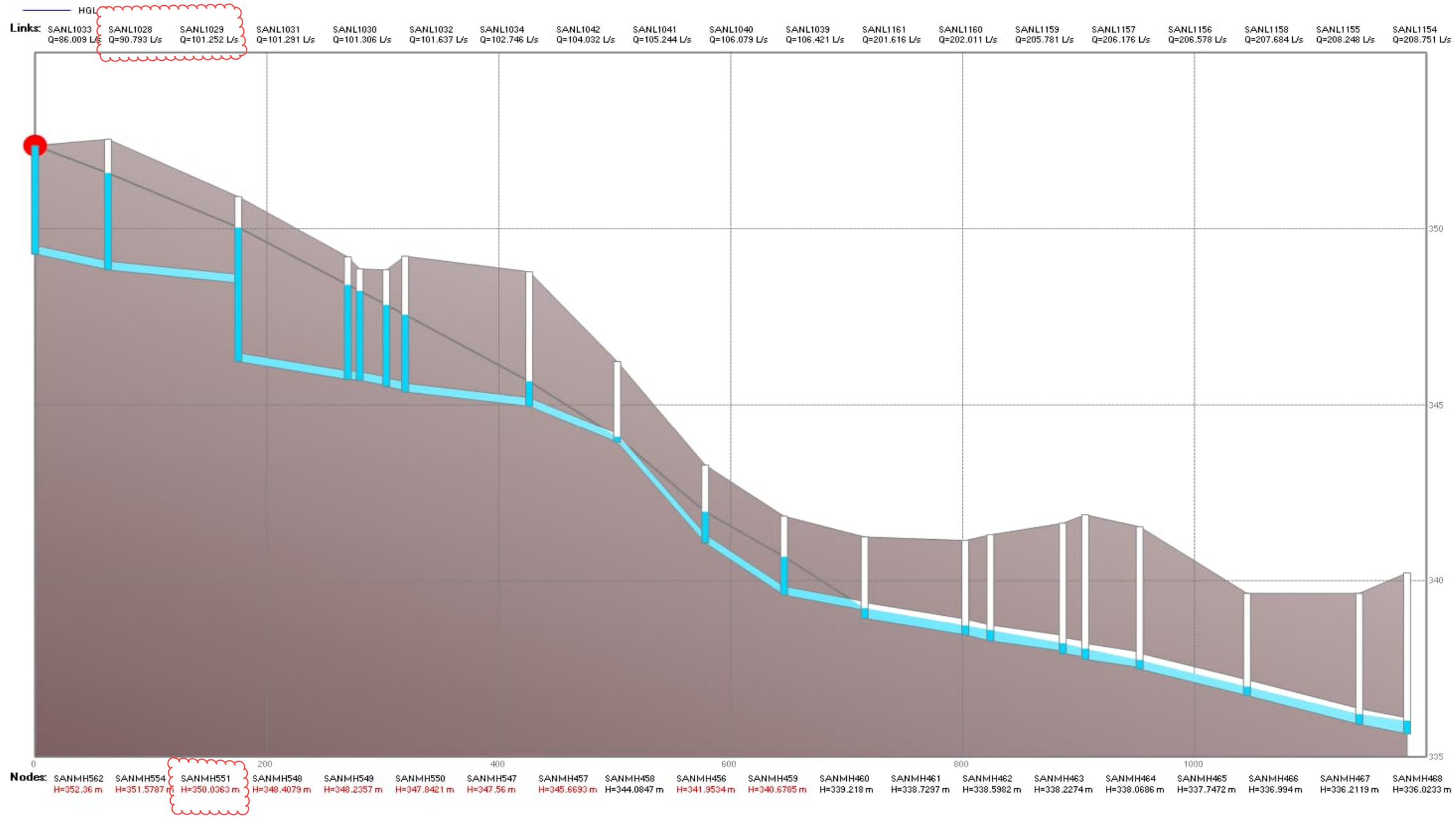
SANMH467 H=336.2073 m
SANMH468 H=336.0183 m


HGL
Links:
SANL1033 Q=86.009 L/s
SANL1028 Q=90.793 L/s
SANL1029 Q=101.252 L/s
SANL1031 Q=101.291 L/s
SANL1030 Q=101.306 L/s
SANL1032 Q=101.637 L/s
SANL1034 Q=102.746 L/s
SANL1042 Q=104.032 L/s
SANL1041 Q=105.244 L/s
SANL1040 Q=106.079 L/s
SANL1039 Q=106.421 L/s
SANL1161 Q=201.616 L/s
SANL1160 Q=202.011 L/s
SANL1159 Q=205.781 L/s
SANL1157 Q=206.176 L/s
SANL1156 Q=206.578 L/s
SANL1158 Q=207.684 L/s
SANL1155 Q=208.248 L/s
SANL1154 Q=208.751 L/s
350
345
340
335
0
200
400
600
800
1000
Nodes:
SANMH562 H=352.36 m
SANMH554 H=351.5787 m
SANMH551 H=350.0363 m
SANMH548 H=348.4079 m
SANMH549 H=348.2357 m
SANMH550 H=347.8421 m
SANMH547 H=347.56 m
SANMH457 H=345.6693 m
SANMH458 H=344.0847 m
SANMH456 H=341.9534 m
SANMH459 H=340.6785 m
SANMH460 H=339.218 m
SANMH461 H=338.7297 m
SANMH462 H=338.5982 m
SANMH463 H=338.2274 m
SANMH464 H=338.0686 m
SANMH465 H=337.7472 m
SANMH466 H=336.994 m
SANMH467 H=336.2119 m
SANMH468 H=336.0233 m
Sep 01, 2021 9:55 PM

