S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

2076 Old Lakeshore Road

Burlington

PRELIMINARY FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

Project Location:

2076 Old Lakeshore Road, Burlington

Prepared For:

1959025 Ontario Inc.

Date: September, 2025

SLA File No: 25038

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1.0 INTRODUCTION AND BACKGROUND

1.1 Overview

S. Llewellyn & Associates Limited has been retained by 1959025 Ontario Inc. to provide Consulting Engineering services for the proposed mixed-use development at 2076 Old Lakeshore Road in the City of Burlington, Region of Halton (see Figure 1.0 for location plan). The property is currently comprised of existing buildings occupied as a motel. The proposed development is bound by an existing residential building to the west, a building of mercantile occupation to the east, Old Lakeshore Road to the north and Lake Ontario to the south.

The proposed development consists of constructing a 23-storey mixed-use building containg approximately 50 residential units, 154 hotel rooms, commercial area and four (4) levels of underground parking. The proposed development will also include asphalt driveways, concrete curbing and landscaped areas. It is also proposed to extend the existing waterfront trail to the southeast limits of the site.

This Preliminary Functional Servicing and Stormwater Management Report will provide information of the proposed servicing, grading and stormwater management scheme for this development, submitted in support of the Zoning By-Law Amendment Application by the proponent. Please refer to the Preliminary Engineering Plans prepared by S. Llewellyn and Associates Limited and the Site Plan prepared by NEUF Architects Inc. for additional information.

1.2 Background Information

The following documents were referenced in the preparation of this report:

Ref. 1: MOE Stormwater Management Practices Planning and Design Manual (Ministry of Environment, March 2003)

Ref. 2: City of Burlington Standard Specifications (City of Burlington, February 2022)

Ref. 3: Halton Region Water and Wastewater Linear Design Manual (Halton Region, November 2024)

Ref. 4: Low Impact Development Stormwater Management Planning and Design Guide (Credit Valley Conservation Authority / Toronto and Region Conservation Authority, 2010)

Ref. 5: Stormwater Management Design Guidelines (City of Burlington, May 21, 2020)

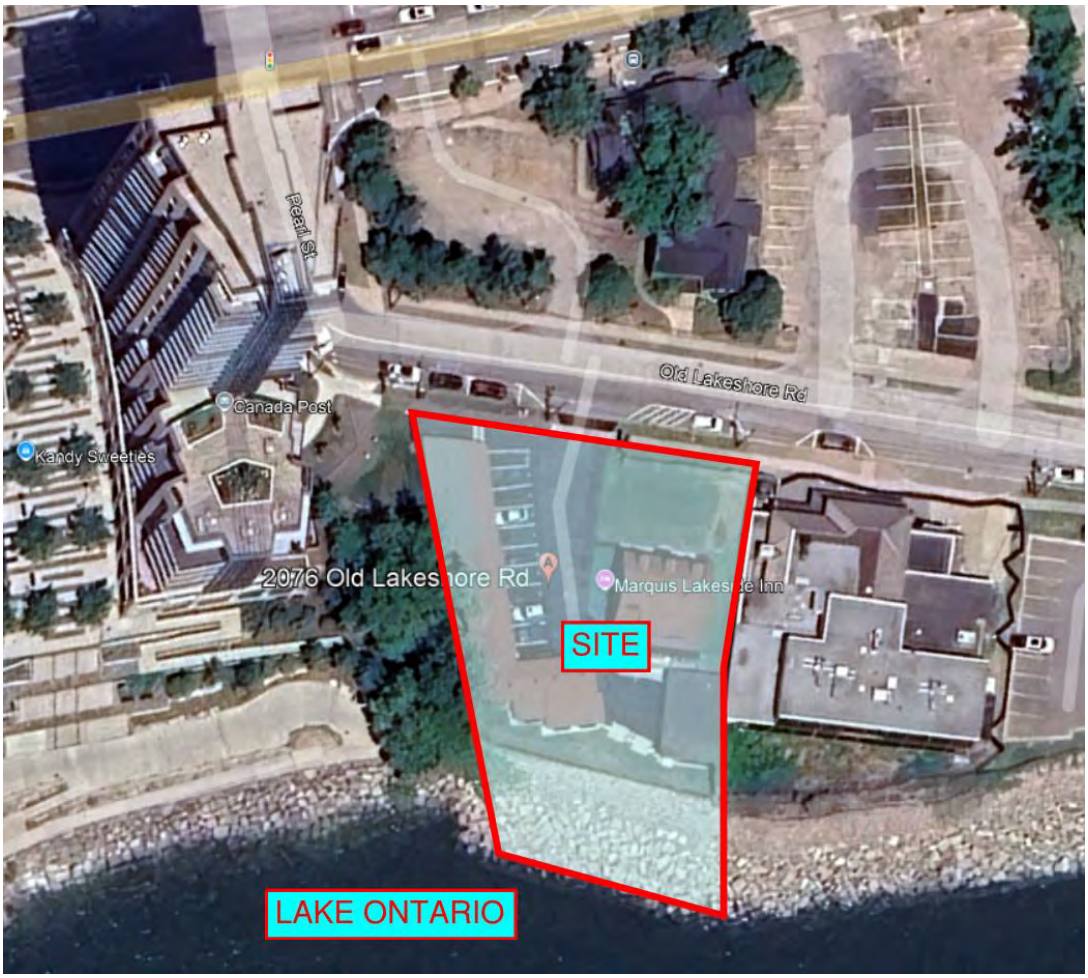


Figure 1.0 – Location Plan

1.3 Geotechnical and Hydrogeological Information

A Geotechnical Investigation report was prepared by Soil-Mat Engineers & Consultants Limited dated November 30, 2023. Also, a Hydrogeological Study report was prepared by Terra-Dynamics Consulting Inc. dated July 7, 2024.

Twelve (12) sample boreholes were advanced between September 5 and 14, 2023 to depths ranging between 1.4m and 25.9m below the existing grades on site. Based on the spatial distribution of the boreholes, asphalt was encountered at the surface of seven (7) of the boreholes while topsoil was encountered in the remaining five (5) boreholes. The asphaltic concrete making up the pavement structure ranged from depths of between 25mm to 100mm and overlay a granular base material that range from 100mm to 300mm in depth. The depth of topsoil encountered at boreholes with topsoil at the surface ranged from 75mm to 150mm; with BH3 and BH10 having a gravel fill of 100mm and 150mm depth underlaying the topsoil. Except for BH3 and BH8 that has a Clayey Silt/Sandy Silt Fill beneath the granular fill on BH3 and beneath the topsoil in BH8 (at a depth range of 1.4m to 1.8m below grade), Clayey Silt/Sandy Silt were also observed in other boreholes that were directly overlayed by topsoil and the pavement structure (at depths ranging from 3.0m to 4.3m below grade). Bedrock of Queenston shale formation was encountered beneath the overburden soils and extended to depths of between 3.5m to 25.9m.

Given the site's stratigraphy, a considerable amount of rock breaking will have to be done to achieve the proposed four (4) levels of underground parking on site.

The water table was observed to be within the shale bedrock; as high as 6.6m below existing grade and with the expectation that it will fluctuate seasonally. Temporary construction dewatering will be required, and the factored dewatering flowrate was estimated as 15,000 L/day (0.17l/s). This is less than the allowable discharge rate noted in Table 2.4 of this report.

Registration on the MECP Environmental Activity and Sector Registry (EASR) Posting for Water Taking will not be required for construction since the temporary construction dewatering flow rate is less than 50,000 L/day. However, an application for permission to discharge to the storm sewer system will be required during the construction phase. Also, an application for permission to discharge to the storm sewer system (long-term dewatering) will be a post-construction consideration unless the subsurface structure of the building is designed as watertight or onsite disposal facilities are implemented. The treatment of the dewatering groundwater from the shale formation to meet the City of Burlington's Storm Sewer Discharge parameter for Total Suspended Solids (TSS), manganese, phosphorus and zinc will be as highlighted in the Hydrogeological study report.

For additional information, refer to the Geotechnical Investigation and Hydrogeological Study reports in Appendix D and E respectively.

2.0 STORM DRAINAGE & STORMWATER MANAGEMENT

The following stormwater management (SWM) criteria will be applied to the site, in accordance with the City of Burlington requirements:

2.1 Stormwater Management Criteria

Quantity Control

The 100-year post development flow rate shall be controlled to the 5-year pre-development flow rate. Additionally, the maximum pre-development imperviousness of 36% is to be used for the pre-development calculations.

Quality Control

The stormwater runoff from the proposed condition site must meet Level 1 (Enhanced) stormwater quality control (80% TSS removal, 90% average annual runoff treatment).

Infiltration/Volume Control

The first 5mm of rainfall is to be retained and infiltrated or reused on site.

Erosion Control

Erosion and sediment control measures will be implemented in accordance with the standards of the City of Burlington.

2.2 Existing Conditions

In the existing condition, there are two existing buildings occupied as a motel together with landscape areas and associated asphalt parking lot. The proposed development is bound by an existing residential building to the west, a building of mercantile occupation to the east, Old Lakeshore Road to the north and Lake Ontario to the south. Most of the runoff from the site is captured by an existing catchbasin within the asphalt parking lot on site which outlets to the

existing 450mmø storm sewer that flows east along Old Lakeshore Road. The remainder of the site sheet drains south to Lake Ontario.

Two (2) catchment areas, Catchment 101 and Catchment 102 have been identified in the existing conditions. Catchment 101 represents the discharge from the site to the existing 450mmø storm sewer along Old Lakeshore Road. Catchment 102 represents the discharge from the site to Lake Ontario. See Table 2.1 and the Existing Conditions Storm Drainage Area Plan in Appendix A for details.

Table 2.1 – Existing Condition Storm Catchment Areas

Catchment ID	Description	Area (ha)	% Impervious	Runoff Coeff. (C)
101	Ex. Discharge to Old Lakeshore Road	0.14	75%	0.75
102	Ex. Drainage to Lake Ontario	0.08	74%	0.76
	Total	**0.22**	**74%**	**0.75**

The existing conditions discharge from the site was calculated using the SWMHYMO Hydrologic Modelling Program for the 2-year to 100-year City of Burlington design storms. A summary of the results can be found in Table 2.2 and Table 2.3 and the detailed SWMHYMO input/output information can be found in Appendix A.

Table 2.2 – Existing Condition Stormwater Discharge (To Old Lakeshore Road)

Storm Event	Discharge (m^3/s)
2-year	0.027
5-year	0.036
10-year	0.042
25-year	0.049
50-year	0.054
100-year	0.060

Table 2.3 – Existing Condition Stormwater Discharge (To Lake Ontario)

Storm Event	Discharge (m^3/s)
2-year	0.015
5-year	0.020
10-year	0.023
25-year	0.028
50-year	0.031
100-year	0.034

Allowable Discharge Rate

As per City of Burlington's design criteria for discharge to an existing storm sewer, the 100-year post-development flow rate shall be controlled to the 5-year pre-development flow rate. Though the percentage imperviousness of the drainage area discharging to the existing sewer (Catchment 101) is 75%, the maximum pre-development imperviousness of 36% will be used for the pre-development calculations for the existing drainage area - as the allowable discharge to the existing storm sewer. The allowable discharge rate for the 5-year storm event has been calculated using the SWMHYMO Hydrologic Modelling Program. A summary of the results can be found in Table 2.4.

Table 2.4 – Allowable Discharge Rate (To Old Lakeshore Road)	
Storm Event	**Allowable Discharge to Existing Storm Sewer (m^3/s)**
5-year	0.030

2.3 Proposed Conditions

It is proposed to develop the site by constructing a 23-storey mixed-use building including four (4) levels of underground parking, asphalt driveways, landscape areas, concrete walkways and curbs and an amenity area. It is proposed to service the site with a 200mmø storm sewer, designed and constructed in accordance with the City of Burlington standards.

Three (3) catchment areas, Catchment 201, 202 and 203 have been identified in the proposed condition. Catchment 201 represents controlled drainage from the site, which will be captured by the roof drains and discharged to the existing 450mmø storm sewer along Old Lakeshore Road. Catchment 202 represents uncontrolled drainage from the site which will sheet drain to Old Lakeshore Road. Catchment 203 represents the uncontrolled sheet drainage from the site to Lake Ontario. See Table 2.5 and the Post-Development Storm Drainage Area Plan in Appendix A for details.

Table 2.5 – Proposed Condition Storm Catchment Areas				
Catchment ID	**Description**	**Area (ha)**	**% Impervious**	**Runoff Coeff. (C)**
201	Controlled drainage to existing Storm Sewer along Old Lakeshore Road	0.08	100%	0.95
202	Uncontrolled drainage to Old Lakeshore Road	0.01	87%	0.82
203	Uncontrolled drainage to Lake Ontario	0.13	95%	0.87
	Total	**0.22**	**92%**	**0.87**

Minor Flows

Minor flows from the site will be conveyed by the proposed 200mmø storm sewer, designed and constructed in accordance with the City of Burlington standards. It is proposed to discharge minor flows from the site to the existing 450mmø storm sewer fronting the site along Old Lakeshore Road.

Major Flows

Major flows from the site will be conveyed overland. The grading of the site has been done such that there will be a drainage split point at the west side of the site to enable most of the major overland flows to be conveyed to Lake Ontario and only a small portion will be conveyed to Old Lakeshore Road (see Preliminary Grading Plan for details).

2.3.1 Stormwater Quantity Control

In line with the quantity control criteria for proposed discharge to existing storm sewers, it is proposed to apply quantity control measures to the runoff from Catchment 201 by means of a 125mmø orifice outlet on the cast-in-place storage tank.

With the installation of quantity control measures for Catchment 201, it will be required to provide on-site stormwater storage. On-site storage will be provided by a cast-in-place concrete storage tank within the underground parking. See Table 2.6 and Appendix A for the stage-storage-discharge relationship of the orifice control and on-site storage.

Table 2.6 – Proposed Condition Stage-Storage-Discharge (Catchment 201)

Elevation (m)	Storage (m^3)	Discharge (m^3/s)
80.78 (Orifice Invert)	0	0.0000
81.08 (Overflow Weir flowing to the Bottom of Tank)	1	0.0159
77.80 (Bottom of Tank)	1	0.0159
78.80 (1.0m Deep)	9	0.0159
79.80 (2.0m Deep)	17	0.0159
80.78 (2.98m Deep)	25	0.0159
81.08 (Weir)	25	0.0159
81.20 (Overflow Pipe)	26	0.0195
81.72 (Top of Tank)	30	0.0306

An analysis was performed on the Proposed Condition site using the SWMHYMO hydrologic modeling program to determine the required volume of stormwater storage during the 2-year to 100-year City of Burlington design storms. A summary of the proposed condition discharge to Old Lakeshore Road can be found in Table 2.7. The detailed SWMHYMO input/output information can be found in Appendix A.

A summary of the uncontrolled discharge rate to Lake Ontario in the proposed condition is not considered germane – since Lake Ontario has capacity to accommodate the uncontrolled flows draining from the site.

Table 2.7 – Proposed Condition Stormwater Discharge (To Old Lakeshore)					
Storm Event	**Catchment 201 Controlled Discharge (m^3/s)**	**Catchment 202 Uncontrolled Discharge (m^3/s)**	**Total Discharge* (m^3/s)**	**Allowable Discharge (m^3/s)**	**Required Storage (m^3)**
2-year	0.016	0.002	0.018	0.030	1.67
5-year	0.016	0.003	0.019		4.50
10-year	0.016	0.003	0.019		6.46
25-year	0.016	0.004	0.020		8.95
50-year	0.016	0.004	0.020		10.76
100-year	0.016	0.005	0.020		12.65
*Total Discharge being the ADD HYD summation for Catchment 201 and 202 in SWMHYMO					

This analysis determined the following:

- The proposed condition discharge rates to Old Lakeshore Road will not exceed the allowable discharge rate during the 2-year to 100-year storm events with the installation of a 125mmø orifice control.
- Catchment 201 will require 12.65m^3 of stormwater storage during the 100-year event, which can be accommodated with the provision of a 30m^3 storage capacity.
- Catchment 203 will discharge uncontrolled to Lake Ontario.

2.4 Stormwater Quality Control & Low Impact Development (LID)

No on-site quality control measures are required since the site consists mostly of rooftop, walkways and landscaped area which is considered clean runoff.

2.4.1 Retention (Priority 1)

As per the City of Burlington's consultation comments for the proposed development, a target of 5mm infiltration depth across the entire site is required. Providing this volume for infiltration or reuse on site would meet the water budget criterion set out in the City of Burlington's consultation comments.

The Runoff Volume Control Target (RVCT) for the site is calculated based on the methodology in the Sustainable Technologies Evaluation Program (STEP) from the Toronto and Region Conservation Authority (TRCA), Credit Valley Conservation (CVC) (Ref. 4).

The Runoff Volume Control Target (RVCT) calculation is as below:

Runoff Volume Control Target (RVCT)

= Runoff Depth * Area

= 5.0 mm * 0.001 m/mm * 0.22 ha * 10,000 m^2/ha

= 11.0m^3

The required 11.0m^3 of retained run-off can be accommodated in the proposed stormwater tank that has a storage capacity of 30m^3 (with a spare capacity of 17.0m^3 after the 100-year storm event which requires a volume of approximately 13.0m^3).

2.5 Sediment and Erosion Control

In order to minimize erosion during the grading and site servicing period of construction, the following measures will be implemented:

- Install silt fencing along the outer boundary of the site to ensure that sediment does not migrate to the adjacent properties;
- Install a mud mat at the construction entrance of the site to reduce mud tracking and sediment leaving the site via construction traffic;
- Install sediment control (silt sacks) in the proposed catchbasins as well as the nearby existing catchbasins to ensure that no untreated runoff enters the existing conveyance system;
- Stabilize all disturbed or landscaped areas with hydro seeding/sodding to minimize the opportunity for erosion.

To ensure and document the effectiveness of the erosion and sediment control structures, an appropriate inspection and maintenance program is necessary. The program will include the following activities:

- Inspection of the erosion and sediment controls (e.g. silt fences, sediment traps, outlets, vegetation, etc.) with follow up reports to the governing municipality; and
- The developer and/or their contractor shall be responsible for any costs incurred during the remediation of problem areas.

2.6 Dewatering

Based on the Hydrogeological Study report completed by Terra-Dynamics Consulting Inc. dated July 7, 2024, temporary construction dewatering will be required, and the factored dewatering flowrate was estimated as 15,000 L/day (0.17l/s) which is less than the 30l/s allowable discharge rate to the existing 450mmø storm sewer along Old Lakeshore Road. An application for permission to discharge to the storm sewer system will be required during the construction phase. The treatment of the groundwater dewatering discharge from the shale formation to meet the City of Burlington's storm sewer discharge parameter should be considered in line with the recommendations of the preliminary Hydrogeological study report.

3.0 SANITARY SEWER SERVICING

3.1 Existing Conditions

There is an existing 200mmø sanitary sewer that fronts the site along Old Lakeshore Road. The existing sanitary sewer flows east along Old Lakeshore Road.

3.2 Sanitary Demand

Sanitary discharge from the site was estimated in accordance with Section 3.2 of Halton Region Water and Wastewater Linear Design Manual, 2024. Table 3.1 summarizes the equivalent population and Table 3.2 summarizes the sanitary sewer discharge rate for the subject lands.

Table 3.1 – Proposed Equivalent Population

Occupancy Type	No. of Units [A]	Gross Floor Area (m^2) [A]	Population Density [B]	Population
Residential	50	-	1.67 per/unit	84
Hotel	154	-	1.67 per/unit	257
Commercial	-	1,805	90 persons/ha	16
			Total Population [C]:	**357**

[A] Information from project statistics prepared by NEUF Architects., dated August 29, 2025.

[B] Population density per Section 3.2 of Region of Halton Water and Wastewater Linear Design Manual (November 2024)

[C] Total population = Residential Population + Commercial Population

Table 3.2 – Proposed Sanitary Sewer Discharge

Population [A]	Avg. Demand [B] (l/s)	Peaking Factor [C]	Infiltration [D] (l/s)	Peak Flow [E] (l/s)
357 persons	0.89	4.04	0.06	**3.66**

[A] From Table 3.1

[B] Average demand = (215 l/cap/day x population)

[C] Peaking Factor = $1+((14/(4+P^{0.5})))$ with P expressed in thousands Min = 2.0

[D] Infiltration flow based on 0.286 l/ha/sec infiltration rate x Site Area (0.22 hectares)

[E] Peak Flow = (Average Flow x Peaking Factor) + Infiltration

Based on Table 3.2, the estimated sanitary demand for the mixed-use buildings is:

3.66 l/s

The proposed site will be serviced by a 200mmø sanitary sewer, designed and constructed in accordance with City of Burlington and Region of Halton standards. Drainage from this proposed sewer will discharge to the existing 200mmø sanitary sewer fronting the site along Old Lakeshore Road.

The minimum grade of the proposed 200mmø sanitary sewer will be 1.0%. At this minimum grade, the proposed sanitary sewer will have a capacity of 0.033 m^3/s (33 l/s). Therefore, the proposed 200mmø sanitary sewer at a minimum grade of 1.0% is adequately sized to service the proposed development.

3.3 Downstream Sanitary Sewer Capacity

The existing 200mmø sanitary sewer flows east along Old Lakeshore Road and outlets to the Junction Street Wastewater Pumping Station located at 2137 Lakeshore Road. Halton Region has identified capacity constraints and operational issues with the Junction Street Wastewater Pumping Station and that it is nearing the end of its service life. The Region is currently

undertaking an Integrated Master Plan (IMP) and the timing of replacement of the Junction Street Wastewater Pumping Station will be refined through the IMP; with the replacement currently forecasted for 2031.

4.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

4.1 Existing Conditions

The existing municipal water distribution system consists of a 300mmø watermain located adjacent to the site along Old Lakeshore Road. There is an existing fire hydrant fronting the site along Old lakeshore Road and another fire hydrant northwest of the site along Pearl Street.

4.2 Domestic Water Demand

Water demand for the site was estimated in accordance with the Halton Region Water and Wastewater Linear Design Manual. Table 4.1 summarizes the domestic water demand requirements for the Average Daily, Maximum Daily and Peaking Hourly demand scenarios.

Table 4.1 – Post-Development Domestic Water Demand

Occupancy Type	Population [A]	Avg. Daily Demand [B] (l/s)	Max. Daily Peaking Factor [C]	Max. Hourly Peaking Factor [D]	Max. Daily Demand [E] (l/s)	Max. Hourly Demand [F] (l/s)
Residential & Hotel	341	1.05	2.25	4.0	**2.36**	4.20
Commercial	16	0.04	2.25	2.25	**0.09**	0.09
				Total:	**2.45**	4.29

[A] From Table 3.1.

[B] Based on Average Day Water Demand Criteria of 265l/cap/day for residential and 225l/pers/day for light commercial (as per Section 2.2 of Region of Halton Water and Wastewater Linear Design Manual (November 2024).

[C] From Section 2.4 of Region of Halton Water and Wastewater Linear Design Manual (November 2024).

[D] From Table 2-2 of Region of Halton Water and Wastewater Linear Design Manual (November 2024).

[E] Max. Daily Demand = Avg. Daily Demand x Max. Daily Peaking Factor

[F] Max. Hourly Demand = Avg. Daily Demand x Max. Hourly Peaking Factor

4.3 Fire Flow Demand

Fire flow demand for the proposed development is governed by a number of guidelines and criteria, such as the Water Supply for Public Fire Protection (Fire Underwriters Survey, 2020), Ontario Building Code (OBC), and various codes and standards published by the National Fire Protection Association (NFPA).

The proposed building is non-combustible construction (C=0.8), with limited combustible occupancy (-15% correction) and a fully supervised sprinkler system (-50% correction). Exposure components are based on the following:

North Face: 0% correction (Greater than 30.0m)
South Face: 0% correction (Greater than 30.0m)
East Face: 25% correction (0m to 3.0m)
West Face: 10% correction (20.1m to 30.0m)
Total: 35%

It is estimated that the required fire flow for the proposed development will be **167 l/s**. See the Fire Flow Demand Requirements in Appendix B for details.

The existing hydrant fronting the site on Old Lakeshore Road is located within the 90m separation from the building face adjacent to a street (as per Sentence 3.2.5.5 of the 2024 Ontario Building Code), no additional private hydrants are proposed for this development.

The following hydrant flow test data for the public fire hydrant fronting the proposed development has been analyzed to determine if the municipal system adjacent to the subject site is adequate to provide the required fire flow, with a minimum pressure of 20 psi. Table 4.2 summarizes the hydrant flow data made available by Aquacom Contracting. Refer to Appendix B for details of the hydrant flow test.

Based on the hydrant flow test data summarized in Table 4.2, the theoretical available flow rate is **593 l/s**, while the minimum required fire flow for the proposed development is only **167 l/s**.

Therefore, based on the analysis, the proposed water distribution system will have the capacity and pressure required to adequately service the proposed development.

Table 4.2 – Hydrant Flow Data (Aquacom Contracting)	
Storm Event	**Discharge (m^3/s)**
Location	2076 Old Lakeshore Road, Burlington
Test Date	2025-07-24
Static Pressure	73 psi
Residual Pressure (One outlet)	71 psi
Residual Pressure (Two outlets)	69 psi
Test Flow (One outlet)	1344 USGPM (84.8 l/s)
Theoretical Flow @ 20 psi	**9397 USGPM (592.8 l/s)**

4.4 Proposed Water Servicing

Proposed water servicing for the site consists of connecting a proposed 200mmø watermains to the existing 300mmø watermain adjacent to the site along Old Lakeshore Road. The proposed 200mmø watermains will be spilt before the property line to provide a 150mmø domestic water service and a 200mmø fire water service to the proposed development. All proposed water services will be designed and constructed in accordance with City of Burlington and Region of Halton standards.

5.0 CONCLUSIONS AND RECOMMENDATIONS

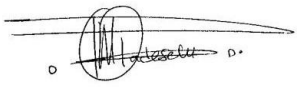
Based on the information provided herein, it is concluded that the proposed development at 2076 Lakeshore Road can be constructed to meet the requirements of the City of Burlington and Region of Halton. Therefore, it is recommended that:

- The development be graded and serviced in accordance with the Preliminary Grading & Erosion Control Plan and the Preliminary Servicing Plan prepared by S. Llewellyn & Associates Limited;
- A 125mmø orifice control be installed as per the Preliminary Servicing Plan and this report to provide adequate stormwater quantity control for the proposed site;
- Erosion and sediment controls be installed as described in this report and shown on the Preliminary Grading & Erosion Control Plan prepared by S. Llewellyn & Associates Limited;
- The proposed sanitary and water servicing system be installed as per the Preliminary Servicing Plan and this report to adequately service the proposed development.

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

Prepared by:

S. LLEWELLYN & ASSOCIATES LIMITED



O. Oladeselu, P.Eng.



S. Frankovich, P.Eng.

APPENDIX A
STORMWATER MANAGEMENT INFORMATION

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PEARL STREET

OLD LAKESHORE ROAD

EX. RESIDENTIAL BUILDING

EX. COMMERCIAL BUILDING

EX. 2 STOREY VINYL SIDED BUILDING No. 2064

LAKE ONTARIO

101
0.14
75%
0.75

102
0.08
74%
0.76

NOTE:
AS PER THE CITY OF BURLIGNTON'S REQUIREMENTS, ALLOWABLE DISCHARGE FOR THIS SITE TO EXISTING STORM SEWERS IS BASED ON A PRE-DEVELOPMENT CONDITION WITH A MAXIMUM OF 36% IMPERVIOUSNESS

LEGEND

- PERVIOUS AREA
- 101 / 0.15 / 74% / 0.75 — DRAINAGE AREA I.D.
- DRAINAGE AREA (ha)
- PERCENT IMPERVIOUS
- RUNOFF COEFFICIENT
- DRAINAGE AREA BOUNDARY
- PRE-DEVELOPMENT SHEET DRAIN

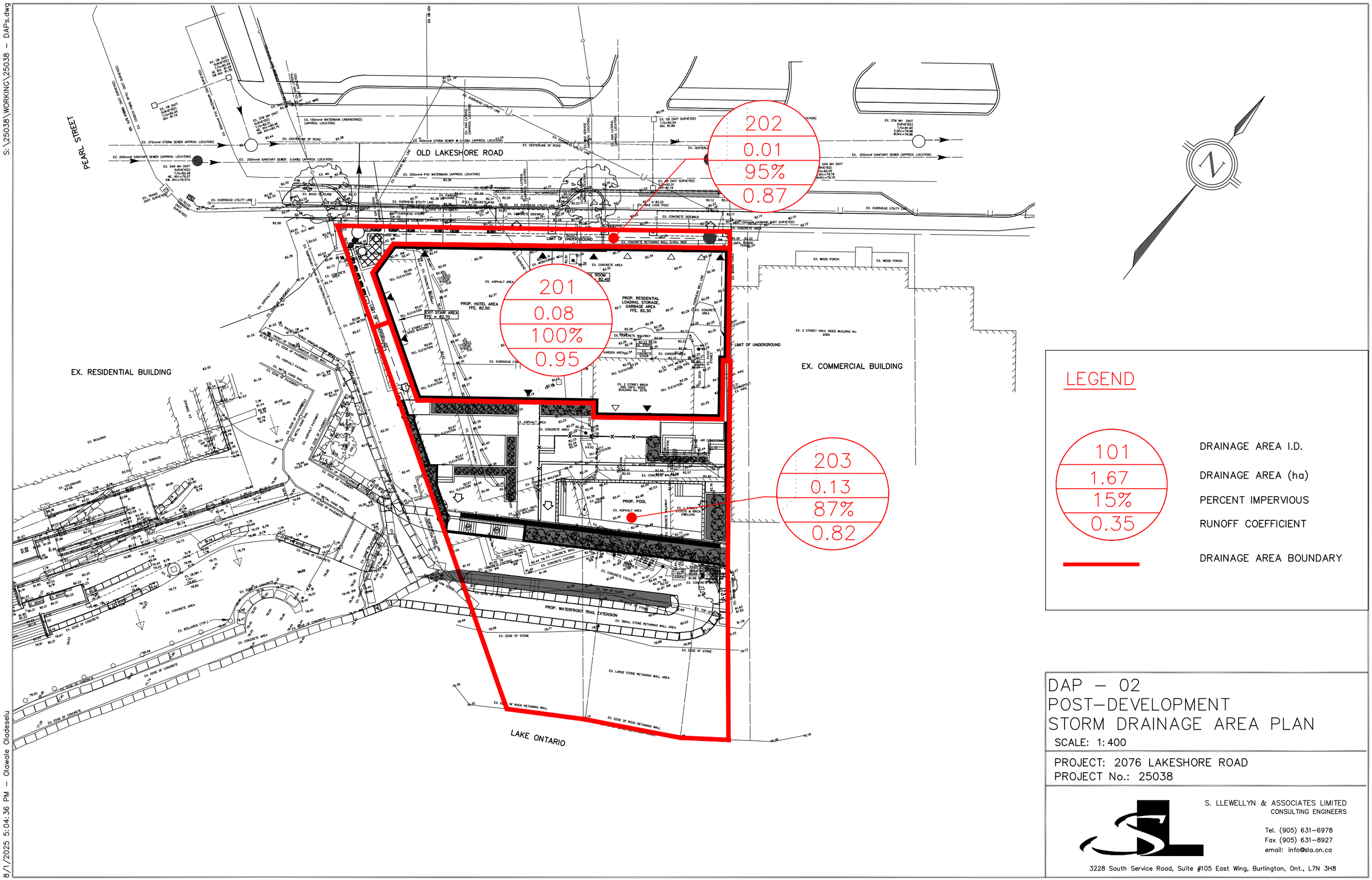
DAP - 01
PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE: 1:400

PROJECT: 2076 LAKESHORE ROAD
PROJECT No.: 25038

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LEGEND

101	DRAINAGE AREA I.D.
1.67	DRAINAGE AREA (ha)
15%	PERCENT IMPERVIOUS
0.35	RUNOFF COEFFICIENT
	DRAINAGE AREA BOUNDARY

DAP – 02
POST–DEVELOPMENT
STORM DRAINAGE AREA PLAN

SCALE: 1:400

PROJECT: 2076 LAKESHORE ROAD
PROJECT No.: 25038

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

Tel. (905) 631–6978
Fax (905) 631–8927
email: info@sla.on.ca

3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

S:\25038\WORKING\25038 – DAPs.dwg
8/1/2025 5:04:36 PM – Olawale Oladeselu

2076 Old Lakeshore Road
Burlington, Ontario

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

STAGE-STORAGE-DISCHARGE CALCULATIONS

Catchment 201
Outlet Device No. 1 (Quantity)

Type:	Tank Outlet
Diameter (mm)	**125**
Area (m^2)	0.01227
Invert Elev. (m)	80.78
C/L Elev. (m)	80.84
Disch. Coeff. (C_d)	0.6
Discharge (Q) =	$C_d A (2 g H)^{0.5}$
Number of Orifices:	1