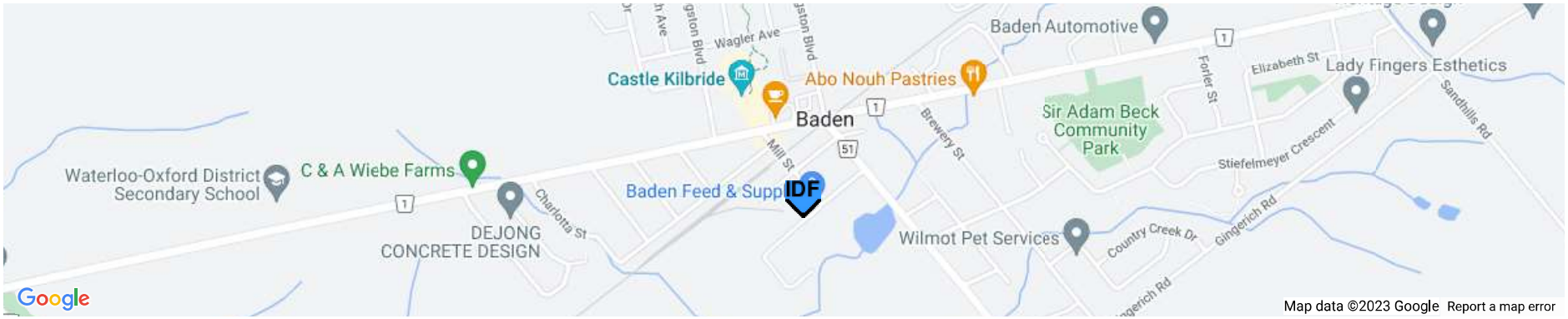
Appendix D

MIDUSS Outputs

Active coordinate

43° 24' 15" N, 80° 40' 15" W (43.404167,-80.670833)

Retrieved: Tue, 15 Aug 2023 15:50:04 GMT



Location summary

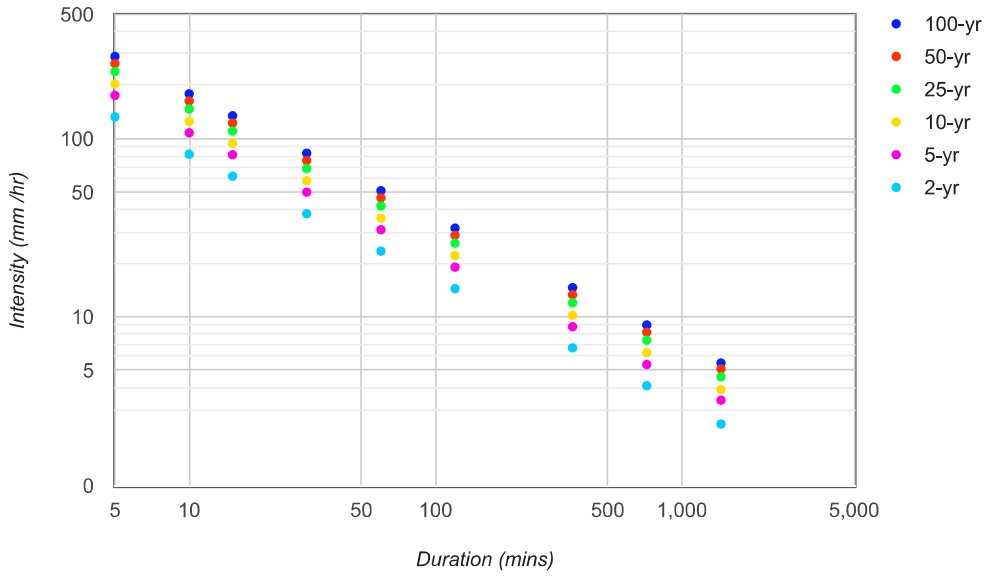
These are the locations in the selection.

IDF Curve: 43° 24' 15" N, 80° 40' 15" W (43.404167,-80.670833)

Results

An IDF curve was found.

Coordinate: 43.404167, -80.670833
IDF curve year: 2010



Coefficient summary

IDF Curve: 43° 24' 15" N, 80° 40' 15" W (43.404167,-80.670833)

Retrieved: Tue, 15 Aug 2023 15:50:04 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	23.4	30.9	35.8	42.0	46.6	51.1
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	132.9	81.9	61.7	38.0	23.4	14.4	6.7	4.1	2.5
5-yr	175.5	108.1	81.4	50.2	30.9	19.0	8.8	5.4	3.4
10-yr	203.3	125.3	94.3	58.1	35.8	22.1	10.2	6.3	3.9
25-yr	238.6	147.0	110.7	68.2	42.0	25.9	12.0	7.4	4.6
50-yr	264.7	163.0	122.8	75.6	46.6	28.7	13.3	8.2	5.1
100-yr	290.2	178.8	134.7	83.0	51.1	31.5	14.6	9.0	5.5

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	11.1	13.6	15.4	19.0	23.4	28.8	40.1	49.4	60.9
5-yr	14.6	18.0	20.4	25.1	30.9	38.1	53.0	65.3	80.4
10-yr	16.9	20.9	23.6	29.1	35.8	44.1	61.4	75.6	93.2
25-yr	19.9	24.5	27.7	34.1	42.0	51.7	72.0	88.7	109.3
50-yr	22.1	27.2	30.7	37.8	46.6	57.4	79.9	98.5	121.3
100-yr	24.2	29.8	33.7	41.5	51.1	63.0	87.6	108.0	133.0

Terms of Use

You agree to the Terms of Use of this site by reviewing, using, or interpreting these data.

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                            Version 2.25  rev. 473"
"                MIDUSS created                          Sunday, February 7, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                             Q:\41012\200\MIDUSS\Pre"
"                Output filename:                         2 Year Pre 26-02-23.out"
"                Licensee name:                                                A"
"                Company                                                        "
"                Date & Time last used:                 2/25/2026 at 11:05:17 AM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 85          IDF CURVE FIT"
"            1   Number of Storms"
"            1   Storm no."
"            2   Return interval"
"           12   Data Pairs"
"                  5.000    10.000    15.000    30.000    60.000"
"                120.000   180.000   240.000   360.000   720.000"
"               1080.000  1440.000   minutes"
"                 11.100    13.600    15.400    19.000    23.400"
"                 28.800     0.000     0.000    40.100    49.400"
"                  0.000    60.900   mm"
"                133.200    81.600    61.600    38.000    23.400"
"                 14.400     0.000     0.000     6.683     4.117"
"                  0.000     2.538   mm/hr"
"      409.751    mm/hr 'A' coeff."
"       0.0103    minutes 'B' coeff."
"      0.69924           'C' exponent"
"       0.0403           Std.error of estimate"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      409.750   Coefficient A"
"        0.010   Constant B"
"        0.699   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          132.798    mm/hr"
"             Total depth                 32.564    mm"
"            6   002hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Area draining towards the southwest neighbouring properties"
"       77.800   % Impervious"
"        0.370   Total Area"
"       36.000   Flow length"
```

```
"        2.000   Overland Slope"
"        0.082   Pervious Area"
"       36.000   Pervious length"
"        2.000   Pervious slope"
"        0.288   Impervious Area"
"       36.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.164   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.841   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.067     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.082      0.288      0.370      hectare"
"             Time of concentration  28.076     2.288      3.645      minutes"
"             Time to Centroid       144.650    93.250     95.957     minutes"
"             Rainfall depth         32.564     32.564     32.564     mm"
"             Rainfall volume        26.75      93.74      120.49     c.m"
"             Rainfall losses        27.228     5.172      10.069     mm"
"             Runoff depth           5.336      27.392     22.495     mm"
"             Runoff volume          4.38       78.85      83.23      c.m"
"             Runoff coefficient     0.164      0.841      0.691      "
"             Maximum flow           0.001      0.066      0.067      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.067     0.067     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.067     0.067     0.067     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.067    c.m/sec"
"             Hydrograph volume            83.232    c.m"
"                     0.067     0.067     0.067     0.067"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.067     0.000     0.067     0.067"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Area Draining Towards Charles St"
```

```
"       76.000   % Impervious"
"        0.364   Total Area"
"       30.000   Flow length"
"        2.000   Overland Slope"
"        0.087   Pervious Area"
"       30.000   Pervious length"
"        2.000   Pervious slope"
"        0.277   Impervious Area"
"       30.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.164   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.839   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.066     0.000     0.067     0.067 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.087      0.277      0.364      hectare"
"             Time of concentration  25.167     2.050      3.393      minutes"
"             Time to Centroid       140.755    92.894     95.674     minutes"
"             Rainfall depth         32.564     32.564     32.564     mm"
"             Rainfall volume        28.45      90.08      118.53     c.m"
"             Rainfall losses        27.230     5.247      10.523     mm"
"             Runoff depth           5.334      27.317     22.041     mm"
"             Runoff volume          4.66       75.57      80.23      c.m"
"             Runoff coefficient     0.164      0.839      0.677      "
"             Maximum flow           0.001      0.066      0.066      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.066     0.066     0.067     0.067"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.066     0.066     0.066     0.067"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.133    c.m/sec"
"             Hydrograph volume           163.460    c.m"
"                    0.066     0.066     0.066     0.133"
" 38          START/RE-START TOTALS 102"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.734    hectare"
"             Total Impervious area                     0.564    hectare"
"             Total % impervious                       76.907"
```

```
" 19          EXIT"
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"     1500.000   Max. Hydrograph"
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"            1   Chicago storm"
"      409.751   Coefficient A"
"        0.010   Constant B"
"        0.699   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          132.841    mm/hr"
"             Total depth                 32.598    mm"
"            6   002hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   Controlled Areas"
"       92.000   % Impervious"
"        0.524   Total Area"
"       13.000   Flow length"
"        2.000   Overland Slope"
"        0.042   Pervious Area"
"       13.000   Pervious length"
"        2.000   Pervious slope"
"        0.482   Impervious Area"
"       13.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.164   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.824   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.129     0.000     0.000     0.000 c.m/sec"
```