		SWM Pond Volumes			Outlet No. 1	
	Elevation m	Area m^2	Tank Incremental Volume	Active Storage Volume m^3	H m	Discharge m^3/s
Orifice Invert	80.78	4.5	0.0	0	0.000	0.0000
Overflow Weir	81.08	4.5	1.3	1	0.237	0.0159
Bottom of Tank	77.80	7.9	0.0	1	0.237	0.0159
1.0m Deep	78.80	7.9	7.9	9	0.237	0.0159
2.0m Deep	79.80	7.9	7.9	17	0.237	0.0159
Orifice Invert	80.78	7.9	7.7	25	0.237	0.0159
Overflow Weir	81.08	7.9	0.3	25	0.237	0.0159
3.40m Deep (Overflow Pipe)	81.20	7.9	0.9	26	0.358	0.0195
Top of Tank	81.72	7.9	4.1	30	0.877	0.0306

```
00001> 2     Metric units
00002> *#*************************************************************************|
00003> *#  Project Name: 2076 LAKESHORE ROAD
00004> *#               BURLINGTON, ONTARIO
00005> *#  JOB NUMBER  : 25038
00006> *#       Date   : JULY 2025
00007> *#    Revised   :
00008> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00009> *#       File   : 25038.DAT
00010> *#*************************************************************************|
00011> *
00012> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[002]
00013>                     BUR6_002.stm
00014> *
00015> READ STORM          STORM_FILENAME "STORM.001"
00016> *
00017> *#*************************************************************************|
00018> *#
00019> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00020> *#        ============================================
00021> *#
00022> **#************************************************************************|
00023> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
00024> CALIB STANDHYD      ID=[1], NHYD=["101"], DT=[1](min), AREA=[0.14](ha),
00025>                     XIMP=[0.75], TIMP=[0.75], DWF=[0](cms), LOSS=[2],
00026>                     SCS curve number CN=[95],
00027>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.0](%),
00028>                                          LGP=[20](m), MNP=[0.250], SCP=[0](min),
00029>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
00030>                                          LGI=[20](m), MNI=[0.013], SCI=[0](min),
00031>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00032> *%-----------------|-------------------------------------------------------|
00033> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
00034> CALIB STANDHYD      ID=[2], NHYD=["101"], DT=[1](min), AREA=[0.08](ha),
00035>                     XIMP=[0.74], TIMP=[0.74], DWF=[0](cms), LOSS=[2],
00036>                     SCS curve number CN=[95],
00037>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[3.5](%),
00038>                                          LGP=[35](m), MNP=[0.250], SCP=[0](min),
00039>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[3.5](%),
00040>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00041>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00042> *%-----------------|-------------------------------------------------------|
00043> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
00044> CALIB STANDHYD      ID=[3], NHYD=["101"], DT=[1](min), AREA=[0.14](ha),
00045>                     XIMP=[0.36], TIMP=[0.36], DWF=[0](cms), LOSS=[2],
00046>                     SCS curve number CN=[95],
00047>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.0](%),
00048>                                          LGP=[20](m), MNP=[0.250], SCP=[0](min),
00049>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
00050>                                          LGI=[20](m), MNI=[0.013], SCI=[0](min),
00051>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00052> *%-----------------|-------------------------------------------------------|
00053>
00054> *#*************************************************************************|
00055> *#
00056> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00057> *#        =============================================
00058> *#
00059> **#************************************************************************|
00060> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
00061> CALIB STANDHYD      ID=[4], NHYD=["201"], DT=[1](min), AREA=[0.08](ha),
00062>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00063>                     SCS curve number CN=[95],
00064>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[1.0](%),
00065>                                          LGP=[4](m), MNP=[0.250], SCP=[0](min),
00066>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.0](%),
00067>                                          LGI=[4](m), MNI=[0.013], SCI=[0](min),
00068>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00069> *%-----------------|-------------------------------------------------------|
00070> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
00071> CALIB STANDHYD      ID=[5], NHYD=["202"], DT=[1](min), AREA=[0.01](ha),
00072>                     XIMP=[0.95], TIMP=[0.95], DWF=[0](cms), LOSS=[2],
00073>                     SCS curve number CN=[95],
00074>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.5](%),
00075>                                          LGP=[12](m), MNP=[0.250], SCP=[0](min),
00076>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
00077>                                          LGI=[12](m), MNI=[0.013], SCI=[0](min),
00078>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00079> *%-----------------|-------------------------------------------------------|
00080> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
00081> CALIB STANDHYD      ID=[6], NHYD=["203"], DT=[1](min), AREA=[0.13](ha),
00082>                     XIMP=[0.87], TIMP=[0.87], DWF=[0](cms), LOSS=[2],
00083>                     SCS curve number CN=[95],
00084>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[4.0](%),
00085>                                          LGP=[45](m), MNP=[0.250], SCP=[0](min),
00086>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[4.0](%),
00087>                                          LGI=[45](m), MNI=[0.013], SCI=[0](min),
00088>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00089> *%-----------------|-------------------------------------------------------|
00090> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
00091> *
00092> ROUTE RESERVOIR     IDout=[7],   NHYD=["201"],  IDin=[4],
00093>                     RDT=[1](min),
00094>                           TABLE of ( OUTFLOW-STORAGE ) values
00095>                                    (cms) - (ha-m)
00096>                                     0.0000 , 0.0000
00097>                                     0.0159 , 0.0001
00098>                                     0.0159 , 0.0001
00099>                                     0.0159 , 0.0009
00100>                                     0.0159 , 0.0017
00101>                                     0.0159 , 0.0025
00102>                                     0.0159 , 0.0025
00103>                                     0.0195 , 0.0026
00104>                                     0.0306 , 0.0030
00105>                                     -1   ,  -1      (max twenty pts)
00106>                           IDovf=[8], NHYDovf=["OVF"]
00107> *%-----------------|-------------------------------------------------------|
00108> ADD HYD             IDsum=[9], NHYD=["Total"], IDs to add=[5+7+8]
00109> *%-----------------|-------------------------------------------------------|
00110> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
00111> *
00112> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[005]
00113>                     BUR6_005.stm
00114> *
00115> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[010]
00116>                     BUR6_010.stm
00117> *
00118> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
00119>                     BUR6_025.stm
00120> *
00121> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[050]
00122>                     BUR6_050.stm
00123> *
00124> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
00125>                     BUR6_100.stm
00126> *
00127> *%-----------------|-------------------------------------------------------|
00128> FINISH
00129>
00130>
00131>
00132>
00133>
00134>
00135>
```

```
00136>
```

```
00001> ================================================================================
00002>
00003>    SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>    S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>    SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>        S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>    SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
00008>                                                          9   9  9   9   # 3902680
00009>          StormWater Management HYdrologic Model           999    999    =========
00010>
00011>  ********************************************************************************
00012>  ***************************** SWMHYMO Ver/4.05  ********************************
00013>  *********  A single event and continuous hydrologic simulation model  *********
00014>  *********     based on the principles of HYMO and its successors      *********
00015>  *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
00016>  ********************************************************************************
00017>  ******** Distributed by:  J.F. Sabourin and Associates Inc.           *********
00018>  *********                 Ottawa,  Ontario: (613) 836-3884            *********
00019>  *********                 Gatineau, Quebec: (819) 243-6858            *********
00020>  *********                 E-Mail: swmhymo@jfsa.Com                    *********
00021>  ********************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  +++++++++ Licensed user: S. Llewellyn & Associates Ltd                 +++++++++
00025>  +++++++++                 in any City          SERIAL#:3902680        +++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ********************************************************************************
00029>  **********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030>  **********           Maximum value for ID numbers  :     10            *********
00031>  **********           Max. number of rainfall points: 105408            *********
00032>  **********           Max. number of flow points    : 105408            *********
00033>  ********************************************************************************
00034>
00035>
00036>  **********************   D E T A I L E D   O U T P U T   **********************
00037>  ********************************************************************************
00038>  *         DATE: 2025-07-30     TIME: 13:36:58     RUN COUNTER: 000056          *
00039>  ********************************************************************************
00040>  * Input   filename: T:\projects\25038\SWMHYMO\25038.dat                        *
00041>  * Output  filename: T:\projects\25038\SWMHYMO\25038.out                        *
00042>  * Summary filename: T:\projects\25038\SWMHYMO\25038.sum                        *
00043>  * User comments:                                                              *
00044>  * 1:_____________________________________________________________________     *
00045>  * 2:_____________________________________________________________________     *
00046>  * 3:_____________________________________________________________________     *
00047>  ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001-----------------------------------------------------------------------
00051> *#*****************************************************************************|
00052> *#  Project Name: 2076 LAKESHORE ROAD
00053> *#               BURLINGTON, ONTARIO
00054> *#  JOB NUMBER  : 25038
00055> *#       Date   : JULY 2025
00056> *#    Revised   :
00057> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00058> *#       File   : 25038.DAT
00059> *#*****************************************************************************|
00060> *
00061>   ** END OF RUN :   1
00062>
00063>  ********************************************************************************
00064>
00065>
00066>
00067>
00068>
00069> --------------------
00070> | START            |  Project  dir.: T:\projects\25038\SWMHYMO\
00071> ------------------   Rainfall dir.: T:\projects\25038\SWMHYMO\
00072>     TZERO =   .00 hrs on       0
00073>     METOUT=   2 (output = METRIC)
00074>     NRUN  = 002
00075>     NSTORM=   1
00076>            #  1=BUR6_002.stm
00077> --------------------------------------------------------------------------------
00078> 002:0002-----------------------------------------------------------------------
00079> *#*****************************************************************************|
00080> *#  Project Name: 2076 LAKESHORE ROAD
00081> *#               BURLINGTON, ONTARIO
00082> *#  JOB NUMBER  : 25038
00083> *#       Date   : JULY 2025
00084> *#    Revised   :
00085> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00086> *#       File   : 25038.DAT
00087> *#*****************************************************************************|
00088> *
00089> --------------------------------------------------------------------------------
00090> 002:0002-----------------------------------------------------------------------
00091> *
00092> --------------------
00093> | READ STORM       |    Filename: Burlington 2-yr 6hr CHICAGO  (A=681.52,
00094> | Ptotal=  40.93 mm|    Comments: Burlington 2-yr 6hr CHICAGO  (A=681.52,
00095> --------------------
00096>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00097>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00098>                 .17   1.715 |   1.67   8.325 |   3.17   4.467 |   4.67   2.213
00099>                 .33   1.858 |   1.83  19.646 |   3.33   3.978 |   4.83   2.105
00100>                 .50   2.032 |   2.00  78.391 |   3.50   3.595 |   5.00   2.008
00101>                 .67   2.247 |   2.17  25.776 |   3.67   3.286 |   5.17   1.920
00102>                 .83   2.522 |   2.33  13.777 |   3.83   3.030 |   5.33   1.841
00103>                1.00   2.888 |   2.50   9.511 |   4.00   2.815 |   5.50   1.769
00104>                1.17   3.399 |   2.67   7.331 |   4.17   2.632 |   5.67   1.703
00105>                1.33   4.172 |   2.83   6.005 |   4.33   2.474 |   5.83   1.642
00106>                1.50   5.492 |   3.00   5.111 |   4.50   2.335 |   6.00   1.586
00107>
00108> --------------------------------------------------------------------------------
00109> 002:0003-----------------------------------------------------------------------
00110> *
00111> *#*****************************************************************************|
00112> *#
00113> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00114> *#        ============================================
00115> *#
00116> **#****************************************************************************|
00117> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
00118> ----------------------
00119> | CALIB STANDHYD     |   Area    (ha)=     .14
00120> | 01:101    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   75.00
00121> ----------------------
00122>                               IMPERVIOUS    PERVIOUS (i)
00123>      Surface Area     (ha)=        .10          .04
00124>      Dep. Storage     (mm)=       1.00         1.30
00125>      Average Slope     (%)=       2.00         2.00
00126>      Length            (m)=      20.00        20.00
00127>      Mannings n            =       .013         .250
00128>
00129>      Max.eff.Inten.(mm/hr)=      78.39        62.83
00130>                over (min)        1.00         6.00
00131>      Storage Coeff.  (min)=        .87 (ii)    6.48 (ii)
00132>      Unit Hyd. Tpeak (min)=       1.00         6.00
00133>      Unit Hyd. peak  (cms)=       1.16          .18
00134>                                                          *TOTALS*
00135>      PEAK FLOW       (cms)=        .02          .00          .027 (iii)
00136>      TIME TO PEAK    (hrs)=       2.00         2.05         2.000
00137>      RUNOFF VOLUME    (mm)=      39.93        29.64        37.358
00138>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00139>      RUNOFF COEFFICIENT   =        .98          .72          .913
00140>
00141>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00142>            CN* =  95.0    Ia = Dep. Storage  (Above)
00143>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00144>            THAN THE STORAGE COEFFICIENT.
00145>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00146>
00147> --------------------------------------------------------------------------------
00148> 002:0004-----------------------------------------------------------------------
00149> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
00150> ----------------------
00151> | CALIB STANDHYD     |   Area    (ha)=     .08
00152> | 02:101    DT= 1.00 |   Total Imp(%)=   74.00   Dir. Conn.(%)=   74.00
00153> ----------------------
00154>                               IMPERVIOUS    PERVIOUS (i)
00155>      Surface Area     (ha)=        .06          .02
00156>      Dep. Storage     (mm)=       1.00         1.30
00157>      Average Slope     (%)=       3.50         3.50
00158>      Length            (m)=      10.00        35.00
00159>      Mannings n            =       .013         .250
00160>
00161>      Max.eff.Inten.(mm/hr)=      78.39        62.02
00162>                over (min)        1.00         7.00
00163>      Storage Coeff.  (min)=        .49 (ii)    7.15 (ii)
00164>      Unit Hyd. Tpeak (min)=       1.00         7.00
00165>      Unit Hyd. peak  (cms)=       1.48          .16
00166>                                                          *TOTALS*
00167>      PEAK FLOW       (cms)=        .01          .00          .015 (iii)
00168>      TIME TO PEAK    (hrs)=       1.95         2.07         2.000
00169>      RUNOFF VOLUME    (mm)=      39.93        29.64        37.256
00170>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00171>      RUNOFF COEFFICIENT   =        .98          .72          .910
00172>
00173>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00174>            CN* =  95.0    Ia = Dep. Storage  (Above)
00175>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00176>            THAN THE STORAGE COEFFICIENT.
00177>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00178>
00179> --------------------------------------------------------------------------------
00180> 002:0005-----------------------------------------------------------------------
00181> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
00182> ----------------------
00183> | CALIB STANDHYD     |   Area    (ha)=     .14
00184> | 03:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00185> ----------------------
00186>                               IMPERVIOUS    PERVIOUS (i)
00187>      Surface Area     (ha)=        .05          .09
00188>      Dep. Storage     (mm)=       1.00         1.30
00189>      Average Slope     (%)=       2.00         2.00
00190>      Length            (m)=      20.00        20.00
00191>      Mannings n            =       .013         .250
00192>
00193>      Max.eff.Inten.(mm/hr)=      78.39        62.83
00194>                over (min)        1.00         6.00
00195>      Storage Coeff.  (min)=        .87 (ii)    6.48 (ii)
00196>      Unit Hyd. Tpeak (min)=       1.00         6.00
00197>      Unit Hyd. peak  (cms)=       1.16          .18
00198>                                                          *TOTALS*
00199>      PEAK FLOW       (cms)=        .01          .01          .021 (iii)
00200>      TIME TO PEAK    (hrs)=       2.00         2.05         2.000
00201>      RUNOFF VOLUME    (mm)=      39.93        29.64        33.343
00202>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00203>      RUNOFF COEFFICIENT   =        .98          .72          .815
00204>
00205>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00206>            CN* =  95.0    Ia = Dep. Storage  (Above)
00207>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00208>            THAN THE STORAGE COEFFICIENT.
00209>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00210>
00211> --------------------------------------------------------------------------------
00212> 002:0006-----------------------------------------------------------------------
00213> *#*****************************************************************************|
00214> *#
00215> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00216> *#        ==============================================
00217> *#
00218> **#****************************************************************************|
00219> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
00220> ----------------------
00221> | CALIB STANDHYD     |   Area    (ha)=     .08
00222> | 04:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00223> ----------------------
00224>                               IMPERVIOUS    PERVIOUS (i)
00225>      Surface Area     (ha)=        .08          .00
00226>      Dep. Storage     (mm)=       1.00         1.30
00227>      Average Slope     (%)=       1.00         1.00
00228>      Length            (m)=      4.00         4.00
00229>      Mannings n            =       .013         .250
00230>
00231>      Max.eff.Inten.(mm/hr)=      78.39        64.85
00232>                over (min)        1.00         3.00
00233>      Storage Coeff.  (min)=        .41 (ii)    3.00 (ii)
00234>      Unit Hyd. Tpeak (min)=       1.00         3.00
00235>      Unit Hyd. peak  (cms)=       1.55          .38
00236>                                                          *TOTALS*
00237>      PEAK FLOW       (cms)=        .02          .00          .017 (iii)
00238>      TIME TO PEAK    (hrs)=       1.93         2.00         2.000
00239>      RUNOFF VOLUME    (mm)=      39.93        29.64        39.830
00240>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00241>      RUNOFF COEFFICIENT   =        .98          .72          .973
00242>
00243>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00244>            CN* =  95.0    Ia = Dep. Storage  (Above)
00245>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00246>            THAN THE STORAGE COEFFICIENT.
00247>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00248>
00249> --------------------------------------------------------------------------------
00250> 002:0007-----------------------------------------------------------------------
00251> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
00252> ----------------------
00253> | CALIB STANDHYD     |   Area    (ha)=     .01
00254> | 05:202    DT= 1.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
00255> ----------------------
00256>                               IMPERVIOUS    PERVIOUS (i)
00257>      Surface Area     (ha)=        .01          .00
00258>      Dep. Storage     (mm)=       1.00         1.30
00259>      Average Slope     (%)=       2.00         2.50
00260>      Length            (m)=      12.00        12.00
00261>      Mannings n            =       .013         .250
00262>
00263>      Max.eff.Inten.(mm/hr)=      78.39        64.24
00264>                over (min)        1.00         4.00
00265>      Storage Coeff.  (min)=        .64 (ii)    4.47 (ii)
00266>      Unit Hyd. Tpeak (min)=       1.00         4.00
00267>      Unit Hyd. peak  (cms)=       1.34          .26
00268>                                                          *TOTALS*
00269>      PEAK FLOW       (cms)=        .00          .00          .002 (iii)
00270>      TIME TO PEAK    (hrs)=       1.95         2.02         2.000
```

```
00271>      RUNOFF VOLUME    (mm)=      39.93        29.64         39.417
00272>      TOTAL RAINFALL   (mm)=      40.93        40.93         40.933
00273>      RUNOFF COEFFICIENT   =        .98          .72           .963
00274>
00275>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00276>            CN* =  95.0    Ia = Dep. Storage  (Above)
00277>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00278>            THAN THE STORAGE COEFFICIENT.
00279>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00280>
00281> ------------------------------------------------------------------------------
00282> 002:0008----------------------------------------------------------------------
00283> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
00284> ---------------------
00285> | CALIB STANDHYD     |   Area    (ha)=     .13
00286> | 06:203    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
00287> ---------------------
00288>                                IMPERVIOUS    PERVIOUS (i)
00289>      Surface Area     (ha)=        .11          .02
00290>      Dep. Storage     (mm)=       1.00         1.30
00291>      Average Slope     (%)=       4.00         4.00
00292>      Length            (m)=      45.00        45.00
00293>      Mannings n            =       .013         .250
00294>
00295>      Max.eff.Inten.(mm/hr)=      78.39        60.11
00296>                  over (min)        1.00         9.00
00297>      Storage Coeff.  (min)=       1.15 (ii)    8.69 (ii)
00298>      Unit Hyd. Tpeak (min)=       1.00         9.00
00299>      Unit Hyd. peak  (cms)=        .99          .13
00300>                                                          *TOTALS*
00301>      PEAK FLOW        (cms)=        .02          .00           .026 (iii)
00302>      TIME TO PEAK     (hrs)=       2.00         2.10          2.000
00303>      RUNOFF VOLUME     (mm)=      39.93        29.64         38.594
00304>      TOTAL RAINFALL   (mm)=      40.93        40.93         40.933
00305>      RUNOFF COEFFICIENT   =        .98          .72           .943
00306>
00307>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00308>            CN* =  95.0    Ia = Dep. Storage  (Above)
00309>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00310>            THAN THE STORAGE COEFFICIENT.
00311>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00312>
00313> ------------------------------------------------------------------------------
00314> 002:0009----------------------------------------------------------------------
00315> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
00316> *
00317> ---------------------
00318> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00319> |  IN>04:(201   )    |
00320> | OUT<07:(201   )    |    =========  OUTLFOW STORAGE TABLE  =========
00321> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00322>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00323>                             .000  .0000E+00    |     .016  .2500E-02
00324>                             .016  .1000E-03    |     .016  .2500E-02
00325>                             .016  .1000E-03    |     .020  .2600E-02
00326>                             .016  .9000E-03    |     .031  .3000E-02
00327>                             .016  .1700E-02    |     .000  .0000E+00
00328>
00329>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00330>      ---------------           (ha)     (cms)     (hrs)        (mm)
00331>      INFLOW >04: (201   )        .08      .017     2.000      39.830
00332>      OUTFLOW<07: (201   )        .08      .016     1.883      39.830
00333>     OVERFLOW<08: (OVF   )        .00      .000      .000        .000
00334>
00335>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00336>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00337>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00338>
00339>
00340>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   91.498
00341>                     TIME SHIFT OF PEAK FLOW          (min)=    -7.00
00342>                     MAXIMUM  STORAGE   USED       (ha.m.)=.1661E-03
00343>
00344> ------------------------------------------------------------------------------
00345> 002:0010----------------------------------------------------------------------
00346> ------------------------
00347> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00348> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
00349>                        ID1 05:202           .01      .002    2.00  39.42    .000
00350>                       +ID2 07:201           .08      .016    1.88  39.83    .000
00351>                       +ID3 08:OVF           .00      .000     .00    .00    .000
00352>                        ==========================================================
00353>                        SUM 09:Total          .09      .018    2.00  39.78    .000
00354>
00355>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00356>
00357> ------------------------------------------------------------------------------
00358> 002:0011----------------------------------------------------------------------
00359> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
00360> *
00361>   ** END OF RUN :   4
00362>
00363> ********************************************************************************
00364>
00365>
00366>
00367>
00368>
00369> ---------------------
00370> | START            |  Project  dir.: T:\projects\25038\SWMHYMO\
00371> ---------------------  Rainfall dir.: T:\projects\25038\SWMHYMO\
00372>     TZERO =   .00 hrs on       0
00373>     METOUT=  2 (output = METRIC)
00374>     NRUN  = 005
00375>     NSTORM=   1
00376>              #  1=BUR6_005.stm
00377> ------------------------------------------------------------------------------
00378> 005:0002----------------------------------------------------------------------
00379> *#*****************************************************************************|
00380> *#  Project Name: 2076 LAKESHORE ROAD
00381> *#               BURLINGTON, ONTARIO
00382> *#  JOB NUMBER  : 25038
00383> *#       Date   : JULY 2025
00384> *#    Revised   :
00385> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00386> *#       File   : 25038.DAT
00387> *#*****************************************************************************|
00388> *
00389> ------------------------------------------------------------------------------
00390> 005:0002----------------------------------------------------------------------
00391> *
00392> ---------------------
00393> | READ STORM       |    Filename: Burlington 5-yr 6hr CHICAGO    (A=802.04
00394> | Ptotal=  53.05 mm|    Comments: Burlington 5-yr 6hr CHICAGO    (A=802.04
00395> ---------------------
00396>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00397>               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
00398>               .17   2.348 |  1.67  10.690 |  3.17   5.897 |  4.67   3.004
00399>               .33   2.537 |  1.83  24.479 |  3.33   5.279 |  4.83   2.862
00400>               .50   2.766 |  2.00 101.312 |  3.50   4.790 |  5.00   2.734
00401>               .67   3.048 |  2.17  31.941 |  3.67   4.394 |  5.17   2.619
00402>               .83   3.407 |  2.33  17.333 |  3.83   4.065 |  5.33   2.514
00403>              1.00   3.881 |  2.50  12.145 |  4.00   3.788 |  5.50   2.419
00404>              1.17   4.539 |  2.67   9.469 |  4.17   3.550 |  5.67   2.331
00405>              1.33   5.523 |  2.83   7.826 |  4.33   3.344 |  5.83   2.251
00406>              1.50   7.185 |  3.00   6.709 |  4.50   3.164 |  6.00   2.176
00407>
00408> ------------------------------------------------------------------------------
00409> 005:0003----------------------------------------------------------------------
00410> *
00411> *#*****************************************************************************|
00412> *#
00413> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00414> *#        ==============================================
00415> *#
00416> **#*****************************************************************************|
00417> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
00418> ---------------------
00419> | CALIB STANDHYD     |   Area    (ha)=     .14
00420> | 01:101    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   75.00
00421> ---------------------
00422>                                IMPERVIOUS    PERVIOUS (i)
00423>      Surface Area     (ha)=        .10          .04
00424>      Dep. Storage     (mm)=       1.00         1.30
00425>      Average Slope     (%)=       2.00         2.00
00426>      Length            (m)=      20.00        20.00
00427>      Mannings n            =       .013         .250
00428>
00429>      Max.eff.Inten.(mm/hr)=     101.31        86.75
00430>                  over (min)        1.00         6.00
00431>      Storage Coeff.  (min)=        .79 (ii)    5.71 (ii)
00432>      Unit Hyd. Tpeak (min)=       1.00         6.00
00433>      Unit Hyd. peak  (cms)=       1.22          .19
00434>                                                          *TOTALS*
00435>      PEAK FLOW        (cms)=        .03          .01           .036 (iii)
00436>      TIME TO PEAK     (hrs)=       2.00         2.03          2.000
00437>      RUNOFF VOLUME     (mm)=      52.05        41.13         49.322
00438>      TOTAL RAINFALL   (mm)=      53.05        53.05         53.053
00439>      RUNOFF COEFFICIENT   =        .98          .78           .930
00440>
00441>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00442>            CN* =  95.0    Ia = Dep. Storage  (Above)
00443>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00444>            THAN THE STORAGE COEFFICIENT.
00445>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00446>
00447> ------------------------------------------------------------------------------
00448> 005:0004----------------------------------------------------------------------
00449> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
00450> ---------------------
00451> | CALIB STANDHYD     |   Area    (ha)=     .08
00452> | 02:101    DT= 1.00 |   Total Imp(%)=   74.00   Dir. Conn.(%)=   74.00
00453> ---------------------
00454>                                IMPERVIOUS    PERVIOUS (i)
00455>      Surface Area     (ha)=        .06          .02
00456>      Dep. Storage     (mm)=       1.00         1.30
00457>      Average Slope     (%)=       3.50         3.50
00458>      Length            (m)=      10.00        35.00
00459>      Mannings n            =       .013         .250
00460>
00461>      Max.eff.Inten.(mm/hr)=     101.31        86.75
00462>                  over (min)        1.00         6.00
00463>      Storage Coeff.  (min)=        .44 (ii)    6.27 (ii)
00464>      Unit Hyd. Tpeak (min)=       1.00         6.00
00465>      Unit Hyd. peak  (cms)=       1.53          .18
00466>                                                          *TOTALS*
00467>      PEAK FLOW        (cms)=        .02          .00           .020 (iii)
00468>      TIME TO PEAK     (hrs)=       1.93         2.03          2.000
00469>      RUNOFF VOLUME     (mm)=      52.05        41.13         49.213
00470>      TOTAL RAINFALL   (mm)=      53.05        53.05         53.053
00471>      RUNOFF COEFFICIENT   =        .98          .78           .928
00472>
00473>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00474>            CN* =  95.0    Ia = Dep. Storage  (Above)
00475>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00476>            THAN THE STORAGE COEFFICIENT.
00477>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00478>
00479> ------------------------------------------------------------------------------
00480> 005:0005----------------------------------------------------------------------
00481> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
00482> ---------------------
00483> | CALIB STANDHYD     |   Area    (ha)=     .14
00484> | 03:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00485> ---------------------
00486>                                IMPERVIOUS    PERVIOUS (i)
00487>      Surface Area     (ha)=        .05          .09
00488>      Dep. Storage     (mm)=       1.00         1.30
00489>      Average Slope     (%)=       2.00         2.00
00490>      Length            (m)=      20.00        20.00
00491>      Mannings n            =       .013         .250
00492>
00493>      Max.eff.Inten.(mm/hr)=     101.31        86.75
00494>                  over (min)        1.00         6.00
00495>      Storage Coeff.  (min)=        .79 (ii)    5.71 (ii)
00496>      Unit Hyd. Tpeak (min)=       1.00         6.00
00497>      Unit Hyd. peak  (cms)=       1.22          .19
00498>                                                          *TOTALS*
00499>      PEAK FLOW        (cms)=        .01          .02           .030 (iii)
00500>      TIME TO PEAK     (hrs)=       2.00         2.03          2.000
00501>      RUNOFF VOLUME     (mm)=      52.05        41.13         45.061
00502>      TOTAL RAINFALL   (mm)=      53.05        53.05         53.053
00503>      RUNOFF COEFFICIENT   =        .98          .78           .849
00504>
00505>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00506>            CN* =  95.0    Ia = Dep. Storage  (Above)
00507>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00508>            THAN THE STORAGE COEFFICIENT.
00509>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00510>
00511> ------------------------------------------------------------------------------
00512> 005:0006----------------------------------------------------------------------
00513> *#*****************************************************************************|
00514> *#
00515> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00516> *#        ===============================================
00517> *#
00518> **#*****************************************************************************|
00519> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
00520> ---------------------
00521> | CALIB STANDHYD     |   Area    (ha)=     .08
00522> | 04:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00523> ---------------------
00524>                                IMPERVIOUS    PERVIOUS (i)
00525>      Surface Area     (ha)=        .08          .00
00526>      Dep. Storage     (mm)=       1.00         1.30
00527>      Average Slope     (%)=       1.00         1.00
00528>      Length            (m)=       4.00         4.00
00529>      Mannings n            =       .013         .250
00530>
00531>      Max.eff.Inten.(mm/hr)=     101.31        88.82
00532>                  over (min)        1.00         3.00
00533>      Storage Coeff.  (min)=        .37 (ii)    2.66 (ii)
00534>      Unit Hyd. Tpeak (min)=       1.00         3.00
00535>      Unit Hyd. peak  (cms)=       1.59          .41
00536>                                                          *TOTALS*
00537>      PEAK FLOW        (cms)=        .02          .00           .022 (iii)
00538>      TIME TO PEAK     (hrs)=       1.93         2.00          2.000
00539>      RUNOFF VOLUME     (mm)=      52.05        41.13         51.944
00540>      TOTAL RAINFALL   (mm)=      53.05        53.05         53.053
```

```
00541>      RUNOFF COEFFICIENT   =        .98          .78           .979
00542>
00543>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00544>            CN* =  95.0    Ia = Dep. Storage  (Above)
00545>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00546>            THAN THE STORAGE COEFFICIENT.
00547>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00548>
00549> ---------------------------------------------------------------------------
00550> 005:0007-----------------------------------------------------------------------
00551> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
00552> ----------------------
00553> | CALIB STANDHYD     |   Area    (ha)=     .01
00554> | 05:202    DT= 1.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
00555> ----------------------
00556>                               IMPERVIOUS    PERVIOUS (i)
00557>      Surface Area     (ha)=        .01          .00
00558>      Dep. Storage     (mm)=       1.00         1.30
00559>      Average Slope     (%)=       2.00         2.50
00560>      Length            (m)=      12.00        12.00
00561>      Mannings n             =      .013         .250
00562>
00563>      Max.eff.Inten.(mm/hr)=     101.31        88.20
00564>                 over (min)        1.00         4.00
00565>      Storage Coeff.  (min)=        .58 (ii)     3.95 (ii)
00566>      Unit Hyd. Tpeak (min)=       1.00         4.00
00567>      Unit Hyd. peak  (cms)=       1.40          .29
00568>                                                          *TOTALS*
00569>      PEAK FLOW       (cms)=        .00          .00          .003 (iii)
00570>      TIME TO PEAK    (hrs)=       1.95         2.02         2.000
00571>      RUNOFF VOLUME    (mm)=      52.05        41.13        51.507
00572>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00573>      RUNOFF COEFFICIENT   =        .98          .78          .971
00574>
00575>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00576>            CN* =  95.0    Ia = Dep. Storage  (Above)
00577>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00578>            THAN THE STORAGE COEFFICIENT.
00579>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00580>
00581> ---------------------------------------------------------------------------
00582> 005:0008-----------------------------------------------------------------------
00583> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
00584> ----------------------
00585> | CALIB STANDHYD     |   Area    (ha)=     .13
00586> | 06:203    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
00587> ----------------------
00588>                               IMPERVIOUS    PERVIOUS (i)
00589>      Surface Area     (ha)=        .11          .02
00590>      Dep. Storage     (mm)=       1.00         1.30
00591>      Average Slope     (%)=       4.00         4.00
00592>      Length            (m)=      45.00        45.00
00593>      Mannings n             =      .013         .250
00594>
00595>      Max.eff.Inten.(mm/hr)=     101.31        84.94
00596>                 over (min)        1.00         8.00
00597>      Storage Coeff.  (min)=       1.04 (ii)    7.61 (ii)
00598>      Unit Hyd. Tpeak (min)=       1.00         8.00
00599>      Unit Hyd. peak  (cms)=       1.05          .15
00600>                                                          *TOTALS*
00601>      PEAK FLOW       (cms)=        .03          .00          .034 (iii)
00602>      TIME TO PEAK    (hrs)=       2.00         2.07         2.000
00603>      RUNOFF VOLUME    (mm)=      52.05        41.13        50.633
00604>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00605>      RUNOFF COEFFICIENT   =        .98          .78          .954
00606>
00607>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00608>            CN* =  95.0    Ia = Dep. Storage  (Above)
00609>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00610>            THAN THE STORAGE COEFFICIENT.
00611>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00612>
00613> ---------------------------------------------------------------------------
00614> 005:0009-----------------------------------------------------------------------
00615> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
00616> *
00617> ----------------------
00618> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00619> |  IN>04:(201   )    |
00620> | OUT<07:(201   )    |    =========  OUTLFOW STORAGE TABLE  =========
00621> ----------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
00622>                             (cms)     (ha.m.)    |    (cms)     (ha.m.)
00623>                              .000  .0000E+00     |     .016  .2500E-02
00624>                              .016  .1000E-03     |     .016  .2500E-02
00625>                              .016  .1000E-03     |     .020  .2600E-02
00626>                              .016  .9000E-03     |     .031  .3000E-02
00627>                              .016  .1700E-02     |     .000  .0000E+00
00628>
00629>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00630>      -------------------        (ha)     (cms)     (hrs)       (mm)
00631>      INFLOW >04: (201   )        .08      .022     2.000     51.944
00632>      OUTFLOW<07: (201   )        .08      .016     1.867     51.944
00633>     OVERFLOW<08: (OVF   )        .00      .000      .000       .000
00634>
00635>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00636>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00637>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00638>
00639>
00640>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   70.748
00641>                     TIME SHIFT OF PEAK FLOW          (min)=    -8.00
00642>                     MAXIMUM  STORAGE   USED       (ha.m.)=.4504E-03
00643>
00644> ---------------------------------------------------------------------------
00645> 005:0010-----------------------------------------------------------------------
00646> ----------------------
00647> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00648> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
00649>                        ID1 05:202          .01     .003    2.00  51.51    .000
00650>                       +ID2 07:201          .08     .016    1.87  51.94    .000
00651>                       +ID3 08:OVF          .00     .000     .00    .00    .000
00652>                        ==========================================================
00653>                        SUM 09:Total         .09     .019    2.00  51.90    .000
00654>
00655>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00656>
00657> ---------------------------------------------------------------------------
00658> 005:0011-----------------------------------------------------------------------
00659> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
00660> *
00661> ---------------------------------------------------------------------------
00662> 005:0002-----------------------------------------------------------------------
00663> *
00664>   ** END OF RUN :   9
00665>
00666> ***************************************************************************
00667>
00668>
00669>
00670>
00671>
00672> ----------------------
00673> | START              |  Project  dir.: T:\projects\25038\SWMHYMO\
00674> ----------------------  Rainfall dir.: T:\projects\25038\SWMHYMO\
00675>     TZERO =   .00 hrs on        0
00676>     METOUT=   2 (output = METRIC)
00677>     NRUN  = 010
00678>     NSTORM=   1
00679>              #  1=BUR6_010.stm
00680> ---------------------------------------------------------------------------
00681> 010:0002-----------------------------------------------------------------------
00682> *#*************************************************************************|
00683> *#  Project Name: 2076 LAKESHORE ROAD
00684> *#               BURLINGTON, ONTARIO
00685> *#  JOB NUMBER  : 25038
00686> *#       Date   : JULY 2025
00687> *#    Revised   :
00688> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00689> *#       File   : 25038.DAT
00690> *#*************************************************************************|
00691> *
00692> ---------------------------------------------------------------------------
00693> 010:0002-----------------------------------------------------------------------
00694> *
00695> --------------------
00696> | READ STORM       |    Filename: Burlington 10-yr 6hr CHICAGO     (A=918.
00697> | Ptotal=  61.10 mm|    Comments: Burlington 10-yr 6hr CHICAGO     (A=918.
00698> --------------------
00699>                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00700>                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00701>                  .17   2.714 |   1.67  12.326 |   3.17   6.808 |   4.67   3.472
00702>                  .33   2.933 |   1.83  28.176 |   3.33   6.095 |   4.83   3.308
00703>                  .50   3.197 |   2.00 116.310 |   3.50   5.532 |   5.00   3.161
00704>                  .67   3.523 |   2.17  36.748 |   3.67   5.075 |   5.17   3.027
00705>                  .83   3.937 |   2.33  19.967 |   3.83   4.696 |   5.33   2.907
00706>                 1.00   4.483 |   2.50  14.001 |   4.00   4.376 |   5.50   2.796
00707>                 1.17   5.242 |   2.67  10.921 |   4.17   4.102 |   5.67   2.695
00708>                 1.33   6.377 |   2.83   9.030 |   4.33   3.864 |   5.83   2.602
00709>                 1.50   8.291 |   3.00   7.743 |   4.50   3.656 |   6.00   2.516
00710>
00711> ---------------------------------------------------------------------------
00712> 010:0003-----------------------------------------------------------------------
00713> *
00714> *#*************************************************************************|
00715> *#
00716> *#         PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00717> *#         ==============================================
00718> *#
00719> **#************************************************************************|
00720> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
00721> ----------------------
00722> | CALIB STANDHYD     |   Area    (ha)=     .14
00723> | 01:101    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   75.00
00724> ----------------------
00725>                               IMPERVIOUS    PERVIOUS (i)
00726>      Surface Area     (ha)=        .10          .04
00727>      Dep. Storage     (mm)=       1.00         1.30
00728>      Average Slope     (%)=       2.00         2.00
00729>      Length            (m)=      20.00        20.00
00730>      Mannings n             =      .013         .250
00731>
00732>      Max.eff.Inten.(mm/hr)=     116.31       103.22
00733>                 over (min)        1.00         5.00
00734>      Storage Coeff.  (min)=        .74 (ii)     5.34 (ii)
00735>      Unit Hyd. Tpeak (min)=       1.00         5.00
00736>      Unit Hyd. peak  (cms)=       1.26          .22
00737>                                                          *TOTALS*
00738>      PEAK FLOW       (cms)=        .03          .01          .042 (iii)
00739>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
00740>      RUNOFF VOLUME    (mm)=      60.10        48.88        57.295
00741>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00742>      RUNOFF COEFFICIENT   =        .98          .80          .938
00743>
00744>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00745>            CN* =  95.0    Ia = Dep. Storage  (Above)
00746>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00747>            THAN THE STORAGE COEFFICIENT.
00748>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00749>
00750> ---------------------------------------------------------------------------
00751> 010:0004-----------------------------------------------------------------------
00752> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
00753> ----------------------
00754> | CALIB STANDHYD     |   Area    (ha)=     .08
00755> | 02:101    DT= 1.00 |   Total Imp(%)=   74.00   Dir. Conn.(%)=   74.00
00756> ----------------------
00757>                               IMPERVIOUS    PERVIOUS (i)
00758>      Surface Area     (ha)=        .06          .02
00759>      Dep. Storage     (mm)=       1.00         1.30
00760>      Average Slope     (%)=       3.50         3.50
00761>      Length            (m)=      10.00        35.00
00762>      Mannings n             =      .013         .250
00763>
00764>      Max.eff.Inten.(mm/hr)=     116.31       102.46
00765>                 over (min)        1.00         6.00
00766>      Storage Coeff.  (min)=        .41 (ii)     5.87 (ii)
00767>      Unit Hyd. Tpeak (min)=       1.00         6.00
00768>      Unit Hyd. peak  (cms)=       1.55          .19
00769>                                                          *TOTALS*
00770>      PEAK FLOW       (cms)=        .02          .00          .023 (iii)
00771>      TIME TO PEAK    (hrs)=       1.93         2.03         2.000
00772>      RUNOFF VOLUME    (mm)=      60.10        48.88        57.182
00773>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00774>      RUNOFF COEFFICIENT   =        .98          .80          .936
00775>
00776>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00777>            CN* =  95.0    Ia = Dep. Storage  (Above)
00778>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00779>            THAN THE STORAGE COEFFICIENT.
00780>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00781>
00782> ---------------------------------------------------------------------------
00783> 010:0005-----------------------------------------------------------------------
00784> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
00785> ----------------------
00786> | CALIB STANDHYD     |   Area    (ha)=     .14
00787> | 03:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00788> ----------------------
00789>                               IMPERVIOUS    PERVIOUS (i)
00790>      Surface Area     (ha)=        .05          .09
00791>      Dep. Storage     (mm)=       1.00         1.30
00792>      Average Slope     (%)=       2.00         2.00
00793>      Length            (m)=      20.00        20.00
00794>      Mannings n             =      .013         .250
00795>
00796>      Max.eff.Inten.(mm/hr)=     116.31       103.22
00797>                 over (min)        1.00         5.00
00798>      Storage Coeff.  (min)=        .74 (ii)     5.34 (ii)
00799>      Unit Hyd. Tpeak (min)=       1.00         5.00
00800>      Unit Hyd. peak  (cms)=       1.26          .22
00801>                                                          *TOTALS*
00802>      PEAK FLOW       (cms)=        .02          .02          .036 (iii)
00803>      TIME TO PEAK    (hrs)=       1.98         2.03         2.000
00804>      RUNOFF VOLUME    (mm)=      60.10        48.87        52.917
00805>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00806>      RUNOFF COEFFICIENT   =        .98          .80          .866
00807>
00808>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00809>            CN* =  95.0    Ia = Dep. Storage  (Above)
00810>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
00811>           THAN THE STORAGE COEFFICIENT.
00812>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00813>
00814> ---------------------------------------------------------------------------
00815> 010:0006-----------------------------------------------------------------
00816> *#*************************************************************************|
00817> *#
00818> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00819> *#        ==============================================
00820> *#
00821> **#************************************************************************|
00822> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
00823> ----------------------
00824> | CALIB STANDHYD     |   Area    (ha)=     .08
00825> | 04:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00826> ----------------------
00827>                              IMPERVIOUS    PERVIOUS (i)
00828>      Surface Area     (ha)=        .08          .00
00829>      Dep. Storage     (mm)=       1.00         1.30
00830>      Average Slope     (%)=       1.00         1.00
00831>      Length            (m)=       4.00         4.00
00832>      Mannings n            =       .013         .250
00833>
00834>      Max.eff.Inten.(mm/hr)=     116.31       105.07
00835>                    over (min)        1.00         2.00
00836>      Storage Coeff.  (min)=        .35 (ii)    2.49 (ii)
00837>      Unit Hyd. Tpeak (min)=       1.00         2.00
00838>      Unit Hyd. peak  (cms)=       1.60          .48
00839>                                                          *TOTALS*
00840>      PEAK FLOW       (cms)=        .03          .00          .026 (iii)
00841>      TIME TO PEAK    (hrs)=       1.92         2.00         2.000
00842>      RUNOFF VOLUME    (mm)=      60.10        48.88        59.989
00843>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00844>      RUNOFF COEFFICIENT   =        .98          .80          .982
00845>
00846>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00847>            CN* =  95.0    Ia = Dep. Storage  (Above)
00848>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00849>            THAN THE STORAGE COEFFICIENT.
00850>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00851>
00852> ---------------------------------------------------------------------------
00853> 010:0007-----------------------------------------------------------------
00854> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
00855> ----------------------
00856> | CALIB STANDHYD     |   Area    (ha)=     .01
00857> | 05:202    DT= 1.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
00858> ----------------------
00859>                              IMPERVIOUS    PERVIOUS (i)
00860>      Surface Area     (ha)=        .01          .00
00861>      Dep. Storage     (mm)=       1.00         1.30
00862>      Average Slope     (%)=       2.00         2.50
00863>      Length            (m)=      12.00        12.00
00864>      Mannings n            =       .013         .250
00865>
00866>      Max.eff.Inten.(mm/hr)=     116.31       103.90
00867>                    over (min)        1.00         4.00
00868>      Storage Coeff.  (min)=        .55 (ii)    3.70 (ii)
00869>      Unit Hyd. Tpeak (min)=       1.00         4.00
00870>      Unit Hyd. peak  (cms)=       1.43          .30
00871>                                                          *TOTALS*
00872>      PEAK FLOW       (cms)=        .00          .00          .003 (iii)
00873>      TIME TO PEAK    (hrs)=       1.93         2.02         2.000
00874>      RUNOFF VOLUME    (mm)=      60.10        48.88        59.539
00875>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00876>      RUNOFF COEFFICIENT   =        .98          .80          .974
00877>
00878>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00879>            CN* =  95.0    Ia = Dep. Storage  (Above)
00880>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00881>            THAN THE STORAGE COEFFICIENT.
00882>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00883>
00884> ---------------------------------------------------------------------------