```
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.042      0.482      0.524      hectare"
"             Time of concentration  15.222     1.241      1.479      minutes"
"             Time to Centroid       127.414    91.580     92.189     minutes"
"             Rainfall depth         32.598     32.598     32.598     mm"
"             Rainfall volume        13.67      157.15     170.81     c.m"
"             Rainfall losses        27.252     5.721      7.444      mm"
"             Runoff depth           5.346      26.876     25.154     mm"
"             Runoff volume          2.24       129.57     131.81     c.m"
"             Runoff coefficient     0.164      0.824      0.772      "
"             Maximum flow           0.001      0.129      0.129      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.129     0.129     0.000     0.000"
" 54          POND DESIGN"
"        0.129   Current peak flow    c.m/sec"
"        0.060   Target outflow    c.m/sec"
"        131.8   Hydrograph volume    c.m"
"           6.   Number of stages"
"      350.652   Minimum water level    metre"
"      352.400   Maximum water level    metre"
"      350.652   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                352.652     0.000     0.000"
"                352.200   0.03824    24.940"
"                352.250   0.03888    27.900"
"                352.300   0.03952    41.900"
"                352.350   0.04015    77.000"
"                352.400    0.1094   135.800"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                352.350     0.900     4.000     0.000     0.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                352.650     0.630    0.1200     1.000"
"             Peak outflow                  0.040    c.m/sec"
"             Maximum level              352.300    metre"
"             Maximum storage             42.241    c.m"
"             Centroidal lag               1.745   hours"
"                  0.129     0.129     0.040     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.040    c.m/sec"
"             Hydrograph volume           132.318    c.m"
"                     0.129     0.129     0.040     0.040"
```

```
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.129     0.000     0.040     0.040"
" 33          CATCHMENT 202"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           202   Uncontrolled to Beck St"
"        26.000   % Impervious"
"         0.088   Total Area"
"         8.000   Flow length"
"         3.000   Overland Slope"
"         0.065   Pervious Area"
"         8.000   Pervious length"
"         3.000   Pervious slope"
"         0.023   Impervious Area"
"         8.000   Impervious length"
"         3.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious SCS Curve No."
"         0.163   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.467   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.807   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.007     0.000     0.040     0.040 c.m/sec"
"              Catchment 202          Pervious   Impervious Total Area "
"              Surface Area           0.065      0.023      0.088      hectare"
"              Time of concentration  10.072     0.821      4.204      minutes"
"              Time to Centroid       120.573    90.878     101.735    minutes"
"              Rainfall depth         32.598     32.598     32.598     mm"
"              Rainfall volume        21.23      7.46       28.69      c.m"
"              Rainfall losses        27.273     6.302      21.821     mm"
"              Runoff depth           5.325      26.296     10.777     mm"
"              Runoff volume          3.47       6.02       9.48       c.m"
"              Runoff coefficient     0.163      0.807      0.331      "
"              Maximum flow           0.001      0.006      0.007      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.007     0.007     0.040     0.040"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                      0.007     0.007     0.007     0.040"
" 40          HYDROGRAPH   Combine    1"
"             6   Combine "
"             1   Node #"
"                 Total Site"
```

```
"             Maximum flow                  0.043    c.m/sec"
"             Hydrograph volume           141.802    c.m"
"                    0.007     0.007     0.007     0.043"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.007     0.000     0.007     0.043"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Uncontrolled to Charles St"
"        4.600   % Impervious"
"        0.122   Total Area"
"        8.000   Flow length"
"       17.000   Overland Slope"
"        0.116   Pervious Area"
"        8.000   Pervious length"
"       17.000   Pervious slope"
"        0.006   Impervious Area"
"        8.000   Impervious length"
"       17.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.163   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.776   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.003     0.000     0.007     0.043 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.116      0.006      0.122      hectare"
"             Time of concentration  5.986      0.488      4.960      minutes"
"             Time to Centroid       115.041    91.055     110.567    minutes"
"             Rainfall depth         32.598     32.598     32.598     mm"
"             Rainfall volume        37.94      1.83       39.77      c.m"
"             Rainfall losses        27.277     7.298      26.358     mm"
"             Runoff depth           5.320      25.299     6.239      mm"
"             Runoff volume          6.19       1.42       7.61       c.m"
"             Runoff coefficient     0.163      0.776      0.191      "
"             Maximum flow           0.003      0.002      0.003      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.003     0.003     0.007     0.043"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.003     0.003     0.003     0.043"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.046    c.m/sec"
"             Hydrograph volume           149.414    c.m"
"                     0.003     0.003     0.003     0.046"
" 38          START/RE-START TOTALS 203"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.734    hectare"
"             Total Impervious area                    0.511    hectare"
"             Total % impervious                      69.560"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                            Version 2.25  rev. 473"
"                MIDUSS created                          Sunday, February 7, 2010"
"           10   Units used:                                            ie METRIC"
"                Job folder:                Q:\41012\200\MIDUSS\2026-03-06 post"
"                Output filename:                                        5yr.out"
"                Licensee name:                                                A"
"                Company                                                        "
"                Date & Time last used:                   3/6/2026 at 2:50:37 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 85          IDF CURVE FIT"
"            1   Number of Storms"
"            1   Storm no."
"            5   Return interval"
"           12   Data Pairs"
"                  5.000    10.000    15.000    30.000    60.000"
"                120.000   180.000   240.000   360.000   720.000"
"               1080.000  1440.000   minutes"
"                 14.600    18.000    20.400    25.100    30.900"
"                 38.100     0.000     0.000    53.000    65.300"
"                  0.000    80.400   mm"
"                175.200   108.000    81.600    50.200    30.900"
"                 19.050     0.000     0.000     8.830     5.440"
"                  0.000     3.350   mm/hr"
"      545.759    mm/hr 'A' coeff."
"       0.0845    minutes 'B' coeff."
"      0.70055           'C' exponent"
"       0.0759           Std.error of estimate"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      544.610   Coefficient A"
"        0.067   Constant B"
"        0.700   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          174.888    mm/hr"
"             Total depth                 43.093    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   Controlled Area"
"       92.000   % Impervious"
"        0.524   Total Area"
"       13.000   Flow length"
```

```
"        2.000   Overland Slope"
"        0.042   Pervious Area"
"       13.000   Pervious length"
"        2.000   Pervious slope"
"        0.482   Impervious Area"
"       13.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.233   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.851   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.179     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.042      0.482      0.524      hectare"
"             Time of concentration  11.076     1.098      1.330      minutes"
"             Time to Centroid       119.700    90.267     90.951     minutes"
"             Rainfall depth         43.093     43.093     43.093     mm"
"             Rainfall volume        18.06      207.74     225.81     c.m"
"             Rainfall losses        33.056     6.425      8.555      mm"
"             Runoff depth           10.036     36.668     34.537     mm"
"             Runoff volume          4.21       176.77     180.97     c.m"
"             Runoff coefficient     0.233      0.851      0.801      "
"             Maximum flow           0.002      0.179      0.179      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.179     0.179     0.000     0.000"
" 54          POND DESIGN"
"        0.179   Current peak flow    c.m/sec"
"        0.090   Target outflow    c.m/sec"
"        181.0   Hydrograph volume    c.m"
"           6.   Number of stages"
"      350.652   Minimum water level    metre"
"      352.400   Maximum water level    metre"
"      350.652   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                350.652     0.000     0.000"
"                352.200   0.03824    24.940"
"                352.250   0.03888    27.900"
"                352.300   0.03952    41.900"
"                352.350   0.04015    77.000"
"                352.400    0.1094   135.800"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
```

```
"              elevation coefficie   breadth sideslope sideslope"
"                352.350     0.900     4.000     0.000     0.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                350.652     0.630    0.1200     1.000"
"             Peak outflow                  0.040    c.m/sec"
"             Maximum level               352.334    metre"
"             Maximum storage              65.465    c.m"
"             Centroidal lag                1.793   hours"
"                  0.179     0.179     0.040     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.040    c.m/sec"
"             Hydrograph volume           181.050    c.m"
"                     0.179     0.179     0.040     0.040"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.179     0.000     0.040     0.040"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Uncontrolled to Beck St"
"       26.000   % Impervious"
"        0.088   Total Area"
"        8.000   Flow length"
"        3.000   Overland Slope"
"        0.065   Pervious Area"
"        8.000   Pervious length"
"        3.000   Pervious slope"
"        0.023   Impervious Area"
"        8.000   Impervious length"
"        3.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.232   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.834   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.010     0.000     0.040     0.040 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area "
"             Surface Area           0.065      0.023      0.088      hectare"
"             Time of concentration  7.329      0.727      3.644      minutes"
```

```
"             Time to Centroid       114.504    90.020     100.838    minutes"
"             Rainfall depth         43.093     43.093     43.093     mm"
"             Rainfall volume        28.06      9.86       37.92      c.m"
"             Rainfall losses        33.100     7.163      26.356     mm"
"             Runoff depth           9.993      35.930     16.736     mm"
"             Runoff volume          6.51       8.22       14.73      c.m"
"             Runoff coefficient     0.232      0.834      0.388      "
"             Maximum flow           0.004      0.009      0.010      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.010     0.010     0.040     0.040"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.010     0.010     0.010     0.040"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.049    c.m/sec"
"             Hydrograph volume           195.778    c.m"
"                     0.010     0.010     0.010     0.049"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.010     0.000     0.010     0.049"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Uncontrolled Flow to Charles St"
"        4.600   % Impervious"
"        0.122   Total Area"
"        8.000   Flow length"
"       17.000   Overland Slope"
"        0.116   Pervious Area"
"        8.000   Pervious length"
"       17.000   Pervious slope"
"        0.006   Impervious Area"
"        8.000   Impervious length"
"       17.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.231   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.803   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.007     0.000     0.010     0.049 c.m/sec"
```

```
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.116      0.006      0.122      hectare"
"             Time of concentration  4.356      0.432      3.792      minutes"
"             Time to Centroid       110.233    89.846     107.303    minutes"
"             Rainfall depth         43.093     43.093     43.093     mm"
"             Rainfall volume        50.15      2.42       52.57      c.m"
"             Rainfall losses        33.152     8.499      32.018     mm"
"             Runoff depth           9.941      34.594     11.075     mm"
"             Runoff volume          11.57      1.94       13.51      c.m"
"             Runoff coefficient     0.231      0.803      0.257      "
"             Maximum flow           0.007      0.002      0.007      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.007     0.007     0.010     0.049"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.007     0.007     0.007     0.049"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                 0.055    c.m/sec"
"             Hydrograph volume          209.290    c.m"
"                    0.007     0.007     0.007     0.055"
" 38          START/RE-START TOTALS 203"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.734    hectare"
"             Total Impervious area                    0.511    hectare"
"             Total % impervious                      69.560"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                        Sunday, February 7, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:               Q:\41012\200\MIDUSS\2026-03-06 post"
"                Output filename:                                     100yr.out"
"                Licensee name:                                               A"
"                Company                                                       "
"                Date & Time last used:                 3/6/2026 at 2:51:59 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 85          IDF CURVE FIT"
"            1   Number of Storms"
"            1   Storm no."
"          100   Return interval"
"           12   Data Pairs"
"                  5.000    10.000    15.000    30.000    60.000"
"                120.000   180.000   240.000   360.000   720.000"
"               1080.000  1440.000   minutes"
"                 24.200    29.800    33.700    41.500    51.100"
"                 63.000     0.000     0.000    87.600   108.000"
"                  0.000   133.000   mm"
"                290.400   178.800   134.800    83.000    51.100"
"                 31.500     0.000     0.000    14.600     9.000"
"                  0.000     5.542   mm/hr"
"      895.762    mm/hr 'A' coeff."
"       0.0108    minutes 'B' coeff."
"      0.69929           'C' exponent"
"       0.0249           Std.error of estimate"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      896.070   Coefficient A"
"        0.014   Constant B"
"        0.699   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          290.344    mm/hr"
"             Total depth                 71.286    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   Controlled Area"
"       92.000   % Impervious"
"        0.524   Total Area"
"       13.000   Flow length"
```