00885> 010:0008-----------------------------------------------------------------
00886> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
00887> ----------------------
00888> | CALIB STANDHYD     |   Area    (ha)=     .13
00889> | 06:203    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
00890> ----------------------
00891>                              IMPERVIOUS    PERVIOUS (i)
00892>      Surface Area     (ha)=        .11          .02
00893>      Dep. Storage     (mm)=       1.00         1.30
00894>      Average Slope     (%)=       4.00         4.00
00895>      Length            (m)=      45.00        45.00
00896>      Mannings n            =       .013         .250
00897>
00898>      Max.eff.Inten.(mm/hr)=     116.31       101.60
00899>                    over (min)        1.00         7.00
00900>      Storage Coeff.  (min)=        .98 (ii)    7.10 (ii)
00901>      Unit Hyd. Tpeak (min)=       1.00         7.00
00902>      Unit Hyd. peak  (cms)=       1.08          .16
00903>                                                          *TOTALS*
00904>      PEAK FLOW       (cms)=        .04          .00          .040 (iii)
00905>      TIME TO PEAK    (hrs)=       2.00         2.05         2.000
00906>      RUNOFF VOLUME    (mm)=      60.10        48.88        58.642
00907>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00908>      RUNOFF COEFFICIENT   =        .98          .80          .960
00909>
00910>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00911>            CN* =  95.0    Ia = Dep. Storage  (Above)
00912>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00913>            THAN THE STORAGE COEFFICIENT.
00914>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00915>
00916> ---------------------------------------------------------------------------
00917> 010:0009-----------------------------------------------------------------
00918> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
00919> *
00920> ----------------------
00921> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00922> |  IN>04:(201   )    |
00923> | OUT<07:(201   )    |    =========  OUTLFOW STORAGE TABLE  =========
00924> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00925>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
00926>                              .000  .0000E+00    |     .016  .2500E-02
00927>                              .016  .1000E-03    |     .016  .2500E-02
00928>                              .016  .1000E-03    |     .020  .2600E-02
00929>                              .016  .9000E-03    |     .031  .3000E-02
00930>                              .016  .1700E-02    |     .000  .0000E+00
00931>
00932>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00933>      --------------------        (ha)     (cms)     (hrs)       (mm)
00934>      INFLOW >04: (201   )         .08      .026     2.000     59.989
00935>      OUTFLOW<07: (201   )         .08      .016     1.867     59.989
00936>     OVERFLOW<08: (OVF   )         .00      .000      .000       .000
00937>
00938>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00939>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00940>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00941>
00942>
00943>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   61.599
00944>                    TIME SHIFT OF PEAK FLOW         (min)=    -8.00
00945>                    MAXIMUM  STORAGE   USED       (ha.m.)=.6463E-03
00946>
00947> ---------------------------------------------------------------------------
00948> 010:0010-----------------------------------------------------------------
00949> ----------------------
00950> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00951> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
00952>                        ID1 05:202           .01     .003    2.00  59.54    .000
00953>                       +ID2 07:201           .08     .016    1.87  59.99    .000
00954>                       +ID3 08:OVF           .00     .000     .00    .00    .000
00955>                        ==========================================================
00956>                        SUM 09:Total          .09     .019    2.00  59.94    .000
00957>
00958>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00959>
00960> ---------------------------------------------------------------------------
00961> 010:0011-----------------------------------------------------------------
00962> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
00963> *
00964> ---------------------------------------------------------------------------
00965> 010:0002-----------------------------------------------------------------
00966> *
00967> ---------------------------------------------------------------------------
00968> 010:0002-----------------------------------------------------------------
00969> *
00970>   ** END OF RUN :  24
00971>
00972> ***************************************************************************
00973>
00974>
00975>
00976>
00977>
00978> --------------------
00979> | START            |  Project  dir.: T:\projects\25038\SWMHYMO\
00980> --------------------  Rainfall dir.: T:\projects\25038\SWMHYMO\
00981>     TZERO =   .00 hrs on        0
00982>     METOUT=   2 (output = METRIC)
00983>     NRUN  = 025
00984>     NSTORM=   1
00985>            #  1=BUR6_025.stm
00986> ---------------------------------------------------------------------------
00987> 025:0002-----------------------------------------------------------------
00988> *#*************************************************************************|
00989> *#  Project Name: 2076 LAKESHORE ROAD
00990> *#               BURLINGTON, ONTARIO
00991> *#  JOB NUMBER   : 25038
00992> *#       Date    : JULY 2025
00993> *#    Revised    :
00994> *#    Company    : S. LLEWELLYN AND ASSOCIATES LTD.
00995> *#       File    : 25038.DAT
00996> *#*************************************************************************|
00997> *
00998> ---------------------------------------------------------------------------
00999> 025:0002-----------------------------------------------------------------
01000> *
01001> --------------------
01002> | READ STORM       |    Filename: Burlington 25-yr 6hr CHICAGO      (A=106
01003> | Ptotal=  71.35 mm|    Comments: Burlington 25-yr 6hr CHICAGO      (A=106
01004> --------------------
01005>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01006>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01007>                .17   3.182 |   1.67  14.410 |   3.17   7.968 |   4.67   4.068
01008>                .33   3.437 |   1.83  32.881 |   3.33   7.135 |   4.83   3.876
01009>                .50   3.746 |   2.00 135.380 |   3.50   6.477 |   5.00   3.704
01010>                .67   4.128 |   2.17  42.866 |   3.67   5.943 |   5.17   3.548
01011>                .83   4.612 |   2.33  23.321 |   3.83   5.499 |   5.33   3.407
01012>               1.00   5.251 |   2.50  16.365 |   4.00   5.125 |   5.50   3.278
01013>               1.17   6.138 |   2.67  12.771 |   4.17   4.805 |   5.67   3.160
01014>               1.33   7.465 |   2.83  10.563 |   4.33   4.527 |   5.83   3.051
01015>               1.50   9.700 |   3.00   9.061 |   4.50   4.284 |   6.00   2.950
01016>
01017> ---------------------------------------------------------------------------
01018> 025:0003-----------------------------------------------------------------
01019> *
01020> *#*************************************************************************|
01021> *#
01022> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01023> *#        ==============================================
01024> *#
01025> **#************************************************************************|
01026> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
01027> ----------------------
01028> | CALIB STANDHYD     |   Area    (ha)=     .14
01029> | 01:101    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   75.00
01030> ----------------------
01031>                              IMPERVIOUS    PERVIOUS (i)
01032>      Surface Area     (ha)=        .10          .04
01033>      Dep. Storage     (mm)=       1.00         1.30
01034>      Average Slope     (%)=       2.00         2.00
01035>      Length            (m)=      20.00        20.00
01036>      Mannings n            =       .013         .250
01037>
01038>      Max.eff.Inten.(mm/hr)=     135.38       123.14
01039>                    over (min)        1.00         5.00
01040>      Storage Coeff.  (min)=        .70 (ii)    4.98 (ii)
01041>      Unit Hyd. Tpeak (min)=       1.00         5.00
01042>      Unit Hyd. peak  (cms)=       1.29          .23
01043>                                                          *TOTALS*
01044>      PEAK FLOW       (cms)=        .04          .01          .049 (iii)
01045>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
01046>      RUNOFF VOLUME    (mm)=      70.35        58.82        67.465
01047>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
01048>      RUNOFF COEFFICIENT   =        .99          .82          .946
01049>
01050>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01051>            CN* =  95.0    Ia = Dep. Storage  (Above)
01052>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01053>            THAN THE STORAGE COEFFICIENT.
01054>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01055>
01056> ---------------------------------------------------------------------------
01057> 025:0004-----------------------------------------------------------------
01058> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
01059> ----------------------
01060> | CALIB STANDHYD     |   Area    (ha)=     .08
01061> | 02:101    DT= 1.00 |   Total Imp(%)=   74.00   Dir. Conn.(%)=   74.00
01062> ----------------------
01063>                              IMPERVIOUS    PERVIOUS (i)
01064>      Surface Area     (ha)=        .06          .02
01065>      Dep. Storage     (mm)=       1.00         1.30
01066>      Average Slope     (%)=       3.50         3.50
01067>      Length            (m)=      10.00        35.00
01068>      Mannings n            =       .013         .250
01069>
01070>      Max.eff.Inten.(mm/hr)=     135.38       123.14
01071>                    over (min)        1.00         5.00
01072>      Storage Coeff.  (min)=        .39 (ii)    5.46 (ii)
01073>      Unit Hyd. Tpeak (min)=       1.00         5.00
01074>      Unit Hyd. peak  (cms)=       1.57          .21
01075>                                                          *TOTALS*
01076>      PEAK FLOW       (cms)=        .02          .01          .028 (iii)
01077>      TIME TO PEAK    (hrs)=       1.93         2.02         2.000
01078>      RUNOFF VOLUME    (mm)=      70.35        58.82        67.350
01079>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
01080>      RUNOFF COEFFICIENT   =        .99          .82          .944
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01081>
01082>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01083>            CN* =  95.0    Ia = Dep. Storage  (Above)
01084>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01085>            THAN THE STORAGE COEFFICIENT.
01086>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01087>
01088> ---------------------------------------------------------------------------
01089> 025:0005----------------------------------------------------------------------
01090> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
01091> ---------------------
01092> | CALIB STANDHYD     |   Area    (ha)=     .14
01093> | 03:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
01094> ---------------------
01095>                              IMPERVIOUS    PERVIOUS (i)
01096>      Surface Area     (ha)=        .05          .09
01097>      Dep. Storage     (mm)=       1.00         1.30
01098>      Average Slope     (%)=       2.00         2.00
01099>      Length            (m)=      20.00        20.00
01100>      Mannings n            =      .013         .250
01101>
01102>      Max.eff.Inten.(mm/hr)=     135.38       123.14
01103>                  over (min)        1.00         5.00
01104>      Storage Coeff.  (min)=        .70 (ii)    4.98 (ii)
01105>      Unit Hyd. Tpeak (min)=       1.00         5.00
01106>      Unit Hyd. peak  (cms)=       1.29          .23
01107>                                                          *TOTALS*
01108>      PEAK FLOW       (cms)=        .02           .02          .043 (iii)
01109>      TIME TO PEAK    (hrs)=       1.98          2.02         2.000
01110>      RUNOFF VOLUME    (mm)=      70.35         58.82        62.970
01111>      TOTAL RAINFALL   (mm)=      71.35         71.35        71.347
01112>      RUNOFF COEFFICIENT   =        .99           .82          .883
01113>
01114>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01115>            CN* =  95.0    Ia = Dep. Storage  (Above)
01116>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01117>            THAN THE STORAGE COEFFICIENT.
01118>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01119>
01120> ---------------------------------------------------------------------------
01121> 025:0006----------------------------------------------------------------------
01122> *#*************************************************************************|
01123> *#
01124> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01125> *#        ==============================================
01126> *#
01127> **#************************************************************************|
01128> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
01129> ---------------------
01130> | CALIB STANDHYD     |   Area    (ha)=     .08
01131> | 04:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01132> ---------------------
01133>                              IMPERVIOUS    PERVIOUS (i)
01134>      Surface Area     (ha)=        .08          .00
01135>      Dep. Storage     (mm)=       1.00         1.30
01136>      Average Slope     (%)=       1.00         1.00
01137>      Length            (m)=       4.00         4.00
01138>      Mannings n            =      .013         .250
01139>
01140>      Max.eff.Inten.(mm/hr)=     135.38       124.94
01141>                  over (min)        1.00         2.00
01142>      Storage Coeff.  (min)=        .33 (ii)    2.32 (ii)
01143>      Unit Hyd. Tpeak (min)=       1.00         2.00
01144>      Unit Hyd. peak  (cms)=       1.62          .51
01145>                                                          *TOTALS*
01146>      PEAK FLOW       (cms)=        .03           .00          .030 (iii)
01147>      TIME TO PEAK    (hrs)=       1.92          2.00         2.000
01148>      RUNOFF VOLUME    (mm)=      70.35         58.82        70.231
01149>      TOTAL RAINFALL   (mm)=      71.35         71.35        71.347
01150>      RUNOFF COEFFICIENT   =        .99           .82          .984
01151>
01152>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01153>            CN* =  95.0    Ia = Dep. Storage  (Above)
01154>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01155>            THAN THE STORAGE COEFFICIENT.
01156>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01157>
01158> ---------------------------------------------------------------------------
01159> 025:0007----------------------------------------------------------------------
01160> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
01161> ---------------------
01162> | CALIB STANDHYD     |   Area    (ha)=     .01
01163> | 05:202    DT= 1.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
01164> ---------------------
01165>                              IMPERVIOUS    PERVIOUS (i)
01166>      Surface Area     (ha)=        .01          .00
01167>      Dep. Storage     (mm)=       1.00         1.30
01168>      Average Slope     (%)=       2.00         2.50
01169>      Length            (m)=      12.00        12.00
01170>      Mannings n            =      .013         .250
01171>
01172>      Max.eff.Inten.(mm/hr)=     135.38       124.40
01173>                  over (min)        1.00         3.00
01174>      Storage Coeff.  (min)=        .52 (ii)    3.45 (ii)
01175>      Unit Hyd. Tpeak (min)=       1.00         3.00
01176>      Unit Hyd. peak  (cms)=       1.46          .34
01177>                                                          *TOTALS*
01178>      PEAK FLOW       (cms)=        .00           .00          .004 (iii)
01179>      TIME TO PEAK    (hrs)=       1.93          2.00         2.000
01180>      RUNOFF VOLUME    (mm)=      70.35         58.82        69.770
01181>      TOTAL RAINFALL   (mm)=      71.35         71.35        71.347
01182>      RUNOFF COEFFICIENT   =        .99           .82          .978
01183>
01184>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01185>            CN* =  95.0    Ia = Dep. Storage  (Above)
01186>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01187>            THAN THE STORAGE COEFFICIENT.
01188>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01189>
01190> ---------------------------------------------------------------------------
01191> 025:0008----------------------------------------------------------------------
01192> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
01193> ---------------------
01194> | CALIB STANDHYD     |   Area    (ha)=     .13
01195> | 06:203    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
01196> ---------------------
01197>                              IMPERVIOUS    PERVIOUS (i)
01198>      Surface Area     (ha)=        .11          .02
01199>      Dep. Storage     (mm)=       1.00         1.30
01200>      Average Slope     (%)=       4.00         4.00
01201>      Length            (m)=      45.00        45.00
01202>      Mannings n            =      .013         .250
01203>
01204>      Max.eff.Inten.(mm/hr)=     135.38       121.55
01205>                  over (min)        1.00         7.00
01206>      Storage Coeff.  (min)=        .92 (ii)    6.62 (ii)
01207>      Unit Hyd. Tpeak (min)=       1.00         7.00
01208>      Unit Hyd. peak  (cms)=       1.12          .17
01209>                                                          *TOTALS*
01210>      PEAK FLOW       (cms)=        .04           .00          .046 (iii)
01211>      TIME TO PEAK    (hrs)=       2.00          2.05         2.000
01212>      RUNOFF VOLUME    (mm)=      70.35         58.82        68.848
01213>      TOTAL RAINFALL   (mm)=      71.35         71.35        71.347
01214>      RUNOFF COEFFICIENT   =        .99           .82          .965
01215>
01216>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01217>            CN* =  95.0    Ia = Dep. Storage  (Above)
01218>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01219>            THAN THE STORAGE COEFFICIENT.
01220>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01221>
01222> ---------------------------------------------------------------------------
01223> 025:0009----------------------------------------------------------------------
01224> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
01225> *
01226> ---------------------
01227> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01228> |  IN>04:(201   )    |
01229> | OUT<07:(201   )    |    =========  OUTLFOW STORAGE TABLE  =========
01230> ---------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
01231>                            (cms)     (ha.m.)    |    (cms)     (ha.m.)
01232>                             .000  .0000E+00     |     .016  .2500E-02
01233>                             .016  .1000E-03     |     .016  .2500E-02
01234>                             .016  .1000E-03     |     .020  .2600E-02
01235>                             .016  .9000E-03     |     .031  .3000E-02
01236>                             .016  .1700E-02     |     .000  .0000E+00
01237>
01238>      ROUTING RESULTS            AREA     QPEAK     TPEAK        R.V.
01239>      --------------------       (ha)     (cms)     (hrs)        (mm)
01240>      INFLOW >04: (201   )        .08      .030     2.000      70.231
01241>      OUTFLOW<07: (201   )        .08      .016     1.867      70.231
01242>     OVERFLOW<08: (OVF   )        .00      .000      .000       .000
01243>
01244>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
01245>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
01246>                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
01247>
01248>
01249>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   52.907
01250>                    TIME SHIFT OF PEAK FLOW        (min)=    -8.00
01251>                    MAXIMUM  STORAGE   USED       (ha.m.)=.8947E-03
01252>
01253> ---------------------------------------------------------------------------
01254> 025:0010----------------------------------------------------------------------
01255> ------------------------
01256> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01257> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01258>                          ID1 05:202         .01     .004    2.00  69.77    .000
01259>                         +ID2 07:201         .08     .016    1.87  70.23    .000
01260>                         +ID3 08:OVF         .00     .000     .00    .00    .000
01261>                          ==========================================================
01262>                          SUM 09:Total       .09     .020    2.00  70.18    .000
01263>
01264>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01265>
01266> ---------------------------------------------------------------------------
01267> 025:0011----------------------------------------------------------------------
01268> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
01269> *
01270> ---------------------------------------------------------------------------
01271> 025:0002----------------------------------------------------------------------
01272> *
01273> ---------------------------------------------------------------------------
01274> 025:0002----------------------------------------------------------------------
01275> *
01276> ---------------------------------------------------------------------------
01277> 025:0002----------------------------------------------------------------------
01278> *
01279>   ** END OF RUN :  49
01280>
01281> ***************************************************************************
01282>
01283>
01284>
01285>
01286>
01287> --------------------
01288> | START            |  Project  dir.: T:\projects\25038\SWMHYMO\
01289> --------------------  Rainfall dir.: T:\projects\25038\SWMHYMO\
01290>     TZERO =   .00 hrs on       0
01291>     METOUT=   2 (output = METRIC)
01292>     NRUN  = 050
01293>     NSTORM=   1
01294>               #  1=BUR6_050.stm
01295> ---------------------------------------------------------------------------
01296> 050:0002----------------------------------------------------------------------
01297> *#*************************************************************************|
01298> *#  Project Name: 2076 LAKESHORE ROAD
01299> *#               BURLINGTON, ONTARIO
01300> *#  JOB NUMBER  : 25038
01301> *#       Date   : JULY 2025
01302> *#    Revised   :
01303> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
01304> *#       File   : 25038.DAT
01305> *#*************************************************************************|
01306> *
01307> ---------------------------------------------------------------------------
01308> 050:0002----------------------------------------------------------------------
01309> *
01310> --------------------
01311> | READ STORM       |    Filename: Burlington 50-yr 6hr CHICAGO     (A=1172
01312> | Ptotal=  78.93 mm|    Comments: Burlington 50-yr 6hr CHICAGO     (A=1172
01313> --------------------
01314>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01315>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01316>                .17   3.533 |   1.67  15.961 |   3.17   8.836 |   4.67   4.516
01317>                .33   3.817 |   1.83  36.356 |   3.33   7.913 |   4.83   4.304
01318>                .50   4.160 |   2.00 149.296 |   3.50   7.185 |   5.00   4.113
01319>                .67   4.582 |   2.17  47.374 |   3.67   6.593 |   5.17   3.940
01320>                .83   5.119 |   2.33  25.806 |   3.83   6.102 |   5.33   3.783
01321>               1.00   5.827 |   2.50  18.121 |   4.00   5.688 |   5.50   3.640
01322>               1.17   6.809 |   2.67  14.149 |   4.17   5.333 |   5.67   3.509
01323>               1.33   8.278 |   2.83  11.707 |   4.33   5.025 |   5.83   3.388
01324>               1.50  10.753 |   3.00  10.045 |   4.50   4.755 |   6.00   3.277
01325>
01326> ---------------------------------------------------------------------------
01327> 050:0003----------------------------------------------------------------------
01328> *
01329> *#*************************************************************************|
01330> *#
01331> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01332> *#        ==============================================
01333> *#
01334> **#************************************************************************|
01335> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
01336> ---------------------
01337> | CALIB STANDHYD     |   Area    (ha)=     .14
01338> | 01:101    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   75.00
01339> ---------------------
01340>                              IMPERVIOUS    PERVIOUS (i)
01341>      Surface Area     (ha)=        .10          .04
01342>      Dep. Storage     (mm)=       1.00         1.30
01343>      Average Slope     (%)=       2.00         2.00
01344>      Length            (m)=      20.00        20.00
01345>      Mannings n            =      .013         .250
01346>
01347>      Max.eff.Inten.(mm/hr)=     149.30       137.65
01348>                  over (min)        1.00         5.00
01349>      Storage Coeff.  (min)=        .67 (ii)    4.77 (ii)
01350>      Unit Hyd. Tpeak (min)=       1.00         5.00
```

```
01351>      Unit Hyd. peak  (cms)=       1.31          .23
01352>                                                          *TOTALS*
01353>      PEAK FLOW       (cms)=        .04          .01          .054 (iii)
01354>      TIME TO PEAK    (hrs)=       1.98         2.02         2.000
01355>      RUNOFF VOLUME    (mm)=      77.93        66.23        75.006
01356>      TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
01357>      RUNOFF COEFFICIENT   =        .99          .84          .950
01358>
01359>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01360>            CN* =  95.0    Ia = Dep. Storage  (Above)
01361>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01362>            THAN THE STORAGE COEFFICIENT.
01363>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01364>
01365> ---------------------------------------------------------------------------
01366> 050:0004----------------------------------------------------------------------
01367> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
01368> ----------------------
01369> | CALIB STANDHYD     |   Area    (ha)=     .08
01370> | 02:101    DT= 1.00 |   Total Imp(%)=   74.00   Dir. Conn.(%)=   74.00
01371> ----------------------
01372>                              IMPERVIOUS    PERVIOUS (i)
01373>      Surface Area     (ha)=        .06          .02
01374>      Dep. Storage     (mm)=       1.00         1.30
01375>      Average Slope     (%)=       3.50         3.50
01376>      Length            (m)=      10.00        35.00
01377>      Mannings n            =       .013         .250
01378>
01379>      Max.eff.Inten.(mm/hr)=     149.30       137.65
01380>                    over (min)        1.00         5.00
01381>      Storage Coeff.  (min)=        .38 (ii)     5.22 (ii)
01382>      Unit Hyd. Tpeak (min)=       1.00         5.00
01383>      Unit Hyd. peak  (cms)=       1.58          .22
01384>                                                          *TOTALS*
01385>      PEAK FLOW       (cms)=        .02          .01          .031 (iii)
01386>      TIME TO PEAK    (hrs)=       1.93         2.02         2.000
01387>      RUNOFF VOLUME    (mm)=      77.93        66.23        74.889
01388>      TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
01389>      RUNOFF COEFFICIENT   =        .99          .84          .949
01390>
01391>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01392>            CN* =  95.0    Ia = Dep. Storage  (Above)
01393>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01394>            THAN THE STORAGE COEFFICIENT.
01395>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01396>
01397> ---------------------------------------------------------------------------
01398> 050:0005----------------------------------------------------------------------
01399> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
01400> ----------------------
01401> | CALIB STANDHYD     |   Area    (ha)=     .14
01402> | 03:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
01403> ----------------------
01404>                              IMPERVIOUS    PERVIOUS (i)
01405>      Surface Area     (ha)=        .05          .09
01406>      Dep. Storage     (mm)=       1.00         1.30
01407>      Average Slope     (%)=       2.00         2.00
01408>      Length            (m)=      20.00        20.00
01409>      Mannings n            =       .013         .250
01410>
01411>      Max.eff.Inten.(mm/hr)=     149.30       137.65
01412>                    over (min)        1.00         5.00
01413>      Storage Coeff.  (min)=        .67 (ii)     4.77 (ii)
01414>      Unit Hyd. Tpeak (min)=       1.00         5.00
01415>      Unit Hyd. peak  (cms)=       1.31          .23
01416>                                                          *TOTALS*
01417>      PEAK FLOW       (cms)=        .02          .03          .049 (iii)
01418>      TIME TO PEAK    (hrs)=       1.98         2.02         2.000
01419>      RUNOFF VOLUME    (mm)=      77.93        66.23        70.441
01420>      TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
01421>      RUNOFF COEFFICIENT   =        .99          .84          .892
01422>
01423>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01424>            CN* =  95.0    Ia = Dep. Storage  (Above)
01425>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01426>            THAN THE STORAGE COEFFICIENT.
01427>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01428>
01429> ---------------------------------------------------------------------------
01430> 050:0006----------------------------------------------------------------------
01431> *#############################################################################|
01432> *#
01433> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01434> *#        ==============================================
01435> *#
01436> **#############################################################################|
01437> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
01438> ----------------------
01439> | CALIB STANDHYD     |   Area    (ha)=     .08
01440> | 04:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01441> ----------------------
01442>                              IMPERVIOUS    PERVIOUS (i)
01443>      Surface Area     (ha)=        .08          .00
01444>      Dep. Storage     (mm)=       1.00         1.30
01445>      Average Slope     (%)=       1.00         1.00
01446>      Length            (m)=       4.00         4.00
01447>      Mannings n            =       .013         .250
01448>
01449>      Max.eff.Inten.(mm/hr)=     149.30       139.40
01450>                    over (min)        1.00         2.00
01451>      Storage Coeff.  (min)=        .32 (ii)     2.23 (ii)
01452>      Unit Hyd. Tpeak (min)=       1.00         2.00
01453>      Unit Hyd. peak  (cms)=       1.63          .52
01454>                                                          *TOTALS*
01455>      PEAK FLOW       (cms)=        .03          .00          .033 (iii)
01456>      TIME TO PEAK    (hrs)=       1.92         2.00         2.000
01457>      RUNOFF VOLUME    (mm)=      77.93        66.23        77.815
01458>      TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
01459>      RUNOFF COEFFICIENT   =        .99          .84          .986
01460>
01461>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01462>            CN* =  95.0    Ia = Dep. Storage  (Above)
01463>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01464>            THAN THE STORAGE COEFFICIENT.
01465>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01466>
01467> ---------------------------------------------------------------------------
01468> 050:0007----------------------------------------------------------------------
01469> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
01470> ----------------------
01471> | CALIB STANDHYD     |   Area    (ha)=     .01
01472> | 05:202    DT= 1.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
01473> ----------------------
01474>                              IMPERVIOUS    PERVIOUS (i)
01475>      Surface Area     (ha)=        .01          .00
01476>      Dep. Storage     (mm)=       1.00         1.30
01477>      Average Slope     (%)=       2.00         2.50
01478>      Length            (m)=      12.00        12.00
01479>      Mannings n            =       .013         .250
01480>
01481>      Max.eff.Inten.(mm/hr)=     149.30       138.88
01482>                    over (min)        1.00         3.00
01483>      Storage Coeff.  (min)=        .50 (ii)     3.31 (ii)
01484>      Unit Hyd. Tpeak (min)=       1.00         3.00
01485>      Unit Hyd. peak  (cms)=       1.47          .35
01486>                                                          *TOTALS*
01487>      PEAK FLOW       (cms)=        .00          .00          .004 (iii)
01488>      TIME TO PEAK    (hrs)=       1.93         2.00         2.000
01489>      RUNOFF VOLUME    (mm)=      77.93        66.23        77.346
01490>      TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
01491>      RUNOFF COEFFICIENT   =        .99          .84          .980
01492>
01493>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01494>            CN* =  95.0    Ia = Dep. Storage  (Above)
01495>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01496>            THAN THE STORAGE COEFFICIENT.
01497>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01498>
01499> ---------------------------------------------------------------------------
01500> 050:0008----------------------------------------------------------------------
01501> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
01502> ----------------------
01503> | CALIB STANDHYD     |   Area    (ha)=     .13
01504> | 06:203    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
01505> ----------------------
01506>                              IMPERVIOUS    PERVIOUS (i)
01507>      Surface Area     (ha)=        .11          .02
01508>      Dep. Storage     (mm)=       1.00         1.30
01509>      Average Slope     (%)=       4.00         4.00
01510>      Length            (m)=      45.00        45.00
01511>      Mannings n            =       .013         .250
01512>
01513>      Max.eff.Inten.(mm/hr)=     149.30       136.92
01514>                    over (min)        1.00         6.00
01515>      Storage Coeff.  (min)=        .89 (ii)     6.32 (ii)
01516>      Unit Hyd. Tpeak (min)=       1.00         6.00
01517>      Unit Hyd. peak  (cms)=       1.15          .18
01518>                                                          *TOTALS*
01519>      PEAK FLOW       (cms)=        .05          .00          .051 (iii)
01520>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
01521>      RUNOFF VOLUME    (mm)=      77.93        66.23        76.410
01522>      TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
01523>      RUNOFF COEFFICIENT   =        .99          .84          .968
01524>
01525>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01526>            CN* =  95.0    Ia = Dep. Storage  (Above)
01527>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01528>            THAN THE STORAGE COEFFICIENT.
01529>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01530>
01531> ---------------------------------------------------------------------------
01532> 050:0009----------------------------------------------------------------------
01533> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
01534> *
01535> ----------------------
01536> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01537> |  IN>04:(201   )    |
01538> | OUT<07:(201   )    |    =========  OUTFLOW STORAGE TABLE  =========
01539> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01540>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
01541>                              .000  .0000E+00   |     .016  .2500E-02
01542>                              .016  .1000E-03   |     .016  .2500E-02
01543>                              .016  .1000E-03   |     .020  .2600E-02
01544>                              .016  .9000E-03   |     .031  .3000E-02
01545>                              .016  .1700E-02   |     .000  .0000E+00
01546>
01547>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01548>      ---------------------      (ha)     (cms)     (hrs)       (mm)
01549>      INFLOW >04: (201   )        .08      .033     2.000     77.815
01550>      OUTFLOW<07: (201   )        .08      .016     1.867     77.815
01551>     OVERFLOW<08: (OVF   )        .00      .000      .000       .000
01552>
01553>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01554>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01555>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01556>
01557>
01558>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   47.968
01559>                    TIME SHIFT OF PEAK FLOW          (min)=    -8.00
01560>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1076E-02
01561>
01562> ---------------------------------------------------------------------------
01563> 050:0010----------------------------------------------------------------------
01564> ------------------------
01565> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01566> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01567>                        ID1 05:202          .01     .004    2.00  77.35    .000
01568>                       +ID2 07:201          .08     .016    1.87  77.81    .000
01569>                       +ID3 08:OVF          .00     .000     .00    .00    .000
01570>                        ========================================================
01571>                        SUM 09:Total         .09     .020    2.00  77.76    .000
01572>
01573>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01574>
01575> ---------------------------------------------------------------------------
01576> 050:0011----------------------------------------------------------------------
01577> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
01578> *
01579> ---------------------------------------------------------------------------
01580> 050:0002----------------------------------------------------------------------
01581> *
01582> ---------------------------------------------------------------------------
01583> 050:0002----------------------------------------------------------------------
01584> *
01585> ---------------------------------------------------------------------------
01586> 050:0002----------------------------------------------------------------------
01587> *
01588> ---------------------------------------------------------------------------
01589> 050:0002----------------------------------------------------------------------
01590> *
01591>   ** END OF RUN :  99
01592>
01593> ****************************************************************************
01594>
01595>
01596>
01597>
01598>
01599> ----------------------
01600> | START              |  Project  dir.: T:\projects\25038\SWMHYMO\
01601> ----------------------  Rainfall dir.: T:\projects\25038\SWMHYMO\
01602>     TZERO =   .00 hrs on      0
01603>     METOUT=   2 (output = METRIC)
01604>     NRUN  = 100
01605>     NSTORM=   1
01606>               #  1=BUR6_100.stm
01607> ---------------------------------------------------------------------------
01608> 100:0002----------------------------------------------------------------------
01609> *#############################################################################|
01610> *#  Project Name: 2076 LAKESHORE ROAD
01611> *#               BURLINGTON, ONTARIO
01612> *#  JOB NUMBER  : 25038
01613> *#       Date   : JULY 2025
01614> *#    Revised   :
01615> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
01616> *#       File   : 25038.DAT
01617> *#############################################################################|
01618> *
01619> ---------------------------------------------------------------------------
01620> 100:0002----------------------------------------------------------------------
```

```
01621> *
01622> --------------------
01623> | READ STORM       |    Filename: Burlington 100-yr 6hr CHICAGO        (A=
01624> | Ptotal=  86.27 mm|    Comments: Burlington 100-yr 6hr CHICAGO        (A=
01625> --------------------
01626>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01627>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01628>                 .17   3.862 |   1.67  17.445 |   3.17   9.657 |   4.67   4.936
01629>                 .33   4.172 |   1.83  39.736 |   3.33   8.649 |   4.83   4.704
01630>                 .50   4.546 |   2.00 163.177 |   3.50   7.853 |   5.00   4.495
01631>                 .67   5.008 |   2.17  51.779 |   3.67   7.206 |   5.17   4.306
01632>                 .83   5.595 |   2.33  28.205 |   3.83   6.670 |   5.33   4.135
01633>                1.00   6.369 |   2.50  19.806 |   4.00   6.217 |   5.50   3.979
01634>                1.17   7.443 |   2.67  15.465 |   4.17   5.829 |   5.67   3.835
01635>                1.33   9.048 |   2.83  12.795 |   4.33   5.492 |   5.83   3.703
01636>                1.50  11.752 |   3.00  10.979 |   4.50   5.197 |   6.00   3.581
01637>
01638> ------------------------------------------------------------------------------
01639> 100:0003------------------------------------------------------------------------
01640> *
01641> *#*************************************************************************|
01642> *#
01643> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01644> *#        ==============================================
01645> *#
01646> **#**********************************************************************|
01647> *# CATCHMENT 101 - EXISTING CONDITIONS (To Old Lakeshore Road)
01648> ----------------------
01649> | CALIB STANDHYD     |   Area    (ha)=     .14
01650> | 01:101    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   75.00
01651> ----------------------
01652>                              IMPERVIOUS    PERVIOUS (i)
01653>      Surface Area     (ha)=        .10          .04
01654>      Dep. Storage     (mm)=       1.00         1.30
01655>      Average Slope     (%)=       2.00         2.00
01656>      Length            (m)=      20.00        20.00
01657>      Mannings n             =      .013         .250
01658>
01659>      Max.eff.Inten.(mm/hr)=     163.18       152.04
01660>                    over (min)        1.00         5.00
01661>      Storage Coeff.  (min)=        .65 (ii)    4.59 (ii)
01662>      Unit Hyd. Tpeak (min)=       1.00         5.00
01663>      Unit Hyd. peak  (cms)=       1.33          .24
01664>                                                          *TOTALS*
01665>      PEAK FLOW       (cms)=        .05          .01          .060 (iii)
01666>      TIME TO PEAK    (hrs)=       1.98         2.02         2.000
01667>      RUNOFF VOLUME    (mm)=      85.27        73.42        82.308
01668>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01669>      RUNOFF COEFFICIENT   =        .99          .85          .954
01670>
01671>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01672>            CN* =  95.0    Ia = Dep. Storage  (Above)
01673>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01674>            THAN THE STORAGE COEFFICIENT.
01675>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01676>
01677> ------------------------------------------------------------------------------
01678> 100:0004------------------------------------------------------------------------
01679> *# CATCHMENT 102 - EXISTING CONDITIONS (To Lake Ontario)
01680> ----------------------
01681> | CALIB STANDHYD     |   Area    (ha)=     .08
01682> | 02:101    DT= 1.00 |   Total Imp(%)=   74.00   Dir. Conn.(%)=   74.00
01683> ----------------------
01684>                              IMPERVIOUS    PERVIOUS (i)
01685>      Surface Area     (ha)=        .06          .02
01686>      Dep. Storage     (mm)=       1.00         1.30
01687>      Average Slope     (%)=       3.50         3.50
01688>      Length            (m)=      10.00        35.00
01689>      Mannings n             =      .013         .250
01690>
01691>      Max.eff.Inten.(mm/hr)=     163.18       152.04
01692>                    over (min)        1.00         5.00
01693>      Storage Coeff.  (min)=        .36 (ii)    5.02 (ii)
01694>      Unit Hyd. Tpeak (min)=       1.00         5.00
01695>      Unit Hyd. peak  (cms)=       1.59          .23
01696>                                                          *TOTALS*
01697>      PEAK FLOW       (cms)=        .03          .01          .034 (iii)
01698>      TIME TO PEAK    (hrs)=       1.93         2.02         2.000
01699>      RUNOFF VOLUME    (mm)=      85.27        73.42        82.190
01700>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01701>      RUNOFF COEFFICIENT   =        .99          .85          .953
01702>
01703>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01704>            CN* =  95.0    Ia = Dep. Storage  (Above)
01705>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01706>            THAN THE STORAGE COEFFICIENT.
01707>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01708>
01709> ------------------------------------------------------------------------------
01710> 100:0005------------------------------------------------------------------------
01711> *# ALLOWABLE - EXISTING CONDITIONS (Allowable Discharge to Old Lakeshore Road)
01712> ----------------------
01713> | CALIB STANDHYD     |   Area    (ha)=     .14
01714> | 03:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
01715> ----------------------
01716>                              IMPERVIOUS    PERVIOUS (i)
01717>      Surface Area     (ha)=        .05          .09
01718>      Dep. Storage     (mm)=       1.00         1.30
01719>      Average Slope     (%)=       2.00         2.00
01720>      Length            (m)=      20.00        20.00
01721>      Mannings n             =      .013         .250
01722>
01723>      Max.eff.Inten.(mm/hr)=     163.18       152.04
01724>                    over (min)        1.00         5.00
01725>      Storage Coeff.  (min)=        .65 (ii)    4.59 (ii)
01726>      Unit Hyd. Tpeak (min)=       1.00         5.00
01727>      Unit Hyd. peak  (cms)=       1.33          .24
01728>                                                          *TOTALS*
01729>      PEAK FLOW       (cms)=        .02          .03          .054 (iii)
01730>      TIME TO PEAK    (hrs)=       1.98         2.02         2.000
01731>      RUNOFF VOLUME    (mm)=      85.27        73.42        77.686
01732>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01733>      RUNOFF COEFFICIENT   =        .99          .85          .900
01734>
01735>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01736>            CN* =  95.0    Ia = Dep. Storage  (Above)
01737>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01738>            THAN THE STORAGE COEFFICIENT.
01739>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01740>
01741> ------------------------------------------------------------------------------
01742> 100:0006------------------------------------------------------------------------
01743> *#*************************************************************************|
01744> *#
01745> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01746> *#        ===============================================
01747> *#
01748> **#**********************************************************************|
01749> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Old Lakeshore Road)
01750> ----------------------
01751> | CALIB STANDHYD     |   Area    (ha)=     .08
01752> | 04:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01753> ----------------------
01754>                              IMPERVIOUS    PERVIOUS (i)
01755>      Surface Area     (ha)=        .08          .00
01756>      Dep. Storage     (mm)=       1.00         1.30
01757>      Average Slope     (%)=       1.00         1.00
01758>      Length            (m)=       4.00         4.00
01759>      Mannings n             =      .013         .250
01760>
01761>      Max.eff.Inten.(mm/hr)=     163.18       153.76
01762>                    over (min)        1.00         2.00
01763>      Storage Coeff.  (min)=        .30 (ii)    2.14 (ii)
01764>      Unit Hyd. Tpeak (min)=       1.00         2.00
01765>      Unit Hyd. peak  (cms)=       1.64          .53
01766>                                                          *TOTALS*
01767>      PEAK FLOW       (cms)=        .04          .00          .036 (iii)
01768>      TIME TO PEAK    (hrs)=       1.92         2.00         2.000
01769>      RUNOFF VOLUME    (mm)=      85.27        73.42        85.153
01770>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01771>      RUNOFF COEFFICIENT   =        .99          .85          .987
01772>
01773>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01774>            CN* =  95.0    Ia = Dep. Storage  (Above)
01775>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01776>            THAN THE STORAGE COEFFICIENT.
01777>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01778>
01779> ------------------------------------------------------------------------------
01780> 100:0007------------------------------------------------------------------------
01781> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Old Lakeshore Road)
01782> ----------------------
01783> | CALIB STANDHYD     |   Area    (ha)=     .01
01784> | 05:202    DT= 1.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
01785> ----------------------
01786>                              IMPERVIOUS    PERVIOUS (i)
01787>      Surface Area     (ha)=        .01          .00
01788>      Dep. Storage     (mm)=       1.00         1.30
01789>      Average Slope     (%)=       2.00         2.50
01790>      Length            (m)=      12.00        12.00
01791>      Mannings n             =      .013         .250
01792>
01793>      Max.eff.Inten.(mm/hr)=     163.18       153.25
01794>                    over (min)        1.00         3.00
01795>      Storage Coeff.  (min)=        .48 (ii)    3.18 (ii)
01796>      Unit Hyd. Tpeak (min)=       1.00         3.00
01797>      Unit Hyd. peak  (cms)=       1.49          .36
01798>                                                          *TOTALS*
01799>      PEAK FLOW       (cms)=        .00          .00          .005 (iii)
01800>      TIME TO PEAK    (hrs)=       1.93         2.00         2.000
01801>      RUNOFF VOLUME    (mm)=      85.27        73.42        84.678
01802>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01803>      RUNOFF COEFFICIENT   =        .99          .85          .982
01804>
01805>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01806>            CN* =  95.0    Ia = Dep. Storage  (Above)
01807>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01808>            THAN THE STORAGE COEFFICIENT.
01809>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01810>
01811> ------------------------------------------------------------------------------
01812> 100:0008------------------------------------------------------------------------
01813> *# CATCHMENT 203 - PROPOSED CONDITIONS (Uncontrolled To Lake Ontario)
01814> ----------------------
01815> | CALIB STANDHYD     |   Area    (ha)=     .13
01816> | 06:203    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
01817> ----------------------
01818>                              IMPERVIOUS    PERVIOUS (i)
01819>      Surface Area     (ha)=        .11          .02
01820>      Dep. Storage     (mm)=       1.00         1.30
01821>      Average Slope     (%)=       4.00         4.00
01822>      Length            (m)=      45.00        45.00
01823>      Mannings n             =      .013         .250
01824>
01825>      Max.eff.Inten.(mm/hr)=     163.18       151.32
01826>                    over (min)        1.00         6.00
01827>      Storage Coeff.  (min)=        .86 (ii)    6.07 (ii)
01828>      Unit Hyd. Tpeak (min)=       1.00         6.00
01829>      Unit Hyd. peak  (cms)=       1.17          .19
01830>                                                          *TOTALS*
01831>      PEAK FLOW       (cms)=        .05          .01          .056 (iii)
01832>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
01833>      RUNOFF VOLUME    (mm)=      85.27        73.42        83.730
01834>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01835>      RUNOFF COEFFICIENT   =        .99          .85          .971
01836>
01837>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01838>            CN* =  95.0    Ia = Dep. Storage  (Above)
01839>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01840>            THAN THE STORAGE COEFFICIENT.
01841>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01842>
01843> ------------------------------------------------------------------------------
01844> 100:0009------------------------------------------------------------------------
01845> *# ROUTE CATCHMENT 201 THROUGH ORIFICE CONTROL
01846> *
01847> ----------------------
01848> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01849> |  IN>04:(201   )    |
01850> | OUT<07:(201   )    |    =========  OUTLFW STORAGE TABLE  =========
01851> ----------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
01852>                             (cms)     (ha.m.)    |    (cms)    (ha.m.)
01853>                              .000  .0000E+00     |     .016  .2500E-02
01854>                              .016  .1000E-03     |     .016  .2500E-02
01855>                              .016  .1000E-03     |     .020  .2600E-02
01856>                              .016  .9000E-03     |     .031  .3000E-02
01857>                              .016  .1700E-02     |     .000  .0000E+00
01858>
01859>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01860>      ---------------------       (ha)     (cms)     (hrs)       (mm)
01861>      INFLOW >04: (201   )        .08      .036     2.000      85.153
01862>      OUTFLOW<07: (201   )        .08      .016     1.850      85.153
01863>     OVERFLOW<08: (OVF   )        .00      .000      .000       .000
01864>
01865>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01866>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
01867>                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
01868>
01869>
01870>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   43.882
01871>                    TIME SHIFT OF PEAK FLOW         (min)=    -9.00
01872>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1265E-02
01873>
01874> ------------------------------------------------------------------------------
01875> 100:0010------------------------------------------------------------------------
01876> ------------------------
01877> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01878> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
01879>                        ID1 05:202           .01     .005    2.00  84.68    .000
01880>                       +ID2 07:201           .08     .016    1.85  85.15    .000
01881>                       +ID3 08:OVF           .00     .000     .00    .00    .000
01882>                        ========================================================
01883>                        SUM 09:Total          .09     .020    2.00  85.10    .000
01884>
01885>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01886>
01887> ------------------------------------------------------------------------------
01888> 100:0011------------------------------------------------------------------------
01889> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
01890> *
```

```
01891> -------------------------------------------------------------------------------
01892> 100:0002-----------------------------------------------------------------------
01893> *
01894> -------------------------------------------------------------------------------
01895> 100:0002-----------------------------------------------------------------------
01896> *
01897> -------------------------------------------------------------------------------
01898> 100:0002-----------------------------------------------------------------------
01899> *
01900> -------------------------------------------------------------------------------
01901> 100:0002-----------------------------------------------------------------------
01902> *
01903> -------------------------------------------------------------------------------
01904> 100:0002-----------------------------------------------------------------------
01905> *
01906>       FINISH
01907> -------------------------------------------------------------------------------
01908> ********************************************************************************
01909>      WARNINGS / ERRORS / NOTES
01910>      -------------------------
01911>    Simulation ended on 2025-07-30     at 13:37:00
01912> ================================================================================
01913>
01914>
```