```
"        2.000   Overland Slope"
"        0.042   Pervious Area"
"       13.000   Pervious length"
"        2.000   Pervious slope"
"        0.482   Impervious Area"
"       13.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.372   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.883   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.317     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.042      0.482      0.524      hectare"
"             Time of concentration  7.080      0.885      1.104      minutes"
"             Time to Centroid       110.810    88.376     89.169     minutes"
"             Rainfall depth         71.286     71.286     71.286     mm"
"             Rainfall volume        29.88      343.66     373.54     c.m"
"             Rainfall losses        44.746     8.317      11.232     mm"
"             Runoff depth           26.540     62.969     60.054     mm"
"             Runoff volume          11.13      303.56     314.68     c.m"
"             Runoff coefficient     0.372      0.883      0.842      "
"             Maximum flow           0.007      0.315      0.317      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                     0.317     0.317     0.000     0.000"
" 54          POND DESIGN"
"        0.317   Current peak flow    c.m/sec"
"        0.200   Target outflow    c.m/sec"
"        314.7   Hydrograph volume    c.m"
"           6.   Number of stages"
"      350.652   Minimum water level    metre"
"      352.400   Maximum water level    metre"
"      350.652   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                350.652     0.000     0.000"
"                352.200   0.03824    24.940"
"                352.250   0.03888    27.900"
"                352.300   0.03952    41.900"
"                352.350   0.04015    77.000"
"                352.400    0.1094   135.800"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
```

```
"              elevation coefficie   breadth sideslope sideslope"
"                352.350     0.900     4.000     0.000     0.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                352.652     0.630    0.1200     1.000"
"             Peak outflow                  0.082    c.m/sec"
"             Maximum level               352.381    metre"
"             Maximum storage             113.901    c.m"
"             Centroidal lag                1.826   hours"
"                  0.317     0.317     0.082     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.082    c.m/sec"
"             Hydrograph volume           313.346    c.m"
"                     0.317     0.317     0.082     0.082"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.317     0.000     0.082     0.082"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Uncontrolled to Beck St"
"       26.000   % Impervious"
"        0.088   Total Area"
"        8.000   Flow length"
"        3.000   Overland Slope"
"        0.065   Pervious Area"
"        8.000   Pervious length"
"        3.000   Pervious slope"
"        0.023   Impervious Area"
"        8.000   Impervious length"
"        3.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.373   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.862   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.022     0.000     0.082     0.082 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area "
"             Surface Area           0.065      0.023      0.088      hectare"
"             Time of concentration  4.685      0.586      2.850      minutes"
```

```
"             Time to Centroid       107.026    88.597     98.775     minutes"
"             Rainfall depth         71.286     71.286     71.286     mm"
"             Rainfall volume        46.42      16.31      62.73      c.m"
"             Rainfall losses        44.671     9.871      35.623     mm"
"             Runoff depth           26.615     61.415     35.663     mm"
"             Runoff volume          17.33      14.05      31.38      c.m"
"             Runoff coefficient     0.373      0.862      0.500      "
"             Maximum flow           0.012      0.015      0.022      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.022     0.022     0.082     0.082"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.022     0.022     0.022     0.082"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                  0.095    c.m/sec"
"             Hydrograph volume           344.730    c.m"
"                     0.022     0.022     0.022     0.095"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.022     0.000     0.022     0.095"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Uncontrolled to Charles St"
"        4.600   % Impervious"
"        0.122   Total Area"
"        8.000   Flow length"
"       17.000   Overland Slope"
"        0.116   Pervious Area"
"        8.000   Pervious length"
"       17.000   Pervious slope"
"        0.006   Impervious Area"
"        8.000   Impervious length"
"       17.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.371   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.832   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.023     0.000     0.022     0.095 c.m/sec"
```