APPENDIX B
FIRE FLOW CALCULATIONS

FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Project Number: **25038**
Project Name: **2076 Old Lakeshore Road**
Date: **Aug-25**

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

$$F = 220\,C\sqrt{A} \qquad \textbf{(1)}$$

where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 Type V for wood frame construction .
= 0.8 Type IV-A Mass Timber Construction
= 0.9 Type IV-B Mass Timber Construction
= 1.0 Type IV-C Mass Timber Construction
= 1.5 Type IV-D Mass Timber Construction
= 1.0 Type III Ordinary Construction
= 0.8 Type II Non Combustible Construction
= 0.6 Type I Fire Resistive Construction

A = Total floor area in square metres

				(1)		(2)			(3)		(4)		Final Adjusted Fire Flow	
Building / Location	# of Storeys	Total GFA (m^2)	Type of Construction	*Fire Flow "F"* (l/min)	(l/s)	*Occupancy* %	Adjustment (l/min)	Adjusted Fire Flow (l/min)	*Sprinkler* %	Adjustment (l/min)	*Exposure* %	Adjustment (l/min)	(l/min)	(l/s)
22-Storey Mixed Use Building	**22**	**6154**	**0.8**	14000	233.3	**-15**	-2100.0	**11900.0**	**-50**	-5950.0	35	4165.0	**10000**	**167**

Total Area Calculation Building A:

Two largest ajoining floors plus 50% of any floors immediately above them up to eight floors

Floor	Area	Tot. Area	Cumm. Area
2	891	891	891
3	928	928	1819
4-9	650	1625	3444
			6154

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No Charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

Minimum credit for systems designed to NFPA 13 is 30%.

If the domestic and fire services are supplied by the same municipal water system, then take an additional 10%.

If the sprinkler system is fully supervised (ie. annunciator panel that alerts the Fire Dept., such as a school), then an additional 10% can be taken. Maximum credit = 50%.

(4) Exposure

0 to 3.0m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
Greater than 30	0%	exceed 75%

22-Storey Mixed-Use Building

Side	Exposure (m)	Charge (%)
North =	**> 30m**	**0**
South =	**> 30m**	**0**
East =	**0 to 3.0m**	**25**
West =	**20.1 to 30.0m**	**10**
Total Exposure =		***35***

AQUACOM CONTRACTING

627 RENNIE STREET HAMILTON ONTARTIO L8H 3P8
(o) 905-467-5853 (c) 905-971-9956 (e) mark@aquacom.ca

August 1, 2025

Michael Gojsic
S. Llewellyn and Associates Limited
3228 South Service Road
Burlington, Ontario
L7N 3H8

Reference: **1959025 Ontario Inc**
2076 Old Lakeshore Road
City of Burlington, Region of Halton
Hydrant Flow Testing

The flow testing was completed Thursday 24 July 2025 as scheduled.

We advised the Region of Halton operations staff of this schedule, and they provided an operator to assist with the operation of the municipal hydrants and to assist with the test.

Please find the attached summary of test results. For your information;

the hydrant was flowed from one than two nozzles, using flow diffusers

residual pressures were recorded from an upstream fire hydrant on the municipal system

theoretical flows were produced from the attached chart, using a .90 nozzle coefficient

all discharge water was dechlorinated as per Ministry requirements

the hydrants were not colour coded at the time of the test

If you should require any further information please do not hesitate to contact the undersigned.

Sincerely yours,



Aquacom Contracting
Mark Kilbourne

AQUACOM CONTRACTING

627 RENNIE STREET HAMILTON ONTARIO L8H3P8

(o) 905-467-5853 (c) 905-971-9956 (e) mark@aquacom.ca

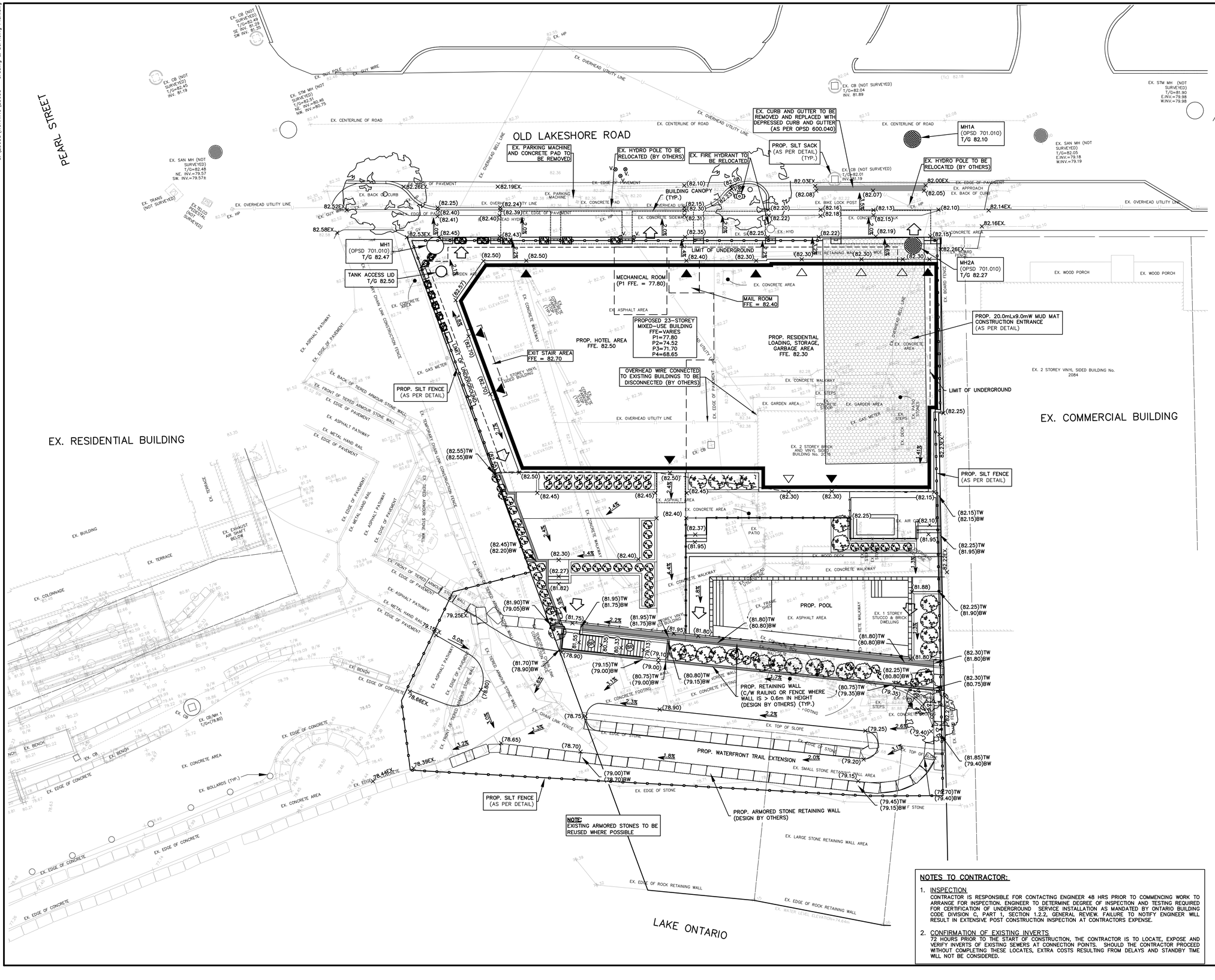
HYDRANT FLOW TEST REPORT

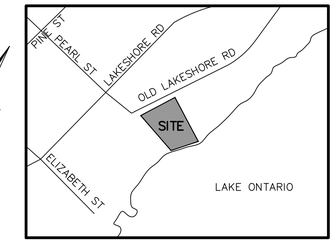
		HYDRANT MAKE	SEC. VALVE CONDITION	TECH.	TIME	STATIC PSI	PITO 1-2.50" PSI	FLOW 1-2.50" US GPM	RESIDUAL 1-2.50" PSI	PITO 2-2.50" PSI	FLOW 2-2.50" US GPM	RESIDUAL 2-2.50" PSI	THEORETICAL FLOW @ 20PSI RESIDUAL	COLOUR CODE
F1	2076 Old Lakeshore	AVK	OK/OPEN	JK	9:00		64	1344		48	2328		9397	BLUE
R1	Old Lakeshore and Pearl, SE	CENTURY	OK/OPEN	HK		73			71			69		
F2														
R2														
F3														
R3														

CUSTOMER	SERVICE DATE	LOCATION	CONTACTS ON SITE HALTON REGION
1959025 ONTARIO INC	24-07-2025	2076 OLD LAKESHORE	HALTON REGION WATER OPERATOR
SLA		CITY OF BURLINGTON	

APPENDIX C
PRELIMINARY ENGINEERING DRAWINGS

DWG No.: C101
25038
S:\25038\WORKING\25038 - Grading & Servicing Plan.dwg





KEY MAP
N.T.S.

LEGEND:

- EXISTING GROUND ELEVATION
- (100.00) PROPOSED GROUND ELEVATION
- (100.00)EX PROPOSED ELEVATION TO MATCH EXISTING
- 2.0% PROPOSED DIRECTION OF SHEET FLOW
- EXISTING DIRECTION OF SHEET FLOW
- EXISTING CATCHBASIN
- EXISTING STORM/SANITARY MANHOLE
- PROPOSED STORM/SANITARY MANHOLE
- PROPOSED SILTATION CONTROL FENCE
- PROPOSED CATCHBASIN SILT SACK
- OVERLAND FLOW

BENCH MARK NOTE:
CITY OF BURLINGTON
MONUMENT INDEX No: 198

PLATE ON PUMP HOUSE LOCATED JUST WEST OF RAMBO CREEK, BEING 0.32km EAST OF BRANT STREET ON LAKESHORE ROAD. PLATE IS FIXED TO THE SOUTH FACE OF BRICK BUILDING, BEING 0.15m EAST OF THE SOUTHWEST CORNER AND 0.30m ABOVE EXISTING CONCRETE SIDEWALK.

ELEVATION= 78.036m

NO.	DATE	BY	REVISIONS
01	SEPT. 4, 25	O.O	ISSUED FOR ZBA

NOTES TO CONTRACTOR:

1. CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
2. ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
3. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
4. THE POSITIONS OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVER-GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
5. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED, REUSED, OR REVISED WITHOUT THE WRITTEN CONSENT OF S. LLEWELLYN AND ASSOCIATES LIMITED.

DESIGN	O.O	CHK'D	M.G
DRAWN	O.O	CHK'D	M.G

DATE: SEPT. 04, 25

SCALE 1:150 (0, 5, 10, 15)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 05/09/25 — PROVINCE OF ONTARIO

NOTES TO CONTRACTOR:

1. INSPECTION
CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.

2. CONFIRMATION OF EXISTING INVERTS
72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS
Tel. (905) 631-6978
Website: www.sla.on.ca
email: info@sla.on.ca
3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT
1959025 ONTARIO INC.
366 KING STREET WEST
HAMILTON, ONTARIO

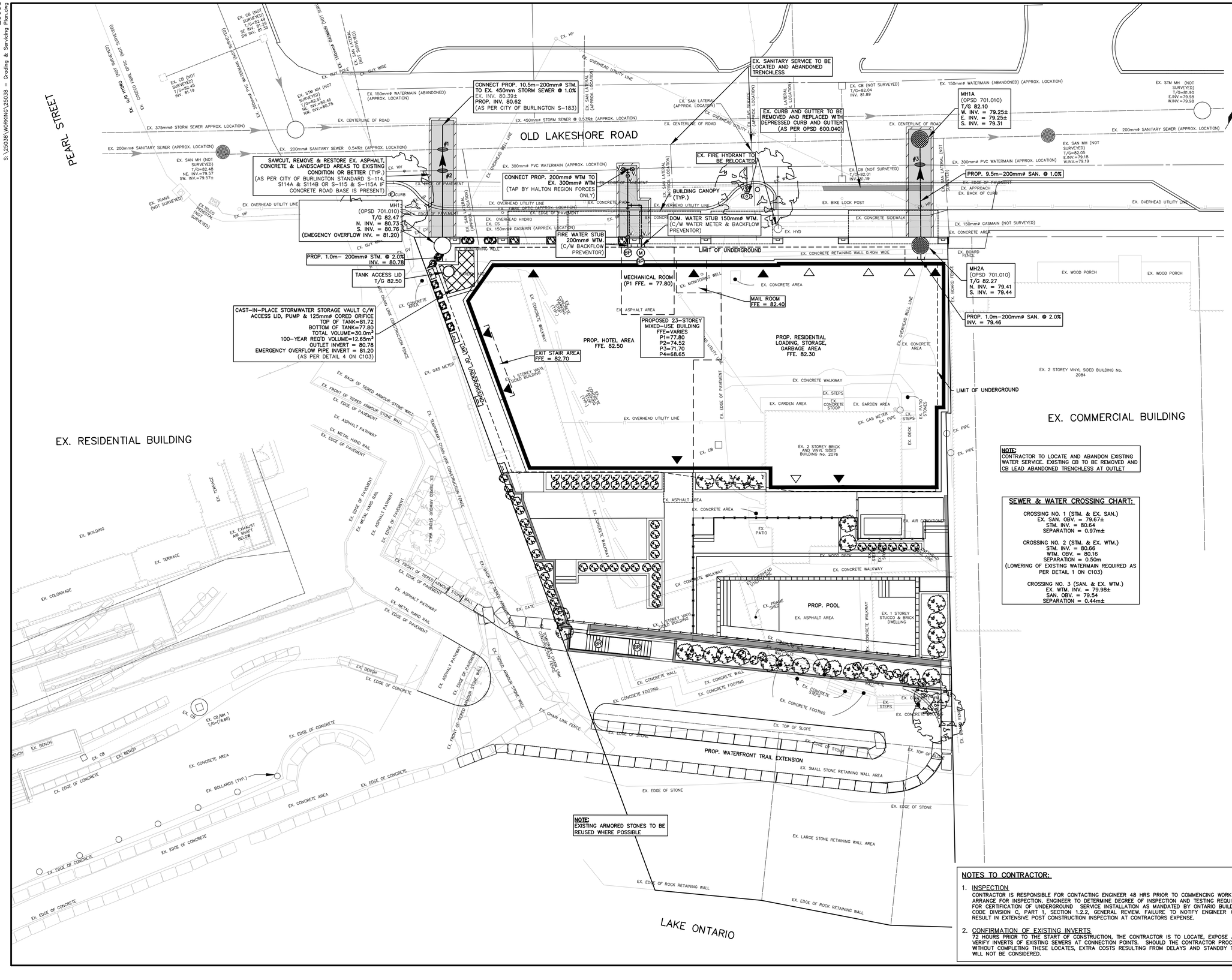
PROJECT NAME
2076 OLD LAKESHORE ROAD
BURLINGTON, ONTARIO

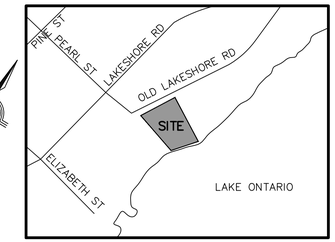
TITLE
PRELIMINARY GRADING AND EROSION CONTROL PLAN

PROJECT No. 25038
DRAWING No. C101

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Plotted: Thursday, September 4, 2025 4:10:42 PM By: Olawale Oladeselu

DWG No.: C102
25038
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KEY MAP
N.T.S.

LEGEND:
- EXISTING CATCHBASIN
- EXISTING STORM/SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED STORM/SANITARY MANHOLE
- PROPOSED CURB STOP/GATE VALVE
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTOR
- SEWER CROSSING
- PROPOSED ROAD RESTORATION

BENCH MARK NOTE:
CITY OF BURLINGTON
MONUMENT INDEX No: 198

PLATE ON PUMP HOUSE LOCATED JUST WEST OF RAMBO CREEK, BEING 0.32km EAST OF BRANT STREET ON LAKESHORE ROAD. PLATE IS FIXED TO THE SOUTH FACE OF BRICK BUILDING, BEING 0.15m EAST OF THE SOUTHWEST CORNER AND 0.30m ABOVE EXISTING CONCRETE SIDEWALK.

ELEVATION= 78.036m

NO.	DATE	BY	REVISIONS
01	SEPT. 4, 25	O.O	ISSUED FOR ZBA

NOTES TO CONTRACTOR:
1. CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
2. ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
3. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
4. THE POSITIONS OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVER-GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
5. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED, REUSED, OR REVISED WITHOUT THE WRITTEN CONSENT OF S. LLEWELLYN AND ASSOCIATES LIMITED.

DESIGN	O.O	CHK'D	M.G	DATE SEPT. 04, 25
DRAWN	O.O	CHK'D	M.G	

SCALE 1:150 (0, 5, 10, 15)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOWICH — 05/09/25 — PROVINCE OF ONTARIO

S. LLEWELLYN & ASSOCIATES LIMITED
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CLIENT
1959025 ONTARIO INC.
366 KING STREET WEST
HAMILTON, ONTARIO

PROJECT NAME
2076 OLD LAKESHORE ROAD
BURLINGTON, ONTARIO

TITLE
PRELIMINARY SITE SERVICING PLAN

PROJECT No. 25038
DRAWING No. C102

DWG No.: C103

25038

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GENERAL NOTES:

1. CONSTRUCTION OF SEWERS, AND RELATED APPURTENANCES SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT STANDARD DRAWINGS OF THE CITY OF BURLINGTON, THE REGIONAL MUNICIPALITY OF HALTON AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD). THE CITY AND THE REGION'S DRAWINGS SHALL TAKE PRECEDENCE OVER THE OPSD DRAWINGS.
2. ONTARIO PROVINCIAL STANDARD DRAWINGS TO BE READ IN CONJUNCTION WITH THE REGION OF HALTON REVISIONS.
3. RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE CONSTRUCTED AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
4. THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR CONSTRUCTION.
5. NO SUBSTITUTIONS WILL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE REGIONAL ENGINEER, CITY OF BURLINGTON OR THE ENGINEER.
6. ALL EXCAVATIONS TO BE BACKFILLED WITH SELECT NATIVE MATERIAL, APPROVED BY THE ENGINEER, TO 95% SPD.
7. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING SILT CONTROL DEVICES AS SHOWN ON THE DRAWINGS AND AS DIRECTED BT THE ENGINEER.
8. TREE PROTECTION PROCEDURES TO BE IMPLEMENTED IN ACCORDANCE WITH CITY OF BURLINGTON STANDARDS.
9. THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL SEALED BY THE ENGINEER AND INDICATED ISSUED FOR CONSTRUCTION ON THE DRAWING.
10. THIS/THESE PLAN(S) IS/ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF S. LLEWELLYN AND ASSOCIATES LIMITED.
11. INFORMATION REGARDING ANY EXISTING SERVICES AND/OR UTILITIES SHOWN ON THE APPROVED SET OF CONSTRUCTION DRAWINGS ARE FURNISHED AS THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER AND HIS AGENTS DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND /OR SUFFICIENCY. THE CONTRACTOR SHALL ASSUME LIABILITY FOR ANY DAMAGE TO EXISTING WORKS.
12. SITE PLAN INFORMATION TAKEN FROM PLANS PREPARED BY NEUF ARCHITECTS INC.
13. THIS/THESE PLAN(S) TO BE READ IN CONJUNCTION WITH THE PRELIMINARY FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT PREPARED BY S. LLEWELLYN AND ASSOCIATES LIMITED DATED SEPTEMBER, 2025.
14. THIS PLAN TO BE USED FOR SERVICING AND GRADING ONLY, FOR BUILDING LOCATION REFER TO TO THE SITE PLAN.
15. MUNICIPAL APPROVAL OF THESE DRAWINGS IS FOR MATERIAL AND COMPLIANCE WITH CITY OF BURLINGTON AND PROVINCIAL SPECIFICATIONS AND STANDARDS ONLY. APPROVAL AND INSPECTION OF THE WORKS BY THE CITY OF BURLINGTON STAFF DOES NOT CERTIFIY THE LINE AND GRADE OF THE WORKS NOR RELIEVE THE CONTRACTOR OF CERTIFICATION OF ALL WORKS BY THE OWNER'S ENGINEER.
16. ALTERNATE MATERIALS MAY BE ACCEPTABLE PROVIDED WRITTEN APPROVAL HAS FIRST BEEN OBTAINED FROM THE CITY OF BURLINGTON AND THE THE ENGINEER.
17. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S BONDED CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS NORMALLY REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS, BUT NOT LIMITED TO THE FOLLOWING:
    - ROAD CUT PERMITS
    - SEWER PERMITS
    - APPROACH APPROVAL PERMITS
    - RELOCATION OF SERVICES
    - COMMITTEE OF ADJUSTMENT
    - ENCROACHMENT AGREEMENTS
18. PRIOR TO CONSTRUCTION THE CONTRACTOR MUST:
    - i. CHECK AND VERIFIY ALL DIMENSIONS AND EXISTING ELEVATIONS WHICH INCLUDE BUT ARE NOT LIMITED TO THE BENCHMARK ELEVATIONS, EXISTING SERVICE CONNECTIONS, EXISTING INVERTS AND REPORT FINDING IN WRITING TO THE ENGINEER.
    - ii. OBTAIN ALL UTILITY LOCATES AND REQUIRED PERMITS AND LICENSES.
    - iii. VERIFY ALL FINISHED FLOOR ELEVATIONS AND BASEMENT FLOOR ELEVATIONS WHICH MY APPEAR ON THESE PLANS COMPLY WITH THE FINAL ARCHITECTURAL DRAWINGS.
    - iv. CONFIRM ALL DRAWINGS USED FOR CONSTRUCTION ARE OF THE MOST RECENT REVISION.
    - v. NOTIFY THE ENGINEER OF THE PROPOSED CONSTRUCTION SCHEDULE FOR COORDINATION OF NECESSARY INSPECTIONS.
19. **THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE ENGINEER 48 HOURS PRIOR TO THE COMMENCING SITE WORKS TO ARRANGE FOR INSPECTION. THE ENGINEER SHALL DETERMINE THE EXTENT OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF THE UNDERGROUND SERVICE INSTALLATION AS MANDATED BY THE ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO MAKE SUITABLE ARRANGEMENTS FOR INSPECTION WILL LEAD TO POST CONSTRUCTION TESTING AND INSPECTION AS DETERMINED BY THE ENGINEER, THE COSTS OF WHICH INCLUDING ANY DELAYS IN CONSTRUCTION SHALL BE BOURNE BY THE CONTRACTOR. FULL PAYMENT FOR UN-INSPECTED WORKS MAY BE WITHHELD UNTIL THE COMPLETION OF THE POST CONSTRUCTION INSPECTION AND TESTING TO THE SATISFACTION OF THE ENGINEER.**
20. INSPECTION BY THE OWNER'S ENGINEER IS FOR CERTIFICATION AND GENERAL CONFORMANCE PURPOSES AND DOES NOT CERTIFY LINE AND GRADE OR IMPLY AN ASSURANCE OF QUALITY CONTROL. THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THE INSTALLATION OF THE WORKS TO PROPER LINE, GRADE AND QUALITY TO CURRENT INDUSTRY STANDARDS.
21. ANY UTILITY RELOCATIONS AND RESTORATIONS DUE TO THE DEVELOPMENT TO BE UNDERTAKEN AT THE EXPENSE OF THE OWNER/DEVELOPER AND SHALL BE COORDINATED BY THE CONTRACTOR.
22. ALL RESTORATIONS AND RECONSTRUCTIONS SHALL BE COMPLETED TO MATCH EXISTING CONDITIONS OR BETTER AND ARE TO BE PERFORMED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF BURLINGTON.
23. SERVICING CONTRACTOR TO MAINTAIN A "CONFINED TRENCH CONDITION" IN ALL SEWER AND WATERMAIN INSTALLATION TRENCHES.
24. THE SITE SERVICING CONTRACTOR SHALL TERMINATE ALL SERVICES 1.0m FROM THE BUILDING FACE.
25. NO BLASTING WILL BE PERMITTED.

ROADWORKS:

1. APPROVED FILL, FREE OF DELETERIOUS AND ORGANIC MATERIAL AND BOULDERS SHALL BE COMPACTED TO A DRY DENSITY NOT LESS THAN 95% THAN THE STANDARD PROCTOR DENSITY. AFTER COMPACTION, SOIL DENSITY TESTS SHALL BE CONDUCTED TO ENSURE ADEQUATE COMPACTION AND STABILITY OF THE FILL AND TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER.
2. SUBGRADE TO BE PROOF ROLLED PRIOR TO PLACEMENT OF SUB BASE. UNSUITABLE MATERIAL TO BE REMOVED AND REPLACED WITH SELECT FILL OR GRANULAR "B" AND COMPACTED TO 98% SPD.
3. ASPHALTIC CONCRETE TO BE COMPACTED TO 97% MARSHALL DENSITY.
4. BOULEVARDS TO BE SODDED WITH #1 NURSERY SOD ON A MINIMUM 150mm OF SELECT TOPSOIL.
5. MANHOLE FRAMES AND COVERS AND WATER VALVE BOXES SHALL BE SET FLUSH WITH BASE COURSE ASPHALT AND ADJUSTED TO FINAL GRADE AFTER INSTALLATION OF SURFACE ASPHALT AS PER CITY OF BURLINGTON STANDARD DRAWINGS S-130.
6. TRAFFIC CONTROL SHALL BE MAINTAINED AT ALL TIMES FOR WORKS ON EXISTING ROADWAYS TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING. THE EXPENSE FOR THE ERECTION OF SIGNS, DELINEATORS AND OTHER TRAFFIC CONTROL DEVICES SHALL BE BORNE BY THE CONTRACTOR.

GRADING NOTES

1. ALONG ADJOINING PROPERTIES GRADE TO MEET EXISTING OR PROPOSED ELEVATIONS WITH SODDED SLOPES (MIN. 3H TO 1V) AND/OR RETAINING WALLS AS SPECIFIED.
2. ALL RETAINING WALLS, WALKWAYS, CURBS, ETC., SHALL BE PLACED A MIN. OF 0.3m OFF THE PROPERTY LINE. ALL WALLS 1.0m OR HIGHER SHALL BE DESIGNED BY A P.ENG.
3. SHOULD A RETAINING WALL BE REQUIRED, THE TOP OF WALL ELEVATIONS SHALL BE SET 150mm ABOVE THE PROPOSED SIDE YARD SWALES.
4. RETAINING WALLS 0.6m IN HEIGHT OR GREATER REQUIRE CONSTRUCTION OF A FENCE OR GUARD RAIL AT THE TOP OF THE REAR OF THE WALL. GUARDS FOR RETAINING WALLS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF EXTERIOR GUARDS AS CONTAINED IN THE ONTARIO BUILDING CODE.
5. TOP OF FOUNDATION WALLS FOR BUILDINGS SHALL BE 150mm (MIN) ABOVE FINISHED GRADE.
6. DRIVEWAY SLOPES SHALL NOT BE LESS THAN 2% AND NOT MORE THAN 7.0% REVERSED SLOPED DRIVEWAYS IN NEW DEVELOPMENTS ARE NOT PERMITTED.
7. IF GRADING IS REQUIRED ON LANDS ADJACENT TO THE DEVELOPMENT WHICH ARE NOT OWNED BY THE DEVELOPER, THEN THE DEVELOPER MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNER TO ALLOW THE DEVELOPER TO GRADE ON THE ADJACENT LANDS, OTHERWISE RETAINING WALLS MUST BE USED.
8. THE WRITTEN PERMISSION REQUIRED FROM THE ADJACENT LANDOWNER SHALL BE OBTAINED PRIOR TO ENTERING THE LANDS. SHOULD PERMISSION NOT BE OBTAINED OR IS WITHDRAWN PRIOR TO COMMENCING THE WORK, THEN THE DEVELOPER SHALL LIMIT HIS ACTIVITIES TO THE LIMITS OF THE DEVELOPMENT SITE.
9. DRIVEWAY AND DRIVEWAY APPROACHES SHALL BE LOCATED SUCH THAT HYDRO VAULTS AND OTHER STREET FURNITURE ARE A MIN. OF 1.2m FROM THE DRIVEWAY ENTRANCE CURB RADII.
10. ANY CHANGES IN GRADES AND CATCH BASINS REQUIRE THE APPROVAL OF THE CITY'S MANAGER OF DEVELOPMENT ENGINEERING.

SILTATION AND EROSION CONTROL

1. SILTATION CONTROL BARRIERS SHALL BE PLACED AS DETAILED.
2. ALL SILTATION CONTROL MEASURES SHALL BE CLEANED AND MAINTAINED AFTER EACH RAINFALL AS DIRECTED AND TO THE SATISFACTION OF THE CITY OF BURLINGTON AND/OR THE HALTON CONSERVATION AUTHORITY.
3. ADDITIONAL SILT CONTROL LOCATIONS MAY BE REQUIRED AS DETERMINED BY THE ENGINEER, THE CITY OF BURLINGTON AND/OR THE HALTON CONSERVATION AUTHORITY.

SANITARY SEWERS:

1. SANITARY SEWERS SHALL BE PVC. PVC PIPE IS TO BE BELL AND SPIGOT AND COMPLY TO ASTM D-3034 WITH MINIMUM SDR 35.
2. MINIMUM BEDDING REQUIREMENTS FOR ALL SANITARY SEWER MAINS AND RELATED CONNECTIONS IN A SINGLE TRENCH SHALL BE CLASS B GRANULAR BEDDING AS PER OPSD 802.010 UNLESS OTHERWISE NOTED.
3. SANITARY SEWER MANHOLES FRAME AND COVER AS PER OPSD 401.010.
4. ALL SEWERS TO BE VIDEO INSPECTED.
5. ALL SEWERS TO BE FLUSHED PRIOR TO VIDEO INSPECTION.
6. ALL PVC SEWERS ARE TO BE TESTED FOR DEFLECTION (MANDREL PASSAGE) AFTER INSTALLATION. SANITARY SEWERS SHALL ALSO BE TESTED FOR LEAKAGE (LOW AIR PRESSURE). PRIOR TO ASSUMPTION BY THE CITY, PIPE DEFLECTION TESTING SHALL BE REPEATED.

STORM SEWERS:

1. 200mm-450mm STORM SEWERS SHALL BE PVC, BELL AND SPIGOT AND SHALL COMPLY TO ASTM D-3034 WITH MINIMUM SDR 35.
2. MINIMUM BEDDING REQUIREMENTS FOR ALL SINGLE STORM SEWER MAINS AND ALL RELATED CONNECTIONS SHALL BE HIGH PERFORMANCE CLEAR STONE (HL-8 GRADED) AS PER CITY OF BURLINGTON STANDARD DRAWINGS S-188.
3. STORM SEWER MANHOLES SHALL BE IN ACCORDANCE WITH OPSD 701.010. AND 703.010. FRAME AND COVER AS PER OPSD 401.01 TYPE A. FRAMES TO BE STAMPED "DANGER" AND "STORM".
4. MANHOLE TOPS SHALL BE INITIALLY SET TO BASE COURSE ASPHALT ELEVATION AND ADJUSTED TO GRADE PRIOR TO PLACEMENT OF TOP LIFT OF ASPHALT.
5. ALL TRENCH EXCAVATIONS ARE TO BE BACKFILLED WITH SELECT NATIVE MATERIAL PLACED IN MAXIMUM 200mm LIFT THICKNESSES WITHIN 3% OF THE OPTIMUM MOISTURE CONTENT AND COMPACTED TO A MINIMUM OF 95% SPD, UNLESS OTHERWISE SPECIFIED.
6. ALL SEWERS TO BE VIDEO INSPECTED.
7. ALL SEWERS TO BE FLUSHED PRIOR TO VIDEO INSPECTION.
8. ALL PVC SEWERS (SANITARY AND STORM) ARE TO BE TESTED FOR DEFLECTION (MANDREL PASSAGE) AFTER INSTALLATION. PRIOR TO ASSUMPTION BY THE CITY, PIPE DEFLECTION TESTING SHALL BE REPEATED.

WATERMAINS:

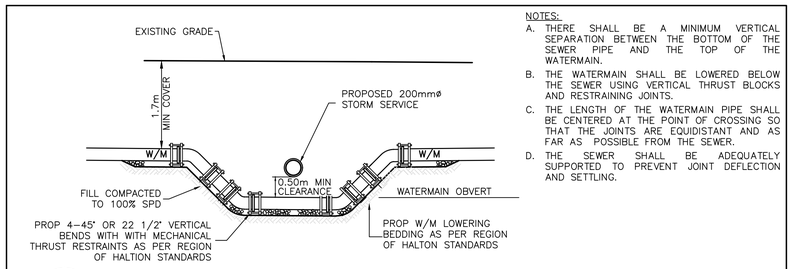
1. FLEXIBLE WATERMAIN PIPE UP TO 300mm DIAMETER TO BE P.V.C. DR-18 AND CONFORM TO A.W.W.A. C-900 WITH MECHANICAL JOINTS AS PER A.W.W.A. C-110, AND TO BE INSTALLED WITH A 10 GAUGE TRACER WIRE.
2. FLEXIBLE PIPE BEDDING TO BE OPSD 802.010 WITH COMPACTED GRANULAR B MATERIAL.
3. MINIMUM COVER TO BE 1.7m TO TOP OF PIPE.
4. DEFLECTION AT JOINTS NOT TO EXCEED 2.5 DEGREES AND SHALL BE EQUAL AT ALL JOINTS.
5. GATE VALVES AND BOXES FOR 150mm DIAMETER WATERMAINS AS PER A.W.W.A. STANDARD C-500 AND ARE TO OPEN TO THE LEFT (COUNTER CLOCKWISE).
6. HYDRANTS SHALL MEET THE REQUIREMENTS OF A.W.W.A. STANDARD C-502 AND SHALL BE SET IN ACCORDANCE WITH REGION OF HALTON, AND CITY OF BURLINGTON BUILDING DEPARTMENT STANDARDS, COMPLETE WITH STEAMER CONNECTIONS. THE 100mm STEAMER PORT SHALL FACE THE FIRE ROUTE AND SHALL BE UNOBSTRUCTED BY ANY PROPOSED LANDSCAPING.
7. ALL FITTINGS TO HAVE MECHANICAL RESTRAINTS THAT MEET UNI-B-13-92.
8. ALL TEMPORARY AND PERMANENT WATERMAIN PLUGS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 1103.01.
9. TAPPING AT EXISTING WATERMAINS SHALL BE UNDERTAKEN IN ACCORDANCE WITH REGION OF HALTON REQUIREMENTS.
10. ALL WATER CUSTOMERS SUPPLIED BY A WATERMAIN TO BE SHUT DOWN SHALL BE NOTIFIED BY THE CONTRACTOR AT LEAST 48 HOURS IN ADVANCE OF THE SHUT DOWN AS PER REGION OF HALTON SPECIFICATIONS. NOTIFICATION SHALL TAKE PLACE UNDER THE ENGINEER'S DIRECTION.
11. MINIMUM HORIZONTAL SEPERATION BETWEEN WATERMAINS (INCLUDING PRIVATE SERVICES) AND STORM AND SANITARY SEWERS SHALL BE 2.5m. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 500mm BETWEEN ALL OTHER UTILITIES WHEN CROSSING.

RESTORATIONS:

1. ALL TRENCH EXCAVATIONS WITHIN EXISTING ROAD ALLOWANCES SHALL BE AS BACKFILLED AS PER CITY OF BURLINGTON STANDARD DRAWING S-114 AND S-114A, OR S-115 AND S-115A WHERE CONCRETE ROAD BASE IS PRESENT.
2. EXISTING PRIVATE FENCING IS TO BE MAINTAINED THROUGHOUT CONSTRUCTION. WHERE REMOVAL OR RELOCATION OF FENCING IS NECESSARY IT SHALL BE RESTORED OR REPLACED TO ORIGINAL CONDITIONS OR BETTER UNDER THE DIRECTION OF THE ENGINEER.
3. DAMAGED CURB, GUTTER AND SIDEWALK TO BE REPLACED WITH 28 MPa CONCRETE TO EXISTING CONDITIONS OR BETTER.

SEWER/WATER ABANDONMENT

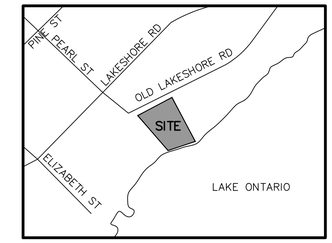
1. ALL EXISTING UNUSED SEWERS MUST BE PROPERLY ABANDONED BY DISCONNECTING SEWER AT THE MAIN AND GROUTING EITHER END OF THE SEWER WITH A MINIMUM 300mm OF CONCRETE.
2. UNUSED MAINTENANCE HOLES AND CATCHBASINS MUST BE COMPLETELY REMOVED.
3. OPENINGS IN MAINTENANCE HOLES AND CATCHBASINS WHERE SERVICES WERE REMOVED OR ABANDONED MUST BE BRICKED AND PARGED.
4. ALL EXISTING UNUSED WATER SERVICES MUST BE PROPERLY ABANDONED AS FOLLOWS:
    - 4.1. FOR COPPER SERVICES: REMOVE CURB STOP, SHUT OFF MAIN STOP, CUT & CRIMP WATER SERVICE AT THE MAIN.
    - 4.2. FOR PVC SERVICES: REMOVE GATE VALVE, REMOVE TEE AND REPLACE WITH SLEEVE. IF A TAPPING VALVE WAS USED, CONTACT THE REGION OF HALTON FOR FURTHER DIRECTION.
5. ALL EXISTING WATER METERS ON SYSTEMS TO BE ABANDONED MUST BE REMOVED IN ACCORDANCE WITH THE CITY OF BURLINGTON STANDARDS. THE SERVICING CONTRACTOR SHOULD CONTACT THE CITY OF BURLINGTON AND REGION OF HALTON TO ARRANGE FOR THE WORK.



DETAIL 1 — WATERMAIN LOWERING DETAIL
SCALE: N.T.S.

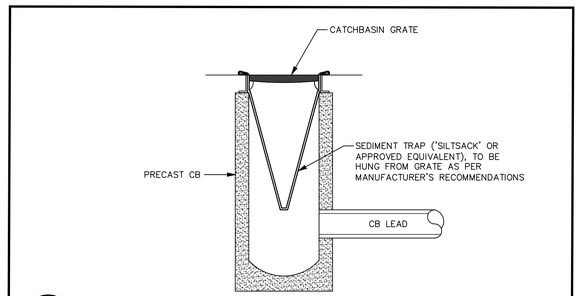
NOTES:

A. THERE SHALL BE A MINIMUM VERTICAL SEPARATION BETWEEN THE BOTTOM OF THE SEWER PIPE AND THE TOP OF THE WATERMAIN.
B. THE WATERMAIN SHALL BE LOWERED BELOW THE SEWER USING VERTICAL THRUST BLOCKS AND RESTRAINING JOINTS.
C. THE LENGTH OF THE WATERMAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS ARE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
D. THE SEWER SHALL BE ADEQUATELY SUPPORTED TO PREVENT JOINT DEFLECTION AND SETTLING.