```
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.116      0.006      0.122      hectare"
"             Time of concentration  2.784      0.348      2.547      minutes"
"             Time to Centroid       104.181    87.983     102.601    minutes"
"             Rainfall depth         71.286     71.286     71.286     mm"
"             Rainfall volume        82.97      4.00       86.97      c.m"
"             Rainfall losses        44.828     11.993     43.318     mm"
"             Runoff depth           26.458     59.293     27.968     mm"
"             Runoff volume          30.79      3.33       34.12      c.m"
"             Runoff coefficient     0.371      0.832      0.392      "
"             Maximum flow           0.021      0.004      0.023      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.023     0.023     0.022     0.095"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.023     0.023     0.023     0.095"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Site"
"             Maximum flow                 0.117    c.m/sec"
"             Hydrograph volume          378.851    c.m"
"                    0.023     0.023     0.023     0.117"
" 38          START/RE-START TOTALS 203"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.734    hectare"
"             Total Impervious area                     0.511    hectare"
"             Total % impervious                       69.560"
" 19          EXIT"
```

Appendix E

Stormceptor Output

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

03/07/2025

Province:	Ontario
City:	Township of Wilmot
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34

Site Name:	76 Mill Street

Drainage Area (ha):	0.52
% Imperviousness:	91.00

Runoff Coefficient 'c': 0.84

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	16.67
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	447

Project Name:	76 Mill Street
Project Number:	41012-200
Designer Name:	Jolie Nguyen
Designer Company:	MTE Consultants
Designer Email:	jnguyen@mte85.com
Designer Phone:	519-743-6500
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	83