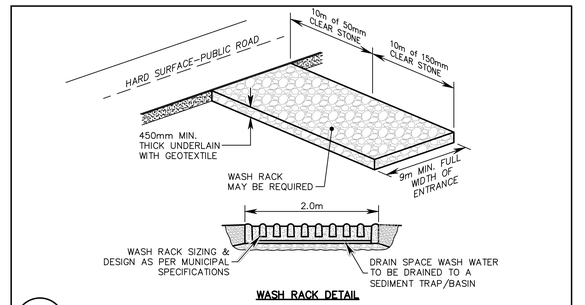


KEY MAP
N.T.S.



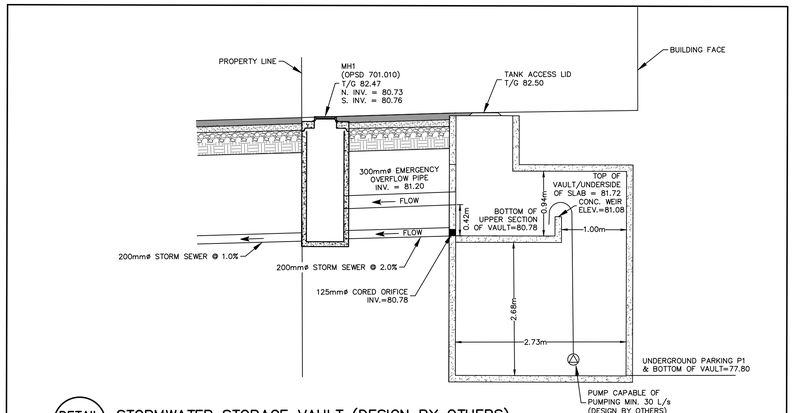


DETAIL 2 — CATCH BASIN SEDIMENT TRAP
SCALE: N.T.S.

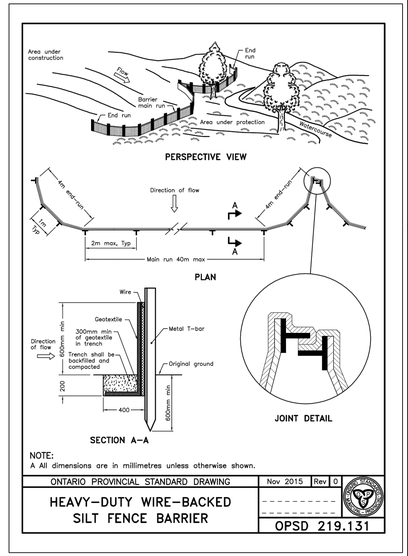


WASH RACK DETAIL

DETAIL 3 — MUD MAT CONSTRUCTION ENTRANCE
SCALE: N.T.S.



DETAIL 4 — STORMWATER STORAGE VAULT (DESIGN BY OTHERS)
SCALE: NTS



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0
HEAVY-DUTY WIRE-BACKED SILT FENCE BARRIER			OPSD 219.131

BENCH MARK NOTE:
CITY OF BURLINGTON
MONUMENT INDEX No: 198

PLATE ON PUMP HOUSE LOCATED JUST WEST OF RAMBO CREEK, BEING 0.32km EAST OF BRANT STREET ON LAKESHORE ROAD. PLATE IS FIXED TO THE SOUTH FACE OF BRICK BUILDING, BEING 0.15m EAST OF THE SOUTHWEST CORNER AND 0.30m ABOVE EXISTING CONCRETE SIDEWALK.

ELEVATION= 78.036m

NO.	DATE	BY	REVISIONS
01	SEPT. 4, 25	O.O	ISSUED FOR ZBA

NOTES TO CONTRACTOR:

1. CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
2. ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
3. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
4. THE POSITIONS OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVER-GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
5. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED, REUSED, OR REVISED WITHOUT THE WRITTEN CONSENT OF S. LLEWELLYN AND ASSOCIATES LIMITED.

DESIGN	O.O	CHK'D	M.G	DATE	SEPT. 04, 25
DRAWN	O.O	CHK'D	M.G		

SCALE 1:150 (0, 5, 10, 15)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 05/09/25 — PROVINCE OF ONTARIO

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS
Tel. (905) 631-6978
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3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT
1959025 ONTARIO INC.
366 KING STREET WEST
HAMILTON, ONTARIO

PROJECT NAME
2076 OLD LAKESHORE ROAD
BURLINGTON, ONTARIO

TITLE
NOTES AND DETAILS

PROJECT No. 25038
DRAWING No. C103

APPENDIX D
GEOTECHNICAL INVESTIGATION REPORT

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

401 Grays Road · Hamilton, ON · L8E 2Z3

www.soil-mat.ca info@soil-mat.ca 905.318.7440 / 800.243.1922 (*toll free*) 905.318.7455

PROJECT NO.: SM 230469-G November 30, 2023

1959025 ONTARIO INC.
366 King Street West
Hamilton, Ontario
L8P 1B3

Attention: Mr. Darko Vranich

GEOTECHNICAL INVESTIGATION
PROPOSED HIGH-RISE RESIDENTIAL DEVELOPMENT
2076 OLD LAKESHORE ROAD
BURLINGTON, ONTARIO

Dear Mr. Vranich,

Further to your authorisation, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P230469, dated August 15, 2023. Our comments and recommendations, based on our findings at the twelve borehole locations, are presented herein.

1. INTRODUCTION

We understand that the project will involve the construction of a residential building approximately 27 storeys in height, with up to six underground parking levels at the property located at 2076 Old Lakeshore Road in Burlington, Ontario. The purpose of this geotechnical investigation work was to further assess the subsurface soil conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, such as additional storeys or basement levels, this office must be consulted to review the new design with respect to the results of this investigation.

2. PROCEDURE

A total of twelve [12] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment as well as HQ diamond barrel coring equipment, under the direction of a representative of SOIL-MAT ENGINEERS. The boreholes were advanced to depths of approximately 1.4 to 25.9 metres below the existing grade from September 5 and 14, 2023. Upon completion of drilling Borehole Nos. 1, 2, 4, 6, 10, 11, and 12 were outfitted with groundwater monitoring wells as part of the Phase 2 Environmental Site Assessment work as well as the Hydrogeological Study being undertaken by TerraDynamics Consulting Inc. The wells installed consisted of 50-millimetre diameter PVC pipe, screened in the lower 3 metres. The monitoring wells were backfilled with well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite 'hole plug' to the surface and fitted with a protective steel 'flushmount' casing.

As noted above the boreholes were advanced with HQ diamond coring equipment where the Queenston Shale Bedrock stopped advancement of power auger equipment. Rock Quality Designation [RQD] was calculated for the recovered core samples, and eight selected samples of the recovered cores were subjected to unconfined compressive strength testing at our laboratory. The detailed results of these tests can be found appended to the end of this report.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of the ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings.

The boreholes were located on site by a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., based on accessibility over the site and clearance of underground services. The ground surface elevation at the borehole locations was referenced to a geodetic benchmark, described as the brass plaque set in the northerly most wall of City Hall, located at 426 Brant Street, Burlington. This benchmark was noted to have a geodetic elevation of 85.61 metres, based on local benchmark information provided to our office by the City of Burlington.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 12, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently comprised of the lands of the Marquis Lakeside Inn located at 2076 Old Lakeshore Road in Burlington, Ontario. The site surrounding the existing 1 and 2-storey hotel building is primarily asphalt surfaced with grass covered areas, generally flat in the northern portion, the southern portion of the site sloping towards Lake Ontario. The site is bounded by Old Lakeshore Road to the north, a pedestrian path extending from Pearl Street to Lake Ontario to the west, a vacant restaurant building (formerly Emma's Back Porch) to the east, and Lake Ontario to the south. The site is generally flat, with a slope downward from north to south to the shoreline of Lake Ontario (geodetic water elevation approximately 74 metres).

The subsurface conditions encountered at the borehole locations are summarised as follows:

Pavement Structure

Borehole Nos. 1, 4, 5, 6, 9, 11 and 12 were advanced through the existing pavement structure, which was found to consist of approximately 25 to 100 millimetres of asphaltic concrete overlying approximately 100 to 300 millimetres of granular base material. The pavement structure encountered at the borehole locations has been summarized as follows:

Table A – Pavement Structure

Borehole No.	1	4	5	6	9	11	12
Asphaltic Concrete [mm]	50	100	75	75	25	50	50
Granular Base [mm]	100	125	175	150	300	150	150

Topsoil

A surficial veneer of topsoil ranging in thickness between approximately 75 and 150 millimetres in thickness was encountered at Borehole Nos. 2, 3, 7, 8 and 10. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term 'topsoil' has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life.

Gravel Fill

Gravel fill, approximately 100 and 150 millimetres in thickness, was encountered beneath the topsoil in Borehole Nos. 3 and 10, respectively. The gravel was found to be generally compact in consistency.

Clayey Silt/Sandy Silt Fill

Clayey silt/sandy silt fill was encountered beneath the granular fill in Borehole No. 3 and beneath the topsoil in Borehole No. 8. The clayey silt/sandy silt fill was brown in colour, contained trace gravel, and occasional cobbles and construction debris inclusions, and was found to be very stiff to soft in consistency. The clayey silt/sandy silt fill was proven to auger refusal on assumed concrete a depth of 1.8 and 1.4 m bgs, respectively.

Clayey Silt/Sandy Silt

Native clayey silt/sandy silt was encountered beneath the topsoil in Borehole Nos. 2, 7, and 10, and beneath the pavement structure in Borehole Nos. 1, 4, 5, 6, 9, 11 and 12. The clayey silt/sandy silt was brown in colour, and contained trace gravel, some to trace clay, with some occasional sandy seams, had a reworked appearance in the upper levels, and was generally soft to hard in consistency. The clayey silt/sandy silt was proven to depths ranging between 3.0 to 4.3 m bgs.

Queenston Shale

Queenston shale bedrock was encountered beneath the clayey silt/sandy silt at depths of approximately 3.0 to 4.3 m bgs in Borehole Nos. 1, 2, 4 through 7, and 9 through 12. The Queenston shale was severely weathered in the upper levels, becoming sounder with depth, and containing occasional grey more resistant layers. The degree of weathering in the upper levels of the Queenston Shale is such that it tends to exhibit the properties of a hard cohesive soil, or weak rock, as evidenced by the ability to penetrate the bedrock with the solid stem augers of the drill. As such, the transition between hard soil and weak rock is somewhat indistinct. The Queenston shale bedrock was proven to termination in all noted boreholes at depths ranging between 3.5 to 25.9 m bgs.

As noted above, the bedrock was cored in Borehole Nos. 2, 3, 5, and 6 using HQ-size diamond core barrel equipment. The Rock Quality Designation [RQD] of the recovered rock cores was determined to range from approximately 55 to 100 per cent, generally indicative of a sound quality rock mass.

Compressive strength testing was carried out on eight [8] core samples, yielding unconfined strengths in the range of approximately 12.4 to 30.9 MPa [~1,800 to 4,500 psi]. The average of the samples taken from below or near the anticipated founding elevation yielded an average strength of 19 MPa [~2,750 psi]. The compressive testing data is summarised as follows, with the detailed results appended to this report:

TABLE B: BEDROCK COMPRESSIVE STRENGTH DATA

Borehole No.	Depth [m]	Geodetic Elevation [m]	q_u [MPa]
1	23.3	58.6	26.5
1	24.6	57.3	12.4
4	18.7	63.3	17.5
4	25.7	56.3	30.9
5	17.9	64.1	22.3
5	22.0	60.0	26.3
7	17.0	65.3	17.2
7	21.7	60.6	27.7

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subject site to be near the boundary of coarse textured glaciolacustrine deposits, clay to silt textured till, and shallow paleozoic bedrock. This is generally consistent with our experience in the area and observations during fieldwork.

Groundwater Observations

As mentioned above, a number of the boreholes were fitted with monitoring wells to allow for measurement of the static groundwater level. The groundwater depth was measured at the wells with the following results:

Table C: Ground Water Level Measurements

Borehole No.	October 4, 2023		October 17, 2023	
	Ground Water Depth [m]	Ground Water Geodetic Elev. [m]	Ground Water Depth [m]	Ground Water Geodetic Elev. [m]
1	15.7	66.2	-	-
2	9.1	72.8	-	-
4	8.5	73.4	-	-
6	5.5	76.5	-	-
10	7.2	74.7	7.3	74.7
11	6.4	75.5	8.1	73.8
12	3.2	78.6	8.6	73.2

Based on our observations during drilling, the available data, and our experience in the area, the static groundwater level is estimated at an elevation of approximately 74 to 76 metres, generally increasing as distance from Lake Ontario increases. The groundwater elevation was observed approximately 3 to 9 metres below the existing grade and would be expected to fluctuate seasonally. It is also noted that the groundwater level would be subject to seasonal variation due to prevailing weather conditions.

4. FOUNDATION CONSIDERATIONS

It is anticipated that the founding level for the structure will extend to depths of up to 20 metres below the existing grade at Lakeshore Road, to an elevation of approximately 62 metres. The sound Queenston Shale bedrock at depth is considered very competent in terms of support conditions for the proposed structure. Based on the results of our investigations, spread footings founded on the competent Shale bedrock may be designed using the following design bearing value:

SLS = ULS = 1,900 kPa [~ 40,000 psf]

It is noted that the SLS value represents the Serviceability Limit State, which is governed by the tolerable settlement based on the proposed building type, using unfactored load combinations. The ULS value represents the Ultimate Limit State and is intended to reflect an upper limit of the available bearing capacity of the founding soils in terms of geotechnical design, using factored load combinations. It is noted the SLS and ULS values are the same, as in order for serviceability limits of deflection to be realised, failure of the Queenston Shale bedrock would have to occur.

All footing beds must be hand cleaned of all loose or disturbed material, ponded water, etc. prior to the placement of foundation concrete. With footings founded on the competent Shale the amount of total and differential settlements are anticipated to be negligible.

In areas where it will be necessary to have adjacent footings at different founding elevations, the lower footing should be constructed prior to the higher footing, if possible, and the higher footing should be set below an imaginary line drawn up from the edge of the lower footing at 10 horizontal to 7 vertical. This practice will limit stress transfer from the higher footings to lower footings.

As the static groundwater level is expected to be well above the anticipated founding level, it will be necessary for the foundations and lowest-level basement floor slab to be constructed as a continuous watertight box, and designed to resist the hydrostatic pressure associated with an elevated groundwater level, considering a water level at ground surface. In the event that a raft slab is utilised, this should be readily accommodated at the excavation base with the raft slab itself.

Should the site plan include any supplemental structures founded at depths shallower than the proposed residential building, all footings exposed to the environment must be provided with a minimum of 1.2 metres of earth cover or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a geotechnical engineer be retained from this office to provide geotechnical engineering services during the excavation support and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations of this report and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the Borehole locations.

5. LATERAL EARTH PRESSURE

The lateral earth pressures on basement walls can be estimated on the basis of a retained soil unit weight, [γ_{wet}], of 20 kN/m^3 [~127 pcf]. The coefficient of lateral earth pressure may be taken as, K_o = 0.5 in fill against rigid walls [at rest condition]. Any additional pressures due to surcharge loading, such as adjacent structures, roadways, parked vehicles, floor slab loading, etc. must be included in the design.

6. SEISMIC DESIGN CONSIDERATIONS

The structure shall be designed according to Section 4.1.8 of the Ontario Building Code, Ontario Regulation 332/12 (as amended). Based on the subsurface soil conditions encountered in this investigation the applicable Site Classification for the seismic design is Site Class B – Rock, based on the average soil characteristics for the site.

The seismic data, from Supplementary Standard SB-1 of the Ontario Building Code, for Burlington are as follows.

S_a[0.2]	S_a[0.5]	S_a[1.0]	S_a[2.0]	S_a[5.0]	S_a[10.0]	PGA	PGV
0.266	0.131	0.062	0.029	0.0068	0.0027	0.172	0.102

7. EXCAVATIONS AND EXCAVATION SUPPORT CONSIDERATIONS

As noted above the proposed building is anticipated to include up to six basement levels. It is anticipated that excavations for the proposed foundations, sewers and other underground services will extend to depths of up to 20 metres below the present grade. The upper level of the Queenston Shale bedrock is typically highly weathered and should yield to a heavy hydraulic excavator equipped with 'rock' teeth. However, the rate of excavation should be anticipated to slow with depth, below perhaps 3 to 8 metres varying by location, as the Shale bedrock becomes sounder and less weathered. As the Shale becomes more competent, or where more resistant layers are encountered, the use of mechanical rock splitters will be required.

The base of excavations into the Queenston Shale are expected to remain solid and stable. However, the exposed Shale will be prone to surface weathering and softening. It is recommended that a thin concrete ‘mud’ slab, perhaps 50 millimetres, be placed over the base of the excavations to protect the founding soils from weathering and to provide a clean working surface for the placement of reinforcing steel, formwork, etc.

EXCAVATION SUPPORT

It is anticipated that the new structure will approach the property limits. As such it is anticipated that open cut excavations may not be suitable and the construction will require some level of excavation support. It is noted that a preconstruction survey of adjacent above and below grade structures should be conducted to assess the appropriate shoring requirements, as well as establish a baseline condition.

Excavation side slopes will remain stable at a slope of 45 degrees to the horizontal in the upper fill materials and 60 degrees to the horizontal in the native silty clay/clayey silt for the short construction period. The side slopes in the Queenston Shale should remain stable at near vertical slopes. Where workers are required to enter the excavations the sides should be thoroughly scaled of all loose rock debris and by routinely evaluated by a Senior Engineer from this office. Consideration could be given to covering the excavation faces with heavy construction tarps or debris netting, secured at top and bottom, to direct any lose rock debris that may come loose safely to the bottom of the excavation. Notwithstanding the foregoing, however, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects.

As mentioned above, some level of excavation support will likely be required to ensure the stability of the excavation faces with little or no horizontal movement. Such support may be accomplished in a number of methods, including rock anchors, ‘soldier’ pile/caissons and timber lagging, or continuous caisson wall.

Caissons to support either soldier piles or a continuous caisson wall should extend a minimum of 1.5 metres beyond the final depth of excavation, and may be designed on the basis of a nominal end bearing pressure of 1,900 kPa [~40,000 psf]. Where no lateral movements are acceptable the shoring should be designed considering an 'at rest' lateral earth pressure coefficient of Ko = 0.5. Where small lateral movements can be tolerated an 'active' earth pressure coefficient of Ka = 0.25 may be considered.

The caissons should be provided with lateral bracing, either by using a waler beam and raker supports, or with rock anchors. From a contractor's point of view, rock anchors would be preferred, provided permission can be obtained from the neighbouring property owners to extend the anchors under their property. It is noted that significant movements of the shoring system may take place if rakers are used to support the shores since compression of the rakers and the footings supporting the inclined raker loads must occur before the rakes can begin to carry load. In this regard, anchors are preferred since they pre-stress the shoring system to the design load even before the excavations reach their final grade.

Regardless of which method of support is pursued for the Shale excavations the overburden soils will need to be properly cut back or additionally supported. Where space is available to cut back the overburden, the soil should be removed completely a distance of at least 300 millimetres from the face of the Shale excavation and then sloped up. Where there is not sufficient space to accommodate cutting back of the overburden soils, they may be supported at near vertical slopes with the provision of a soldier pile [support at depth by caissons] and timber lagging system, or with shotcrete.

The excavation support must be designed as required by the Occupational Health and Safety Act and Regulations for Construction Projects and the Canadian Foundation Engineering Manual. This office should be given the opportunity to review the shoring shop drawings and design parameters before construction, and a representative of SOIL-MAT ENGINEERS should be on site to observe the installation of the shoring. The shoring must be monitored for movements, and a plan must be available before the excavations begin, to rectify the shoring system should movements become apparent.

GROUNDWATER CONTROL

As noted above the static groundwater levels in the monitoring wells have been measured at a depth of approximately 3 to 9 metres below the existing grade. Evidently excavations to the depths required will extend below the static groundwater level and thus will experience groundwater infiltration through more permeable seams in the bedrock. It is noted the Shale bedrock tends to be layered and fissured, such that permeable seams are intermittently spaced. For excavations extending a short distance below the static groundwater level, it may be possible to adequately control any water

that may seep into the excavations from more permeable seams in the fill material, silty clay/clayey silt and Queenston Shale and from surface water using conventional construction 'dewatering' techniques, such as pumping from sumps in the base of the excavations. The need for multiple sumps should be anticipated. Where deeper excavations are required the rate and volume of groundwater infiltration should be anticipated to be much greater. The groundwater control requirements will be significantly influenced by the excavation shoring method implemented, being greatest for open cuts into the Shale and much less for a continuous caisson wall. More water should be expected when connections are made with existing services. Surface water should be directed away from the excavations.

A detailed hydrogeological assessment of the site is being conducted by Terra-Dynamics Consulting Inc. The findings and recommendations found in the Hydrogeological assessment will be reviewed and any relevant construction considerations included in a separate letter.

8. FLOOR SLAB CONSIDERATIONS

As noted above, the proposed basement levels will extend below the measured static groundwater level. As such it will be necessary that the perimeter foundations and lowest-level basement raft slab be constructed as a water-tight box, making use of suitable membrane systems beneath the slab and against the exterior of foundation walls. This will likely require the use of foundation wall membrane systems intended for 'blind side' or 'single face' application. The system should also incorporate a water-stop component between the raft slab and perimeter foundation walls, and consideration should be given to using a concrete waterproofing admixture in all concrete used for the foundation walls and lowest-level slab. The foundation walls and lowest-level floor slab will also be required to be designed to resist the hydrostatic pressure, considering a groundwater level equal to the existing ground surface level. Elevator pits extending below the general basement floor level should also be designed to be continuously water-tight with the surrounding structure.

9. BACKFILL CONSIDERATIONS

It is expected that the majority of the material excavated to accommodate the basement levels will be transported off-site. Where required select portions of the fill material and silty clay/clayey silt soils are considered suitable for use as backfill in service trenches, etc. provided it is free of organics or any other deleterious material. The use of Queenston Shale backfill is not recommended as it will require significant effort and will be prone to ongoing settlement for many years if it is not properly graded and moisture conditioned, even if it is well compacted.

The use of free draining, well-graded granular material, such as an Ontario Provincial Standard Specification [OPSS] Granular B, Type II (crushed limestone bedrock) is often preferred for backfill against foundation walls. This material is more readily compacted in restricted access areas, and generally presents a more positive support condition for exterior concrete sidewalks, pavement, etc. The use of alternative materials, including recycled concrete aggregates, clear stone materials, etc., may be considered, however should be reviewed and approved by our office prior to use. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

Fine-grained cohesive soils such as those encountered on site are sensitive to moisture absorption and will become practically impossible to compact using conventional compaction equipment if they become wet during the 'wet' periods of the year. After a period of heavy precipitation, any near-surface wet, or softened material, should be allowed to air-dry or be removed and discarded. These soils are not considered to be free draining and therefore should not be used where this characteristic is necessary. They should not be used in confined spaces where access for compaction is difficult.

Backfill materials used in service trenches or to raise the subgrade elevation under exterior pavement areas should have its moisture content within 3 per cent of its optimum moisture content. In service trenches the backfill material should be compacted to a minimum of 98 per cent of its standard Proctor maximum dry density [SPMDD]. Any fill required against the basement walls should consist of free draining granular material compacted to 98 per cent of its standard Proctor maximum dry density. Where asphalt or concrete paving extends up to the building the upper 1 metre of foundation wall backfill should be compacted to 100 per cent of its standard Proctor maximum dry density. Lift thickness would depend on the material type and moisture content of the backfill material and size of the compaction equipment used by the contractor. A representative of SOIL-MAT should be retained to monitor the backfilling and compaction operations to confirm uniform compaction of the backfill material to project specification requirements.

10. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a fully-loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be sub-excavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50mm clear stone, 'rip rap' stone, etc.] 'punched' into the soft areas. It may also be prudent to consider the provision of a heavy geofabric over the subgrade to act as a separator between the subgrade and granular base materials.

The need for sub-excavations of softened subgrade materials will be reduced if construction is undertaken during dry periods of the year and careful attention is paid to the compaction operations. As noted above the on-site soils are sensitive to disturbance and moisture and may present difficulty for roadway construction during 'wet' periods of the year. Should pavement construction be undertaken during 'wet' periods of the year it should be anticipated that greater stabilisation efforts will be required and/or additional depth of OPSS Granular 'B', Type II sub-base course material may be required.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

The suggested pavement structures outlined in Table D are based on subgrade parameters estimated on the basis of visual and tactile examinations of the on-site soils and past experience. The outlined pavement structure may be expected to have an approximate ten-year life, assuming that regular maintenance is performed. Should a more detailed pavement structure design be required, site specific traffic information would be needed, together with detailed laboratory testing of the subgrade soils.

TABLE D: Recommended Pavement Structures

LAYER DESCRIPTION	COMPACTION REQUIREMENTS	LIGHT DUTY SECTIONS	HEAVY DUTY [TRUCK ROUTE]
Asphaltic Concrete Wearing course OPSS HL 3 or HL 3A	92 per cent Marshall MRD	65 millimetres	40 millimetres
Binder Course OPSS HL 8	92 per cent Marshall MRD		65 millimetres
Base Course OPSS Granular 'A'	100% SPMDD	150 millimetres	150 millimetres
Sub-base Course OPSS Granular 'B' Type II	100% SPMDD	300 millimetres	450 millimetres

* Marshall MRD denotes Maximum Relative Density.

* SPMDD denotes Standard Proctor Maximum Dry Density, ASTM-D698.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

11. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.



Stephen R. Sears, B. Eng. Mgmt., P. Eng., QP$_{ESA}$
Senior Engineer

Adam Roemmele, P. Eng.
Review Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 12, inclusive
Rock Core Compressive Strength Test Results

Distribution: 1959025 Ontario Inc. [1, plus pdf]



LEGEND

Borehole Location

BH#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 230469-G.
2. Borehole locations are approximate.
3. Benchmark was noted to have geodetic elevation of 77.901 metres as per COSINE Station Report no. 0011991U001.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Proposed High-Rise Structure
2076 Old Lakeshore Road
Burlington, Ontario

Borehole Location Plan

Project No. SM 230469-G

Date: October 2023

Drawn: PTT | Checked: SRS

SM 230469-G
Borehole Location Plan

Drawing No. 1

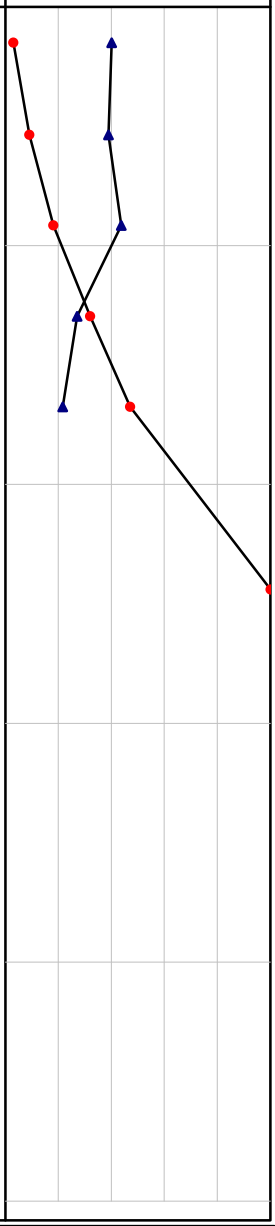
Log of Borehole No. 1

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597892

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.90	Ground Surface							
0 / 0	81.70	**Pavement Structure** — Approximately 50 millimetres of asphaltic concrete over 100 millimetres of compact granular base.	SS	1	4,2,1,2	3			
3 / 1		**Silty Sand/Sandy Silt** — Brown, trace gravel, some clay, reworked in appearances in the upper levels, very loose to dense.	SS	2	2,3,6,8	9			
6 / 2			SS	3	6,8,10,50/4" Wet Spoon	18			
7 / 2	79.60	Transition to more till-like material.	SS	4	8,16,16,17	32			
10 / 3			SS	5	5,21,26,50/5"	47			
11 / 3	78.30	**Queenston shale** — Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	SS	6	50/2"	100			
16 / 5			HQ	7	RQD=81.7%				
33 / 9									

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 5, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

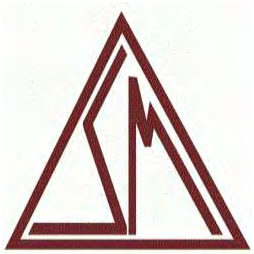
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Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 1 of 3

Log of Borehole No. 1

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597892



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17											
57					HQ	8	RQD=98.3%					
58												
59	18											
60												
61												
62	19				HQ	9	RQD=86.7%					
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 5, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 1

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597892

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66–98	56.00		End of Borehole		HQ	10	RQD=94.4%					Core C2: 23.31 metres Unconfined Compressive Strength = 26.5 MPa
					HQ	11	RQD=100%					Core C3: 24.63 metres Unconfined Compressive Strength = 12.4 MPa

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 5, 2023 to termination at a depth of 25.9 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 15.66 metres bgs.

Drill Method: HS/HQ
Drill Date: September 5, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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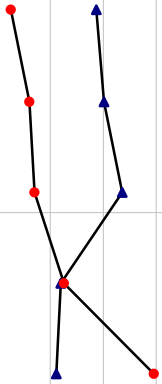
Log of Borehole No. 2

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797682
E: 597890

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.90	Ground Surface								
0 / 0		**Topsoil** Approximately 75 millimetres of topsoil.								
0 / 0		**Silty Sand/Sandy Silt** Brown, some to trace clay, trace gravel and reworked in appearances in the upper levels, loose to very dense.		SS	1	4,3,2,2	5			
4 / 1				SS	2	3,4,8,6	12			
7 / 2				SS	3	7,9,5,7	14			
8 / 2	79.60	Transition to more till-like material.		SS	4	7,12,13,15	25			
11 / 3	78.30	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,24,35,50/4"	59			

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 6, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 2

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797682
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55	17											
56												
57												
58												
59	18											
60												
61												
62	19											
63												
64												
65												
	61.80											

Drill Method: HS/HQ
Drill Date: September 6, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Sheet: 2 of 3

Log of Borehole No. 2

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797682
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66			End of Borehole									
67												
68												
69	21											
70												
71												
72	22											
73												
74												
75												
76	23											
77												
78												
79	24											
80												
81												
82	25											
83												
84												
85												
86	26											
87												
88												
89	27											
90												
91												
92	28											
93												
94												
95	29											
96												
97												
98												

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 6, 2023 to termination at a depth of 20.1 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 9.08 metres bgs.

Drill Method: HS/HQ
Drill Date: September 6, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 3 of 3

Log of Borehole No. 3

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 479783
E: 597880

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 / 0	81.97		Ground Surface									
0 – 1 / 0	81.60		**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	1,4,5,3	9			0 PPM	
1 – 5 / 1			**Pavement Structure** Approximately 150 millimetres of compact granular base.		SS	2	1,1,1,2	2			0 PPM	
5 – 6 / 1 – 2	80.17		**Silty Sand/Silty Clay Fill** Brown, occasional cobbles, organics and concrete inclusions, stiff to soft.		SS	3	28,50/2"	100			0 PPM	
6 / 2			End of Borehole Spoon Refusal on Assumed Concrete									

NOTES:

1. Borehole was advanced using solid stem auger equipment on September 12, 2023 to spoon refusal on assumed concrete at a depth of 1.8 metres.

2. Borehole was recorded as open and 'dry' below the ground surface upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Auger
Drill Date: September 12, 2023
Hole Size: 150 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597876

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 ft / 0 m	81.96	Ground Surface									
0	81.70	**Pavement Structure** — Approximately 100 millimetres of asphaltic concrete over 125 millimetres of compact granular base.		SS	1	2,2,2,3	4				
1		**Silty Sand/Sandy Silt** — Brown, trace gravel, some clay, occasional sandy seams, occasional rocks inclusions and reworked in appearances in the upper levels, very loose to dense.		SS	2	1,0,2,2	2				
2				SS	3	1,2,4,12	6				
7	79.60	Transition to more till-like material.		SS	4	7,10,18,15	28				
3	78.60	**Queenston shale** — Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,22,28,50/5"	50				
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
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29											
30											
31											
32											
33											

Drill Method: HS/HQ
Drill Date: September 7, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
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Log of Borehole No. 4

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597876

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17				HQ	6	RQD=93.3%					
57												
58												
59	18											
60												
61												
62	19				HQ	7	RQD=95.3%					
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 7, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 4

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597876

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98	56.06		End of Borehole		HQ	8	RQD=95.8%					Core D1: 18.69 metres Unconfined Compressive Strength = 17.5 MPa
					HQ	9	RQD=89.3%					Core D3: 25.69 metres Unconfined Compressive Strength = 30.9 MPa

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 7, 2023 to termination at a depth of 25.9 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 8.53 metres bgs.

Drill Method: HS/HQ
Drill Date: September 7, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
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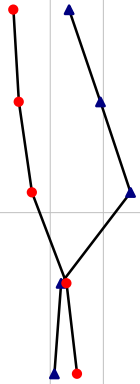
Log of Borehole No. 5

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797697
E: 597894

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	82.01	Ground Surface								
0 / 0	81.70	**Pavement Structure** Approximately 75 millimetres of asphaltic concrete over 175 millimetres of compact granular base.		SS	1	5,4,2,1	6			
3 / 1		**Silty Sand/Sandy Silt** Brown, trace gravel, some to trace clay, occasional sandy seams, reworked in appearances in the upper levels, loose to compact.		SS	2	2,5,3,6	8			
7 / 2				SS	3	4,6,7,8	13			
8 / 2	79.70	Transition to more till-like material.		SS	4	4,15,11,14	26			
10 / 3	78.60	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,9,21,50/4"	30			
26 / 8				HQ	6	RQD=100%				
33 / 10										

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 8, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

Soil-Mat Engineers & Consultants Ltd.
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Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 1 of 3

Log of Borehole No. 5

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797697
E: 597894

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17											
57					HQ	7	RQD=75.0%					
58												
59	18											
60												
61												
62	19											
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 8, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 5

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797697
E: 597894

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66–98	59.01		End of Borehole		HQ	8	RQD=91.8%					Core B1: 7.92 metres Unconfined Compressive Strength = 22.3 MPa Core B2: 21.97 metres Unconfined Compressive Strength = 26.3 MPa

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 8, 2023 to termination at a depth of 23.0 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: HS/HQ
Drill Date: September 8, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 6

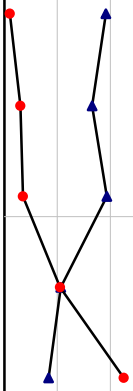
Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797661
E: 597890

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.97	Ground Surface								
0 / 0	81.70	**Pavement Structure** Approximately 75 millimetres of asphaltic concrete over 150 millimetres of compact granular base.								
1 / 0		**Silty Sand/Sandy Silt** Brown, trace gravel, some to trace clay, occasional sandy seams, reworked in appearances in the upper levels, very loose to dense.		SS	1	3,1,1,1	2			
2 / 1				SS	2	2,3,3,4	6			
3 / 1				SS	3	2,3,4,5	7			
7 / 2	79.60	Transition to more till-like material, occasional cobbles inclusions.		SS	4	7,9,12,14	21			
10 / 3	78.60	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	6,11,34,34	45			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 11, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

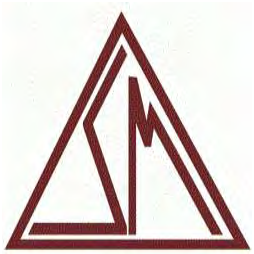
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Log of Borehole No. 6

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797661
E: 597890



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17											
57												
58												
59	18											
60												
61												
62	19											
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 11, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 6

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797661
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66	61.67											
67			End of Borehole									
68												
69	21											
70												
71												
72	22											
73												
74												
75												
76	23											
77												
78												
79	24											
80												
81												
82	25											
83												
84												
85												
86	26											
87												
88												
89	27											
90												
91												
92	28											
93												
94												
95	29											
96												
97												
98												

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 11, 2023 to termination at a depth of 20.3 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 5.49 metres bgs.

Drill Method: HS/HQ
Drill Date: September 11, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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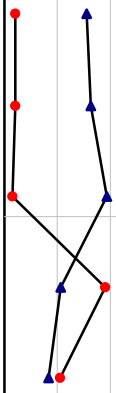
Log of Borehole No. 7

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797662
E: 597856

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	82.29	Ground Surface							
0 / 0	82.10	**Topsoil** Approximately 125 millimetres of topsoil..	SS	1	1,2,2,1	4			
3 / 1		**Silty Sand/Sandy Silt** Brown, trace gravel, trace to some clay, occasional organics inlcusions in the upper levels, very loose to dense.	SS	2	2,2,2,1	4			
6 / 2			SS	3	3,2,1,3	3			
8 / 2	79.70	Transition to more till-like material, occasional cobbles inclusions.	SS	4	6,17,21,16	38			
10 / 3			SS	5	6,9,12,15	21			
14 / 4	78.00	**Queenston shale** Red, high silt content, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	HQ	6	RQD=48.3%				
33 / 9									

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 12, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 7

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797662
E: 597856

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65	11 12 13 14 15 16 17 18 19				HQ	7	RQD=70.7%					

Drill Method: HS/HQ
Drill Date: September 12, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 7

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797662
E: 597856

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66–98	59.39		End of Borehole		HQ	8	RQD=85.0%					Core A1: 17.00 metres Unconfined Compressive Strength = 17.2 MPa Core A2: 21.68 metres Unconfined Compressive Strength = 27.7

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 12, 2023 to termination at a depth of 22.9 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: HS/HQ
Drill Date: September 12, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 8

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797686
E: 597896

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
ft 0 / m 0	81.95		Ground Surface									
0–1 / 0			**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4,7,7,6	14			0 PPM	
1–4 / 1	80.55		**Silty Sand/Sandy Silt Fill** Brown, trace gravel, occasional cobbles and construction debris inclusions, compact.		SS	2	1,4,0,0	4			0 PPM	
4 / 1			End of Borehole Auger Refusal on Assumed Concrete									
5–33 / 2–9												

NOTES:

1. Borehole was advanced using solid stem auger equipment on September 12, 2023 to auger refusal on assumed concrete at a depth of 1.4 metres.

2. Borehole was recorded as open and 'dry' below the ground surface upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Auger
Drill Date: September 12, 2023
Hole Size: 150 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 9

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797676
E: 597886

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 ft / 0 m	81.94	Ground Surface								
0 ft / 0 m	81.60	**Pavement Structure** Approximately 25 millimetres of asphaltic concrete over 300 millimetres of compact granular base.		SS	1	5,3,3,3	6			0 PPM
3 ft / 1 m		**Silty Sand/Sandy Silt** Brown, trace gravel, some to trace clay, reworked in appearances in the upper levels, loose to dense.		SS	2	2,5,7,8	12			75 PPM
6 ft / 2 m	79.90	Transition to more till-like material, occasional cobbles inclusions.		SS	3	7,8,10,11	18			0 PPM
9 ft / 3 m	78.70			SS	4	9,9,26,22	35			0 PPM
11 ft / 3 m	78.44	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	14,21,50/6"	71			0 PPM
		End of Borehole Spoon Refusal on Assumed Bedrock								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on September 14, 2023 to spoon refusal on assumed bedrock at a depth of 3.5 metres.

2. Borehole was recorded as open and 'dry' below the ground surface upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Auger
Drill Date: September 14, 2023
Hole Size: 150 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 10

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797684
E: 597890

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.93	Ground Surface								
0 / 0		**Topsoil** Approximately 125 millimetres of topsoil.		SS	1	3,4,2,4	6			80 PPM
1 / 0		**Pavement Structure** Approximately 100 millimetres of compact granular base.		SS	2	3,4,4,4	8			0 PPM
2 / 1		**Silty Sand/Sandy Silt** Brown, some clay, reworked in appearances in the upper levels, loose to compact.		SS	3	4,8,9,10	17			0 PPM
7 / 2	79.60	Transition to more till-like material, occasional cobbles inclusions.		SS	4	3,11,18,17	29			0 PPM
10 / 3	78.50	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,11,50/6"	61			0 PPM
30 / 9	72.73	End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 13, 2023 to termination at a depth of 9.2 metres.
2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 7.24 metres bgs.
October 17, 2023 - 7.26 metres bgs.

Drill Method: HS/HQ
Drill Date: September 13, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 11

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797674
E: 597872

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.96	Ground Surface							
0 / 0	81.70	**Pavement Structure** Approximately 50 millimetres of asphaltic concrete over 150 millimetres of compact granular base.							
		Silty Sand/Sandy Silt Brown, trace gravel, some to trace clay, reworked in appearances in the upper levels, very loose to compact.	SS	1	5,2,3,2	5			0 PPM
			SS	2	3,2,1,2	3			0 PPM
			SS	3	3,2,7,10	9			0 PPM
2 / 1	79.60	Transition to more till-like material.							
	78.80	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	SS	4	5,9,11,14	20			0 PPM
			SS	5	5,21,25,50/4"	46			0 PPM
9 / 3	72.76	End of Borehole							

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 14, 2023 to termination at a depth of 9.2 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 6.42 metres bgs.
October 17, 2023 - 8.14 metres bgs.

Drill Method: HS/HQ
Drill Date: September 14, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 12

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797669
E: 597887

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.81	Ground Surface							
0 / 0	81.60	**Pavement Structure** Approximately 50 millimetres of asphaltic concrete over 150 millimetres of compact granular base.							
1–7 / 0–2		**Silty Sand/Sandy Silt** Brown, trace gravel, some clay, occasional sandy seams, reworked in appearances in the upper levels, loose to compact.	SS	1	9,4,3,3	7			0 PPM
			SS	2	1,2,4,3	6			35 PPM
			SS	3	2,5,6,6 Wet Spoon	11			0 PPM
7 / 2	79.40	Transition to more till-like material, occasional cobbles inclusions.	SS	4	9,10,12,38	22			0 PPM
9 / 3	78.80	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.							
30 / 9	72.61	End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 13, 2023 to termination at a depth of 9.2 metres.
2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 3.2 metres bgs.
October 17, 2023 - 8.64 metres bgs.

Drill Method: HS/HQ
Drill Date: September 13, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Depth of Core (m)	Elevation of Core (m)	Recovery	Rock Quality Designation [RQD]	Depth / Elevation of Tested Core Sample (m)
Borehole No. 1 - Ground Surface Elevation 81.9 metres				
9.2 to 10.7 m	72.7 to 71.2 m	105%	82%	
16.8 to 18.3 m	65.1 to 63.6 m	98%	98%	
18.3 to 19.9 m	63.6 to 62 m	100%	87%	
22.9 to 24.5 m	59 to 57.4 m	103%	94%	23.3 m / 58.6 m
24.5 to 25.9 m	57.4 to 56 m	102%	102%	24.6 m / 57.3 m
Borehole No. 4 - Ground Surface Elevation 81.96 metres				
16.9 to 18.5 m	65 to 63.5 m	98%	93%	
18.5 to 20 m	63.5 to 62 m	112%	95%	18.7 m / 63.3 m
23 to 24.5 m	58.9 to 57.4 m	102%	96%	
24.5 to 25.9 m	57.4 to 56 m	102%	91%	25.7 m / 56.3 m
Borehole No. 5 - Ground Surface Elevation 82.01 metres				
7.8 to 9.3 m	74.2 to 72.7 m	102%	102%	7.9 m / 74.1 m
17 to 18.5 m	65 to 63.5 m	97%	75%	
21.4 to 23 m	60.6 to 59 m	100%	92%	22 m / 60 m
Borehole No. 7 - Ground Surface Elevation 82.29 metres				
6.2 to 7.7 m	76.1 to 74.6 m	90%	48%	
16.9 to 18.4 m	65.4 to 63.9 m	105%	71%	17 m / 65.3 m
21.4 to 22.9 m	60.9 to 59.4 m	102%	85%	21.7 m / 60.6 m

Unconfined Compressive Strength
26.5 MPa
12.4 MPa
17.5 MPa
30.9 MPa
22.3 MPa
26.3 MPa
17.2 MPa
27.7 MPa

APPENDIX E
HYDROGEOLOGICAL STUDY REPORT

Terra-Dynamics Consulting Inc.

404 Queenston Street, St. Catharines, ON L2P 2Y2

905-646-7931 Fax: 905-935-0397 www.terra-dynamics.com

3.0 Physical Setting

The Site is municipally serviced and within the City of Burlington and Halton Region. The ground surface elevation is between 82.0 and 75.5 metres above sea level (m ASL) (Figure 2, City of Burlington, 2021). The Site is within the Lower Rambo Creek Watershed of the Burlington Urban Creeks Watershed (Conservation Halton, 2019) with Rambo Creek located approximately 230 m to the north-east, and Lake Ontario located adjacent to the south. The Site is within the Credit Valley Source Protection Area (CVSPA) but no CVSPA-mapped or Credit Valley Conservation (CVC) regulated vulnerable areas are on-site.

3.1 Geology

The Site is located within the South Slope Physiographic Region (Chapman and Putnam, 1984). The regional surficial geology is mapped as a combination of Halton Till (silt to silty clay) and bedrock at surface (i.e. less than 1 m of overburden), in the northern and southern portions of the Site (OGS, 2003).

The underlying bedrock is the Queenston Formation, comprised of shales with minor interbeds of siltstones and limestones averaging 100 m in thickness (Singer et al, 2003) extending further than 200 metres radially from the Site (Armstrong and Dodge, 2007). The bedrock regionally dips towards Lake Ontario (SNC-Lavalin, 2006).

On September 5 to 13, 2023, twelve boreholes were completed by Soil-Mat Engineers & Consultants Ltd. (Soil-Mat) to between 2 and 26 metres below ground surface (m BGS), and seven monitoring wells were constructed (Figure 2, Appendix A, Soil-Mat, 2023). Summarizing the drilling program:

1. Boreholes were advanced in the overburden by hollow-stem augers and split-spoon sampling. Beneath pavement and/or topsoil, soils were generally silty sand/sandy silt underlain by '*more till-like material*' (Soil-Mat, 2023a). Earlier investigations classified these materials as "fine sand" over "silty clay" (Soil-Mat, 2014) and the silty clay was also classified as "*clayey silt (glacial till)*" (Terraprobe, 2021). Shale bedrock was encountered between 3.0 to 4.3 metres below ground surface (m BGS) and the top of bedrock locally dips to the west from 79 to 78 m ASL.

2. Bedrock boreholes were advanced in the shale using HQ coring (96 mm/2.5 inches, diameter). The bedrock is red shale "*with more resistant grey layers, highly weathered in the upper levels... becomes sounder with depth*" (Soil-Mat, 2023a). The rock quality designation (RQD) was good (75-90%) to excellent (90-100%) at BH1, BH4 and BH5, while only at BH7 was it poor (<25%) and fair (50-75%).

Hydrogeologic cross-sections were prepared using the above referenced borehole information to visualize the subsurface conditions (Figures 3 and 4).

3.1.1 Geologic Units to be Excavated

Excavation for four basement levels is calculated to proceed to approximately 66.7 m ASL, (NEUF Architects Inc., 2025) or a depth of about 11.8 metres into the shale (Figures 3 and 4).

3.2 Groundwater Levels

Seven groundwater monitoring wells were constructed to monitor three depth intervals in the shale bedrock (Figure 2, Table 1), in increasing depth they are:

a) Shallow Shale (6 to 9 m BGS): MW-10, MW-11 and MW-12;
b) Intermediate Shale (17 to 20 m BGS): MW-2 and MW-6; and
c) Deeper Shale (23 to 26 m BGS): MW-1 and MW-4.

Groundwater levels were measured using a combination of manual measurements and water level datalogging pressure transducers.

Water level datalogger pressure transducers were continuously deployed from October 2023 to October 2024, at three, of the seven, shale groundwater monitoring wells (i.e. MW-10 Shallow, MW-2 Intermediate and MW-4 Deep). The groundwater level hydrographs for these three locations are presented in Appendix B (Charts B-1, B-2, B-3 and B-4) which included barometric compensation.

Manual groundwater level measurements were also collected at the other four monitoring wells in Fall 2023, Winter, Spring, Summer and Fall 2024 (Table 1). However, some fall 2023 manual groundwater level measurements reflect water level recovery and are not static water level background conditions (Table 1). Water level datalogger pressure transducers were also deployed for a two-week period from October 30 to November 15 2023 at the other four shale monitoring wells continuing water level monitoring following in-situ hydraulic conductivity testing (Charts B-5, B-6, B-7 and B-8, Appendix B).

3.2.1 Groundwater Level Discussion

The shale groundwater table was monitored at three groundwater monitoring wells: MW-10, MW-11 and MW-12 (Figure 2, Appendix A). The depth to the water table was observed to be no shallower than 6 metres during the one-year of monitoring (Table 1). Shallow groundwater levels were generally 6.7 to 6.9 m BGS at MW-10, 6.4 to 6.6 m BGS at MW-11 and 6.3 to 6.6 m BGS at MW-12 (Table 1). During the one-year of monitoring, the water table groundwater levels were shallowest in June 2024 as shown by the water level datalogger plot for MW-10 (Chart B-1, Appendix B). The seasonal water table variation from the Fall 2023 low to the Spring 2024 high was less than 1 metre as recorded by the water level datalogger at MW-10 (Chart B-1, Appendix B).

Although monitoring well MW-11 showed evidence of a quick groundwater level rise (1.2 m) in response to a 5.9 mm/day precipitation event November 6, 2023, similar quick responses were not noted at MW-10 or MW-12 (Chart B-1 and B-6, Appendix B) and may have resulted from surface water entering the flushmount well. Groundwater levels were higher, although similar in elevation, at the Site (as measured at MW-10) than as reported at Lake Ontario as reported by the Department of Fisheries and Oceans at Burlington Station 02HB017 (Chart B-4, Appendix B), i.e. Lake Ontario is downgradient of the water table at the Site.

Intermediate shale groundwater levels were monitored at MW-2 and MW-6, with monitoring well screens below the planned base of the fourth underground level. The intermediate shale groundwater levels ranged from about 8 to 9 m BGS (Table 1). During the one-year of monitoring, the intermediate

shale groundwater levels were shallowest in July 2024 as shown by the water level datalogger plot for MW-2 (Chart B-2, Appendix B). The intermediate groundwater levels appear to mimic, understandably, the Lake Ontario surface water levels, however are deeper on average by about 2 metres (Chart B-4, Appendix B). The vertical groundwater gradient was downwards from the water table to the intermediate groundwater system as noted in comparing MW-10 to MW-2 and MW-12 to MW-6 in 2024. However, these intermediate groundwater levels are higher than the planned base of a fourth underground level, indicating a possible upwards groundwater gradient into the future open excavation.

Deep groundwater levels within the shale were monitored at MW-1 and MW-4. Seasonal groundwater level fluctuation was limited at continuously monitored MW-4 (Chart B-3, Appendix B), after recovering following hydraulic conductivity testing in October 2023 and April 2024 (Section 3.3). The vertical gradient was downwards from the intermediate to deep groundwater systems.

3.3 Hydraulic Conductivity Analyses

Hydraulic conductivity testing of the bedrock monitoring wells was completed using a rising-head or a falling-head approach. The analyses were completed in Aqtesolv™ and the bedrock hydraulic conductivity results are summarized in Table 2 and analyses are presented in Appendix C. The calculated bulk representative hydraulic conductivity for the shale on-site is $7x10^{-9}$ m/s. Monitoring wells were developed prior to hydraulic conductivity testing.

Table 2 – Shale Hydraulic Conductivity

Individual Hydraulic Conductivity Results (m/s)	Geometric Mean (m/s)	Unit
$1x10^{-7}$ (MW-10), $1x10^{-9}$ (MW-11) $2x10^{-10}$ (MW-12)	$3x10^{-9}$	Shallow Shale
$6x10^{-9}$ (MW-2), $1x10^{-8}$ (MW-6)	$8x10^{-9}$	Intermediate Shale
$2x10^{-6}$ (MW-1), $3x10^{-10}$ (MW-4)	$2x10^{-8}$	Deep Shale
Geometric Mean	$7x10^{-9}$	Shale

There was considerable variation in the hydraulic conductivity results, ranging from 10^{-6} to 10^{-10} m/s. We have previously noted considerable variation in hydraulic conductivity on other investigations completed in the Queenston Shale within the City of Burlington (Terra-Dynamics, 2021). However, the bedrock is of sufficiently low permeability that groundwater control pumping methods may not be necessary or feasible (Figure 5, Preene, 2020).

3.4 Geologic Units to be Dewatered – Maximum Estimate

The construction excavation into the shale will be below the water table to a proposed maximum excavation depth of between 66.7 m ASL (NEUF Architects Inc., 2025), and a maximum groundwater level elevation of 75.6 m ASL (Table 1), therefore 8.9 metres of shale could horizontally contribute groundwater to the excavation. Long-term dewatering considerations are also discussed in Section 4.0.

3.5 Groundwater Quality Analyses

Unfiltered groundwater quality samples were collected November 15 or 21, 2023 from four monitoring wells: (i) MW-10 (shallow shale), (ii) MW-11 (shallow shale), (iii) MW-1 (deep shale) and (iv) MW-6

(intermediate shale). These groundwater samples were submitted to SGS Canada Inc. (an accredited Ontario laboratory) for laboratory analyses and comparison to the City of Burlington Sewer Use By-Law for Storm Sewer Discharge (Appendix D).

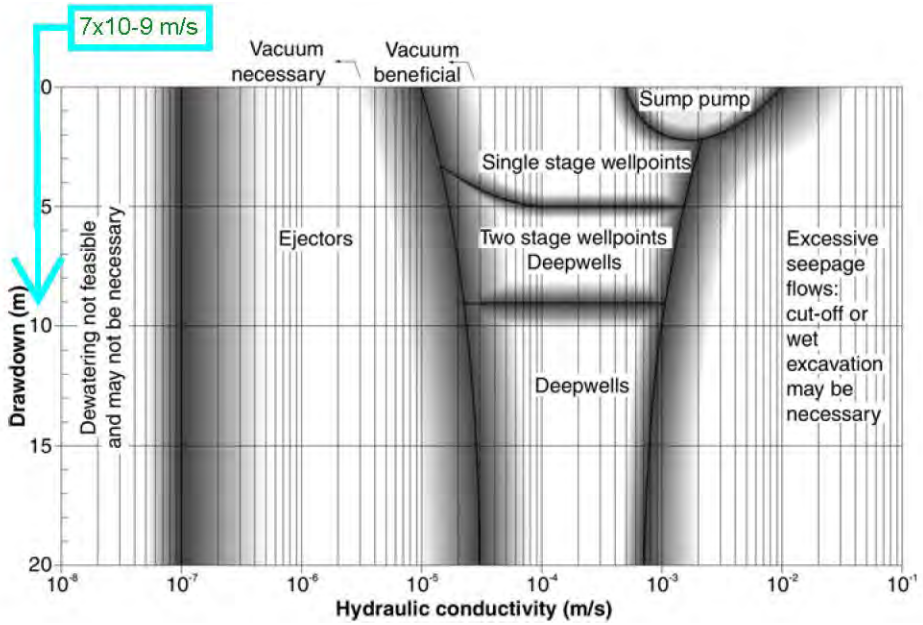


Figure 5 – Range of application of groundwater control pumping methods in granular soils (Preene,2020)

Dewatering groundwater from the shale will require treatment to meet the City of Burlington Storm Sewer Discharge criteria for total suspended solids (TSS), manganese, phosphorus and zinc (Table 3, Appendix D). However, sediment settlement tanks and/or filtering through silt-sacks for TSS would be expected to also reduce manganese, phosphorus and zinc. For example, other 'filtered' groundwater samples collected on-site by others were analyzed for zinc at the Site were non-detect at <0.005 mg/L at MW-10 and MW-11 (Soil-Mat, 2023b), however additional treatment may also be required.

Table 3 - Groundwater Quality Parameters Exceeding Storm Sewer Discharge Criteria

Parameter	Criterion (mg/L)	MW-10 Shallow	MW-11 Shallow	MW-6 Inter	MW-1 Deep
Total Suspended Solids	15	**563**	**442**	**228**	**70**
Manganese	0.05	**0.359**	**0.969**	**0.518**	**0.578**
Total Phosphorus	0.4	**0.441**	**1.02**	0.295	0.070
Zinc	0.04	0.035	**0.147**	**0.124**	**0.046**
PAHs (Total)	0.002	<0.001	<0.001	0.002	**0.004**
Chloroform	0.002	0.0020	0.0008	**0.0040**	<0.0005

Notes: **Bolded values exceeded criterion**, Inter=Intermediate

The isolated detections of PAHs and Chloroform are not considered representative of overall groundwater conditions. However, during construction dewatering, confirmatory water quality testing should be completed to ensure additional treatment is not required.

3.5.1 Long-Term Groundwater Quality Treatment for Discharge

For long-term dewatering, if required, elevated TSS may be sufficiently lowered by 60% (TRCA, 2004) via an oil and grit separator. The oil and grit separator may also reduce other parameters if still elevated above City of Burlington Stormsewer discharge criteria or additional treatment may be required.

3.6 Hydrogeologic Setting

Given the water table observed as about 3 metres below the top of the shale bedrock, it can be considered unconfined. Excavation within the bedrock will involve some collection of groundwater, but 'active' construction dewatering is not anticipated but rather limited excavation sump collection of seeping groundwater due to the low hydraulic conductivity (Figure 5, Preene, 2020).

4.0 Groundwater Dewatering Assessment

Dewatering flow rates were estimated for construction excavation dewatering and post-construction conditions. The horizontal dewatering rates were estimated using an analytical equation for radial flow to a water table from Powers et al (2007).

The maximum groundwater level elevation for the assessment was 75.6 m ASL. The depth of excavation may extend to an elevation of 66.7 m ASL. This requires a potential horizontal dewatering value of 9.4 m (i) 8.9 metres construction depth, plus (ii) an additional 0.5 m of dewatering depth was added as a reasonable assumption for keeping an excavation dry (Preene, 2023). An excavation of 47 by 38 metres was used for the analyses approximating the dimensions of the Site. An additional factor of safety was introduced by modelling using a hydraulic conductivity of $1x10^{-7}$ m/s for the shale.

The calculated maximum construction horizontal dewatering rate is modelled to be less than 10,000 Litres/day (Table E-1, Appendix E).

As the calculated maximum dewatering rate is less than 50,000 L/day, a Ministry of the Environment, Conservation & Parks (MECP) Environmental Activity and Sector Registry (EASR) temporary 'Construction Site Dewatering' application should not be required, however a dewatering plan should be prepared for discharge to the City of Burlington storm sewer.

With respect to long term dewatering, the dewatering flow rate is modelled to decrease over time, to less than 500 Litres/day after 5 years (Figure E-1, Appendix E). Long-term post-construction dewatering rates incorporated a Cooper-Jacob influence calculation from Cashman and Preene (2021), and a saturated thickness of 6.9 m reflecting the maximum groundwater level (75.6 m ASL) and the fourth underground level floor at 68.7 m ASL. Example calculations are shown in Table E-2(Appendix E) at 5 years, where the daily discharge rate is modelled to be less than 500 L/day. Consequently, it is our understanding that this small amount of water would not require 'bath-tubbing" waterproofing, but could be captured by perimeter foundation drainage. However, conditions during excavation should be observed to inform perimeter drainage design.

4.1 Dewatering Zone of Influence

A construction dewatering zone of influence in the shale bedrock was conservatively calculated as between a radial distance of 33 metres (Table E-1, Appendix E). This is a conservative calculation as it does not include consideration of groundwater recharge, or the time to reach this distance. However, it is our understanding that there should be no settlement concerns with dewatering occurring in the shale (Soil-Mat, 2023).

4.2 Other Dewatering Considerations

Ministry of the Environment, Conservation and Parks (MECP, 2024) water well records within 200 m were reviewed and no private groundwater supplies are suggested to exist within this municipally serviced area.

Within 200 m of the Site, only construction dewatering Permits to Take Water (PTTW) and Environmental Activity and Sector Registries (EASRs) were listed by the MECP under Access Environment, i.e. no PTTW were listed within 200 m for groundwater supplies that would be negatively affected by on-site construction dewatering.

5.0 Conclusions and Recommendations

5.1 Conclusions

The following conclusions are provided:

1. Construction of a 23-story mixed-use building at 2076 Old Lakeshore Road, Burlington is proposed to include 4 basement parking levels;

2. Construction of the 4 basement parking levels will require excavation to an elevation of 66.7 metres above sea level. This excavation will be primarily of shale bedrock;

3. The water table at the Site is within the shale bedrock, observed to be as high as 6.3 metres below ground surface. The shale bedrock exhibits a low average bulk hydraulic conductivity of $7x10^{-9}$ m/s;

4. Total suspended solids in dewatering waters will require treatment to meet the City of Burlington stormsewer discharge criterion which may also address potentially naturally elevated manganese, phosphorus and zinc concentrations;

5. Construction dewatering for the underground levels is modelled to not require a Construction Dewatering EASR from the MECP with maximum in-flows calculated as less than 10,000 Litres/day to dewater the shale bedrock;

6. No negative effects are predicted to occur from dewatering takings during construction; and

7. Post-construction dewatering is calculated to be very low at less than 500 L/day after 5 years.

5.2 Recommendations

The following recommendations are provided for your consideration:

1. Total suspended solids (TSS) should be reduced in dewatering waters through sediment control and filtration where needed and laboratory analyses should be completed to confirm reduction in TSS, manganese, phosphorus and zinc;

2. A Dewatering plan should be designed for discharge to the City of Burlington stormsewer;

3. A Permit should be obtained from the City of Burlington for discharging groundwaters from the Site to the stormsewer; and

4. Monitoring wells should be decommissioned once Site Plan approval is received.

6.0 Limitations

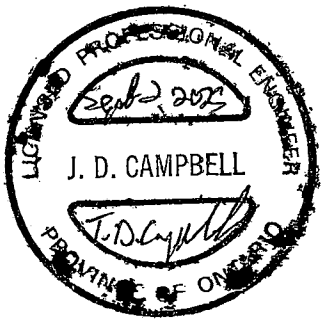
Subsurface dewatering assessments, by their nature, have inherent limitations and uncertainties primarily due to the heterogeneities in geologic conditions causing differences in hydraulic conductivity, hydraulic gradients and pressures in areas of a site not investigated by boreholes and/or monitoring wells. It is believed that these uncertainties have been addressed through conservative interpretation of other existing regional-based geologic conditions and site-specific data at the places investigated. Conditions may vary in the subsurface at places not investigated. The assessment of dewatering potential, including the evaluation of risk and/or impact, is valid only for the assumptions and conditions outlined in this report and the conditions as they were observed at the time of the investigation. Should knowledge of the site conditions change, the assessments of risks posed by the site may differ from that presented in this report.

This report was prepared by Terra-Dynamics Inc. for 1959025 Ontario Inc.. The material in it reflects Terra-Dynamics' best judgment in light of the information available to Terra-Dynamics at the time of preparation of this report. Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibility of such third parties. Terra-Dynamics accepts no responsibility for damages, if any, suffered by any third parties as a result of decisions made, or actions taken, based on this report. However that being said, a reliance letter is provided with the final report that authorizes the City of Burlington to make reliance on the findings and recommendation outlined in this report (Appendix F).

We trust this information is sufficient. Please do not hesitate to contact us if you have any questions or require additional information for your review.

Yours truly,

TERRA-DYNAMICS INC.