EFO5	87
EFO6	91
EFO8	96
EFO10	98
EFO12	99

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

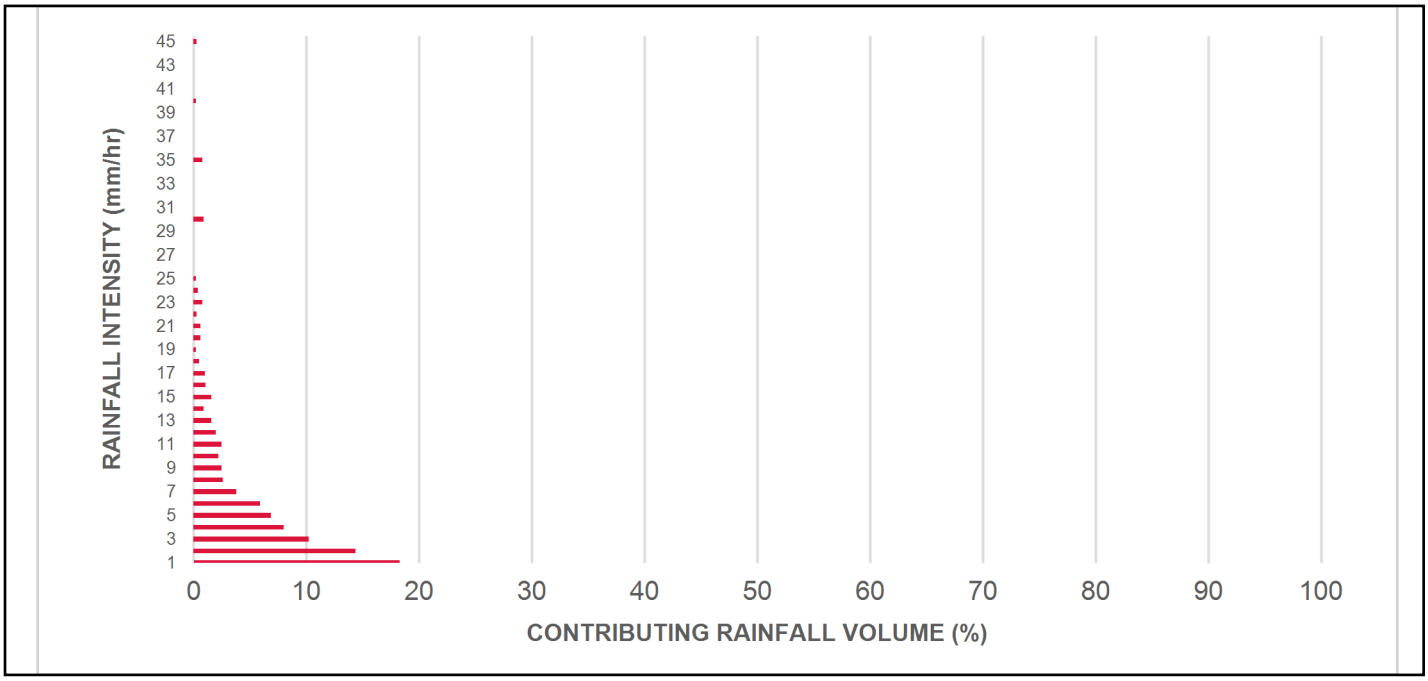
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

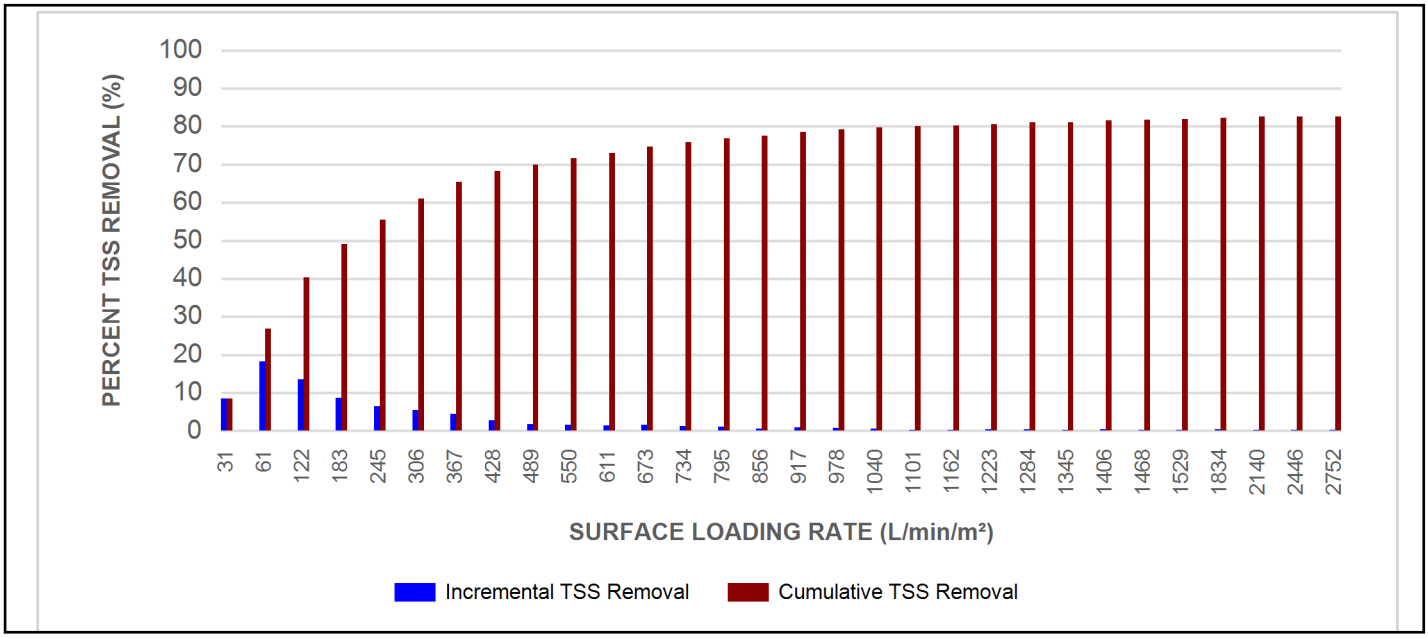
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	0.61	37.0	31.0	100	8.5	8.5
1.00	18.3	26.8	1.22	73.0	61.0	100	18.3	26.8
2.00	14.4	41.3	2.45	147.0	122.0	93	13.5	40.3
3.00	10.2	51.5	3.67	220.0	183.0	86	8.7	49.0
4.00	8.0	59.5	4.89	294.0	245.0	81	6.5	55.5
5.00	6.9	66.4	6.11	367.0	306.0	78	5.4	61.0
6.00	5.9	72.3	7.34	440.0	367.0	76	4.5	65.4
7.00	3.8	76.1	8.56	514.0	428.0	73	2.8	68.2
8.00	2.6	78.7	9.78	587.0	489.0	70	1.8	70.0
9.00	2.5	81.1	11.01	660.0	550.0	67	1.7	71.6
10.00	2.2	83.3	12.23	734.0	611.0	65	1.4	73.0
11.00	2.5	85.8	13.45	807.0	673.0	64	1.6	74.7
12.00	2.0	87.8	14.68	881.0	734.0	64	1.3	75.9
13.00	1.6	89.4	15.90	954.0	795.0	63	1.0	76.9
14.00	0.9	90.4	17.12	1027.0	856.0	63	0.6	77.5
15.00	1.6	91.9	18.34	1101.0	917.0	62	1.0	78.5
16.00	1.1	93.0	19.57	1174.0	978.0	62	0.7	79.2
17.00	1.0	94.0	20.79	1247.0	1040.0	61	0.6	79.8
18.00	0.5	94.6	22.01	1321.0	1101.0	59	0.3	80.1
19.00	0.2	94.8	23.24	1394.0	1162.0	58	0.1	80.3
20.00	0.6	95.4	24.46	1468.0	1223.0	56	0.4	80.6
21.00	0.6	96.1	25.68	1541.0	1284.0	55	0.4	81.0
22.00	0.3	96.4	26.91	1614.0	1345.0	54	0.1	81.1
23.00	0.8	97.2	28.13	1688.0	1406.0	52	0.4	81.6
24.00	0.4	97.6	29.35	1761.0	1468.0	50	0.2	81.8
25.00	0.2	97.8	30.57	1834.0	1529.0	48	0.1	81.9
30.00	0.9	98.7	36.69	2201.0	1834.0	40	0.3	82.2
35.00	0.8	99.5	42.80	2568.0	2140.0	34	0.3	82.5
40.00	0.2	99.7	48.92	2935.0	2446.0	30	0.1	82.6
45.00	0.3	100.0	55.03	3302.0	2752.0	27	0.1	82.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**83 %**

Climate Station ID: 6149387 *Years of Rainfall Data*: 34

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

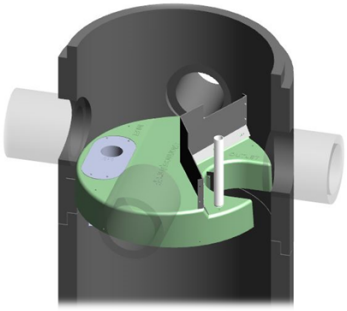
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

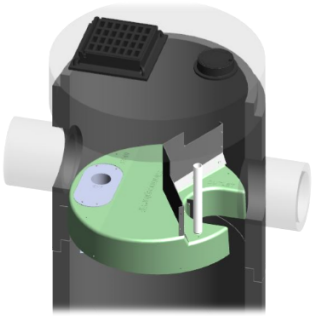
DESIGN FLEXIBILITY

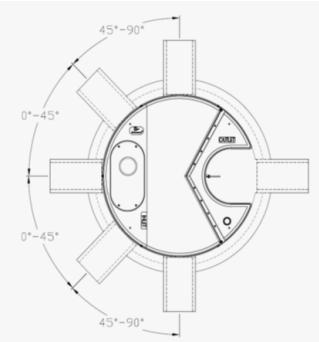
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.