Jayme D. Campbell, P.Eng.
Senior Water Resource Engineer

Attachments
Figure 1 – Site Location
Figure 2 – Site Details
Figure 3 – Hydrogeologic Cross Section A-A'
Figure 4 – Hydrogeologic Cross Section B-B'
Table 1 – Manual Groundwater Levels
Appendix A – Borehole/Monitoring Well Logs
Appendix B – Hydrographs
Appendix C – Hydraulic Conductivity Analyses
Appendix D – Water Quality Analyses
Appendix E – Dewatering Calculations
Appendix F – Reliance Letter

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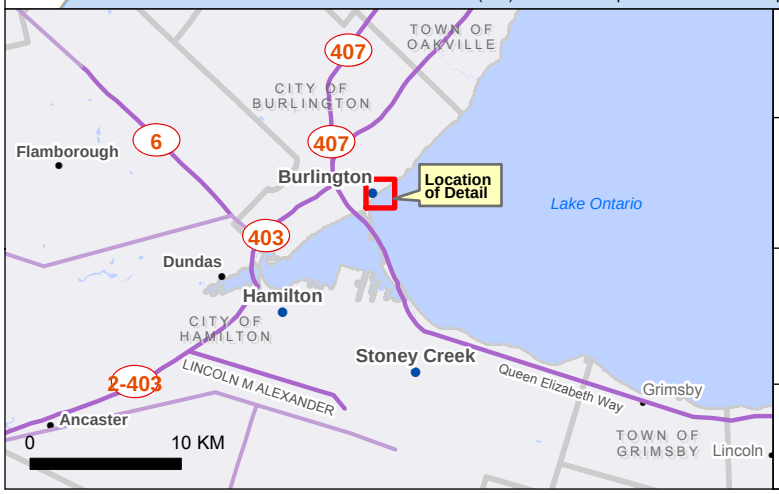
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Site Location

Dewatering Hydrogeological Study
2670 Old Lakeshore Road, Burlington, ON

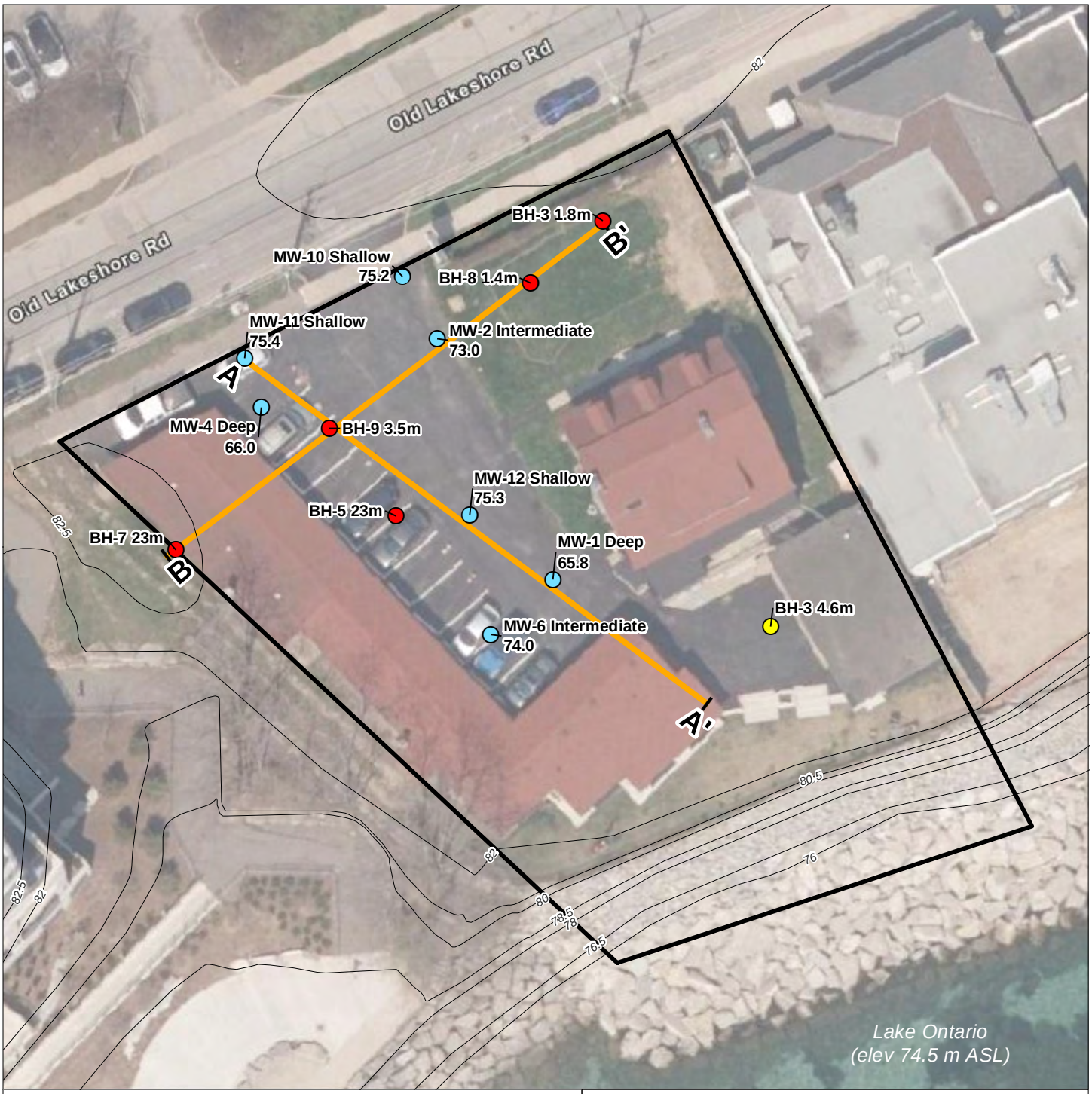
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Figure 1

Path: H:\TERRA_DYNAMICS\9767 - TD 2670 Old Lakeshore Rd\gis\mxd\Figure 1 Location of Subject Lands.mxd Revised: August 14, 2025



Legend

- Subject Lands
- Surface Contours, m ASL (City of
- Geologic Cross-section
- Borehole (Soil-Mat 2023)
- Borehole (TerraProbe)
- Monitoring Well (Soil-Mat 2023)

Depth (m) / *Identifier* — **BH-5 23m**

BH-3 4.6m

Identifier — **MW-1 Deep**

Water Level (mASL) — **65.8**

Manual groundwater levels April 9, 2024.

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Air photo: City of Burlington 2023.
Coordinate system : NAD 1983, UTM Zone 17T

Site Details

Dewatering Hydrogeological Study
2670 Old Lakeshore Road, Burlington, ON

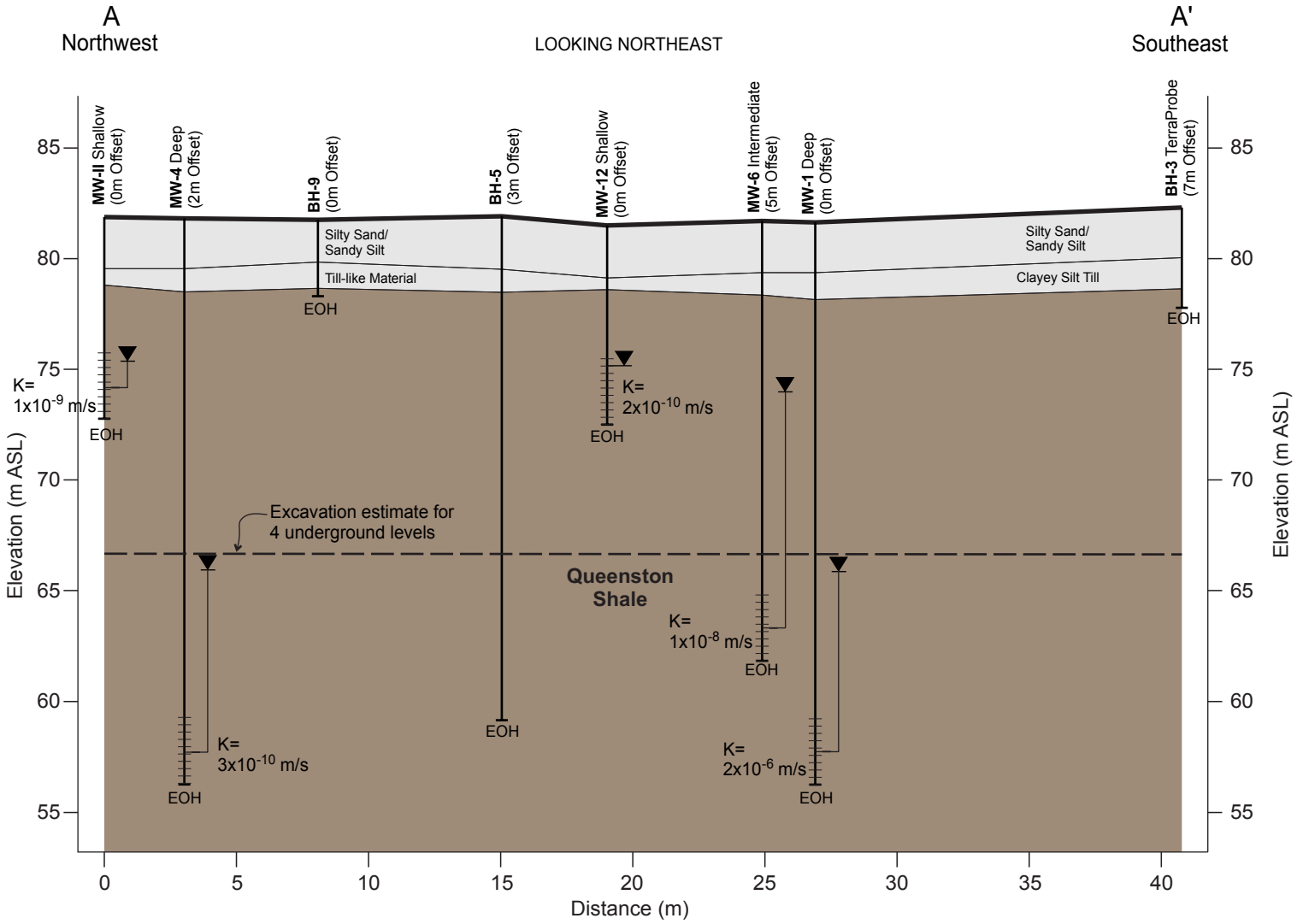
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Figure 2

Path: H:\TERRA_DYNAMICS\9767 - TD 2670 Old Lakeshore Rd\gis\mxd\Figure 2 Site Details.mxd Revised: August 17, 2025



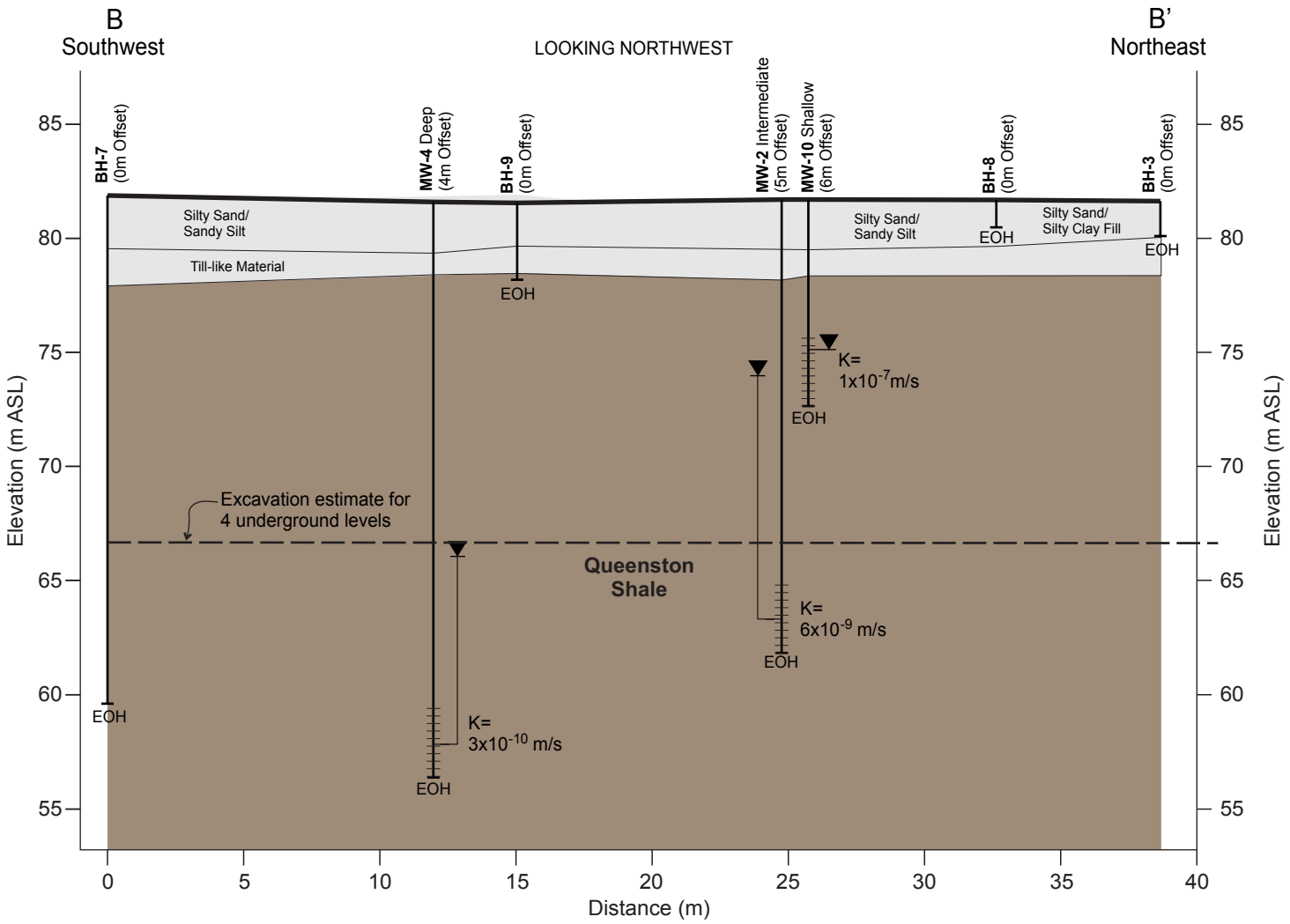
- Groundwater Level April 9, 2024 mASL
- Well Screen
- EOH — End of Hole
- K= 3x10^{-10} — Hydraulic Conductivity (m/s)
- Overburden
- Queenston Shale Bedrock

Hydrogeologic Cross-section A-A'

Dewatering Hydrogeological Study
2670 Old Lakeshore Road, Burlington, ON

Terra-Dynamics inc.

Figure 3



- Groundwater Level April 9, 2024 mASL
- Well Screen
- EOH End of Hole
- K= $3x10^{-10}$ Hydraulic Conductivity (m/s)
- Overburden
- Queenston Shale Bedrock

Hydrogeologic Cross-section B-B'

Dewatering Hydrogeological Study
2670 Old Lakeshore Road, Burlington, ON

Terra-Dynamics inc.

Figure 4

Table 1
Monitoring Well Details and Manual Water Levels

Well I.D.	Ground Elevation (m ASL)	Stick-Up (m)	TOC Elevation (m ASL)	Well Depth Below TOC (m)	Well Depth below ground (m)	Date	Water level (m below TOC)	Water Level below ground (m)	Water Level Elevation (m ASL)
MW1 - Deep	81.90	-0.06	81.84	25.85	25.91	4-Oct-23	15.60	15.66	66.24
						30-Oct-23	15.03	15.09	66.81
						31-Oct-23	15.07	15.13	66.77
						7-Nov-23	15.01	15.07	66.84
						15-Nov-23	15.27	15.33	66.57
						22-Feb-24	15.89	15.95	65.95
						9-Apr-24	16.07	16.13	65.78
						2-Oct-24	16.15	16.21	65.69
MW2 - Intermediate	81.90	-0.14	81.77	20.14	20.27	4-Oct-23	8.95	9.09	72.82
						30-Oct-23	9.09	9.23	72.68
						31-Oct-23	8.96	9.09	72.81
						7-Nov-23	10.12	10.26	71.65
						15-Nov-23	9.71	9.85	72.06
						22-Feb-24	8.94	9.08	72.83
						9-Apr-24	8.76	8.90	73.01
						3-Sep-24	8.57	8.71	73.20
						2-Oct-24	8.63	8.77	73.14
MW4 - Deep	81.96	-0.17	81.79	25.74	25.91	31-Oct-23	23.01	23.18	58.78
						7-Nov-23	20.02	20.19	61.77
						15-Nov-23	18.24	18.41	63.55
						22-Feb-24	15.93	16.10	65.86
						9-Apr-24	15.83	16.00	65.96
						2-Oct-24	15.64	15.81	66.15
MW6 - Intermediate	81.97	-0.10	81.87	20.17	20.27	30-Oct-23	7.55	7.65	74.32
						7-Nov-23	8.24	8.34	73.63
						15-Nov-23	8.25	8.35	73.62
						22-Feb-24	7.99	8.09	73.88
						9-Apr-24	7.88	7.98	73.99
						3-Sep-24	7.92	8.02	73.95
						2-Oct-24	7.96	8.06	73.91
MW10 - Shallow	81.9	-0.04	81.89	9.10	9.14	4-Oct-23	7.20	7.24	74.69
						17-Oct-23	7.22	7.26	74.67
						30-Oct-23	7.18	7.22	74.71
						31-Oct-23	7.28	7.32	74.61
						7-Nov-23	7.19	7.23	74.70
						15-Nov-23	7.18	7.22	74.71
						21-Nov-23	7.17	7.21	74.72
						22-Feb-24	6.86	6.90	75.04
						9-Apr-24	6.68	6.72	75.21
						3-Sep-24	6.72	6.76	75.17
						2-Oct-24	6.66	6.70	75.23

Table 1
Monitoring Well Details and Manual Water Levels

Well I.D.	Ground Elevation (m ASL)	Stick-Up (m)	TOC Elevation (m ASL)	Well Depth Below TOC (m)	Well Depth below ground (m)	Date	Water level (m below TOC)	Water Level below ground (m)	Water Level Elevation (m ASL)
BH/MW11 - Shallow	82.0	-0.06	81.9	9.08	9.14	17-Oct-23	8.08	8.14	73.82
						30-Oct-23	7.84	7.90	74.06
						31-Oct-23	8.46	8.52	73.44
						7-Nov-23	6.96	7.02	74.94
						15-Nov-23	7.51	7.57	74.39
						21-Nov-23	7.86	7.92	74.04
						22-Feb-24	7.16	7.22	74.74
						9-Apr-24	6.53	6.59	75.37
						3-Sep-24	6.35	6.41	75.56
						2-Oct-24	6.35	6.41	75.55
BH/MW12 - Shallow	81.8	-0.10	81.71	9.04	9.14	4-Oct-23	3.10	3.20	78.61
						17-Oct-23	8.54	8.64	73.17
						30-Oct-23	8.39	8.49	73.32
						31-Oct-23	8.43	8.53	73.28
						7-Nov-23	8.70	8.80	73.02
						15-Nov-23	8.63	8.73	73.08
						21-Nov-23	8.57	8.67	73.14
						22-Feb-24	7.45	7.55	74.26
						9-Apr-24	6.45	6.55	75.26
						3-Sep-24	6.16	6.26	75.55
						2-Oct-24	6.49	6.59	75.22

Note:
MW=Monitoring well; TOC= Top of Casing; mASL=metres above sea level
Grey shading indicates recovering groundwater levels

Appendix A

Soil-Mat and Terraprobe

Borehole/ Monitoring Well Logs

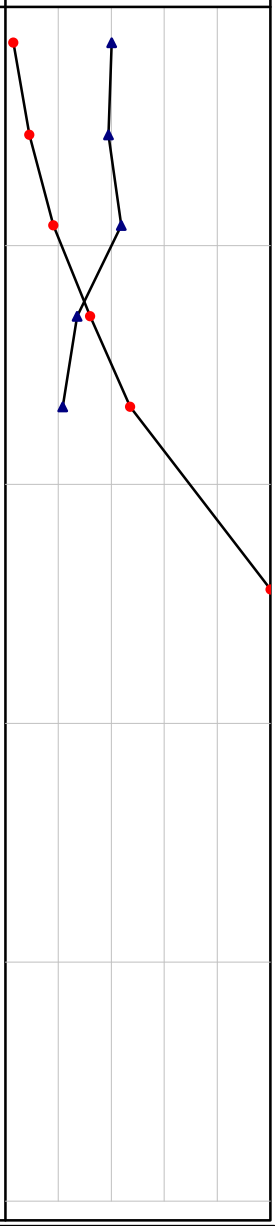
Log of Borehole No. 1

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597892

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	81.90	Ground Surface								
0 / 0	81.70	**Pavement Structure** Approximately 50 millimetres of asphaltic concrete over 100 millimetres of compact granular base.								
1 / 0		**Silty Sand/Sandy Silt** Brown, trace gravel, some clay, reworked in appearances in the upper levels, very loose to dense.		SS	1	4,2,1,2	3			
2 / 1				SS	2	2,3,6,8	9			
3 / 1				SS	3	6,8,10,50/4" Wet Spoon	18			
7 / 2	79.60	Transition to more till-like material.		SS	4	8,16,16,17	32			
10 / 3				SS	5	5,21,26,50/5"	47			
11 / 3	78.30	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.								
16 / 5				SS	6	50/2"	100			
33 / 9				HQ	7	RQD=81.7%				

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 5, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
Field Logged by: PTT
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Log of Borehole No. 1

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597892

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17											
57					HQ	8	RQD=98.3%					
58												
59	18											
60												
61												
62	19				HQ	9	RQD=86.7%					
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 5, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 1

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597892

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66–98	56.00		End of Borehole		HQ	10	RQD=94.4%					Core C2: 23.31 metres Unconfined Compressive Strength = 26.5 MPa
					HQ	11	RQD=100%					Core C3: 24.63 metres Unconfined Compressive Strength = 12.4 MPa

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 5, 2023 to termination at a depth of 25.9 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 15.66 metres bgs.

Drill Method: HS/HQ
Drill Date: September 5, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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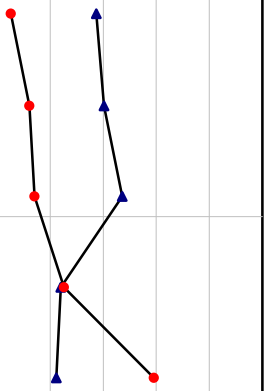
Log of Borehole No. 2

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797682
E: 597890

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.90	Ground Surface								
0–2 / 0–0.6		**Topsoil** Approximately 75 millimetres of topsoil.		SS	1	4,3,2,2	5			
2–7 / 0.6–2.2		**Silty Sand/Sandy Silt** Brown, some to trace clay, trace gravel and reworked in appearances in the upper levels, loose to very dense.		SS	2	3,4,8,6	12			
				SS	3	7,9,5,7	14			
7–8 / 2.2–2.4	79.60	Transition to more till-like material.		SS	4	7,12,13,15	25			
10–11 / 3–3.4	78.30	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,24,35,50/4"	59			

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 6, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 2

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797682
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55	17											
56												
57												
58												
59	18											
60												
61												
62	19											
63												
64												
65												
	61.80											

Drill Method: HS/HQ
Drill Date: September 6, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 2

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797682
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66			End of Borehole									
67												
68												
69	21											
70												
71												
72	22											
73												
74												
75												
76	23											
77												
78												
79	24											
80												
81												
82	25											
83												
84												
85												
86	26											
87												
88												
89	27											
90												
91												
92	28											
93												
94												
95	29											
96												
97												
98												

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 6, 2023 to termination at a depth of 20.1 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 9.08 metres bgs.

Drill Method: HS/HQ
Drill Date: September 6, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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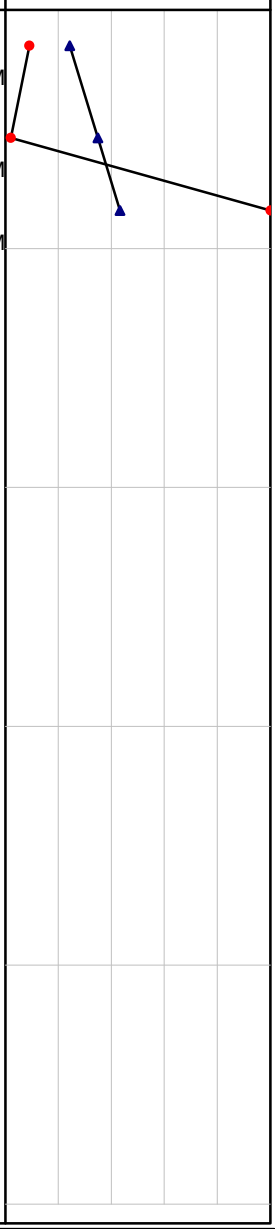
Log of Borehole No. 3

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 479783
E: 597880

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.97	Ground Surface								
0 / 0	81.60	**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	1,4,5,3	9			0 PPM
3 / 1		**Pavement Structure** Approximately 150 millimetres of compact granular base.		SS	2	1,1,1,2	2			0 PPM
5 / 2	80.17	**Silty Sand/Silty Clay Fill** Brown, occasional cobbles, organics and concrete inclusions, stiff to soft.		SS	3	28,50/2"	100			0 PPM
		End of Borehole Spoon Refusal on Assumed Concrete								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on September 12, 2023 to spoon refusal on assumed concrete at a depth of 1.8 metres.

2. Borehole was recorded as open and 'dry' below the ground surface upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Auger
Drill Date: September 12, 2023
Hole Size: 150 millimetres
Drilling Contractor: Davis Drilling Ltd.

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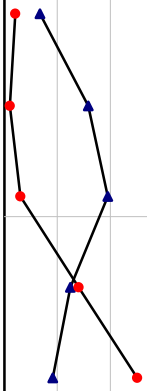
Log of Borehole No. 4

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597876

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		81.96	Ground Surface							
0	0	81.70	**Pavement Structure** Approximately 100 millimetres of asphaltic concrete over 125 millimetres of compact granular base.							
1–2	1		**Silty Sand/Sandy Silt** Brown, trace gravel, some clay, occasional sandy seams, occasional rocks inclusions and reworked in appearances in the upper levels, very loose to dense.	SS	1	2,2,2,3	4			
3–4				SS	2	1,0,2,2	2			
5–6				SS	3	1,2,4,12	6			
7	2	79.60	Transition to more till-like material.							
8–9				SS	4	7,10,18,15	28			
10	3	78.60	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	SS	5	4,22,28,50/5"	50			
11–12	4									
13–14										
15–16	5									
17–18										
19–20	6									
21–22										
23–24	7									
25–26										
27–28	8									
29–30										
31–32	9									
33										

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 7, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 1 of 3

Log of Borehole No. 4

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597876

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17				HQ	6	RQD=93.3%					
57												
58												
59	18											
60												
61												
62	19				HQ	7	RQD=95.3%					
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 7, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 2 of 3

Log of Borehole No. 4

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797671
E: 597876

Depth	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
66										
67										
68										
69	21									
70										
71										
72	22									
73										
74										
75										
76	23									
77										
78				HQ	8	RQD=95.8%				
79	24									
80										
81										
82	25			HQ	9	RQD=89.3%				
83										
84										
85	56.06	End of Borehole								
86	26									
87										
88										
89	27									
90										
91										
92	28									
93										
94										
95	29									
96										
97										
98										

Moisture Content w%: 10 20 30 40

Standard Penetration Test blows/300mm: 20 40 60 80

Core D1: 18.69 metres Unconfined Compressive Strength = 17.5 MPa

Core D3: 25.69 metres Unconfined Compressive Strength = 30.9 MPa

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 7, 2023 to termination at a depth of 25.9 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 8.53 metres bgs.

Drill Method: HS/HQ
Drill Date: September 7, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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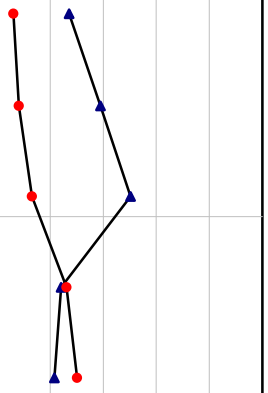
Log of Borehole No. 5

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797697
E: 597894

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	82.01		Ground Surface								
0 / 0	81.70		**Pavement Structure** Approximately 75 millimetres of asphaltic concrete over 175 millimetres of compact granular base.		SS	1	5,4,2,1	6			
3 / 1			**Silty Sand/Sandy Silt** Brown, trace gravel, some to trace clay, occasional sandy seams, reworked in appearances in the upper levels, loose to compact.		SS	2	2,5,3,6	8			
7 / 2	79.70		Transition to more till-like material.		SS	3	4,6,7,8	13			
10 / 3					SS	4	4,15,11,14	26			
11 / 3	78.60		**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,9,21,50/4"	30			
26 / 8					HQ	6	RQD=100%				

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 8, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 5

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797697
E: 597894

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52												
53	16											
54												
55												
56	17											
57					HQ	7	RQD=75.0%					
58												
59	18											
60												
61												
62	19											
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 8, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 5

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797697
E: 597894

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66–98	59.01		End of Borehole		HQ	8	RQD=91.8%					Core B1: 7.92 metres Unconfined Compressive Strength = 22.3 MPa Core B2: 21.97 metres Unconfined Compressive Strength = 26.3 MPa

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 8, 2023 to termination at a depth of 23.0 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: HS/HQ
Drill Date: September 8, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 6

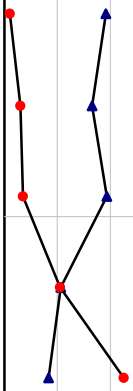
Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797661
E: 597890

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.97	Ground Surface								
0 / 0	81.70	**Pavement Structure** Approximately 75 millimetres of asphaltic concrete over 150 millimetres of compact granular base.								
1 / 0		**Silty Sand/Sandy Silt** Brown, trace gravel, some to trace clay, occasional sandy seams, reworked in appearances in the upper levels, very loose to dense.		SS	1	3,1,1,1	2			
2 / 1				SS	2	2,3,3,4	6			
3 / 1				SS	3	2,3,4,5	7			
7 / 2	79.60	Transition to more till-like material, occasional cobbles inclusions.		SS	4	7,9,12,14	21			
10 / 3	78.60	**Queenston shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	6,11,34,34	45			
11 / 3										
15 / 4										
19 / 5										
23 / 7										
26 / 8										
30 / 9										
33										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 11, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 6

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797661
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE: Type	SAMPLE: Number	SAMPLE: Blow Counts	SAMPLE: Blows/300mm	SAMPLE: Recovery	SAMPLE: PP (kgf/cm2)	SAMPLE: U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34												
35												
36	11											
37												
38												
39												
40	12											
41												
42												
43	13											
44												
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17											
57												
58												
59	18											
60												
61												
62	19											
63												
64												
65												

Drill Method: HS/HQ
Drill Date: September 11, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 6

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797661
E: 597890

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66	61.67											
67			End of Borehole									
68												
69	21											
70												
71												
72	22											
73												
74												
75												
76	23											
77												
78												
79	24											
80												
81												
82	25											
83												
84												
85												
86	26											
87												
88												
89	27											
90												
91												
92	28											
93												
94												
95	29											
96												
97												
98												

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 11, 2023 to termination at a depth of 20.3 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 5.49 metres bgs.

Drill Method: HS/HQ
Drill Date: September 11, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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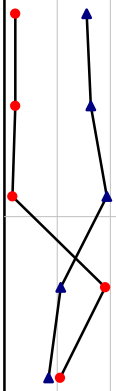
Log of Borehole No. 7

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797662
E: 597856

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	82.29	Ground Surface							
0 / 0	82.10	**Topsoil** Approximately 125 millimetres of topsoil..	SS	1	1,2,2,1	4			
3 / 1		**Silty Sand/Sandy Silt** Brown, trace gravel, trace to some clay, occasional organics inlcusions in the upper levels, very loose to dense.	SS	2	2,2,2,1	4			
6 / 2			SS	3	3,2,1,3	3			
8 / 2	79.70	Transition to more till-like material, occasional cobbles inclusions.	SS	4	6,17,21,16	38			
10 / 3			SS	5	6,9,12,15	21			
14 / 4	78.00	**Queenston shale** Red, high silt content, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	HQ	6	RQD=48.3%				
33 / 9									

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: HS/HQ
Drill Date: September 12, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 7

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797662
E: 597856

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65	11 12 13 14 15 16 17 18 19				HQ	7	RQD=70.7%					

Drill Method: HS/HQ
Drill Date: September 12, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 7

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797662
E: 597856

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
66–98	59.39		End of Borehole		HQ	8	RQD=85.0%					Core A1: 17.00 metres Unconfined Compressive Strength = 17.2 MPa Core A2: 21.68 metres Unconfined Compressive Strength = 27.7

NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 12, 2023 to termination at a depth of 22.9 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: HS/HQ
Drill Date: September 12, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 8

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797686
E: 597896

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 / 0	81.95	Ground Surface									
0–3 / 0–1		**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4,7,7,6	14			0 PPM	
3–4 / 1	80.55	**Silty Sand/Sandy Silt Fill** Brown, trace gravel, occasional cobbles and construction debris inclusions, compact.		SS	2	1,4,0,0	4			0 PPM	
4 / 1		End of Borehole Auger Refusal on Assumed Concrete									

NOTES:

1. Borehole was advanced using solid stem auger equipment on September 12, 2023 to auger refusal on assumed concrete at a depth of 1.4 metres.

2. Borehole was recorded as open and 'dry' below the ground surface upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Auger
Drill Date: September 12, 2023
Hole Size: 150 millimetres
Drilling Contractor: Davis Drilling Ltd.

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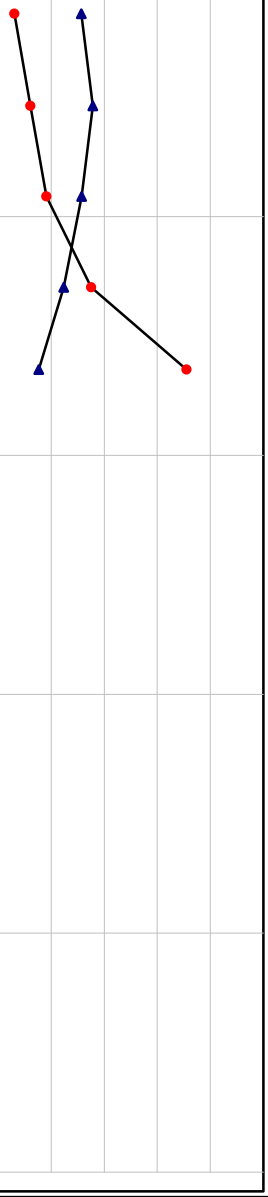
Log of Borehole No. 9

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797676
E: 597886

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.94	Ground Surface								
0 / 0	81.60	**Pavement Structure** Approximately 25 millimetres of asphaltic concrete over 300 millimetres of compact granular base.		SS	1	5,3,3,3	6			0 PPM
3 / 1		**Silty Sand/Sandy Silt** Brown, trace gravel, some to trace clay, reworked in appearances in the upper levels, loose to dense.		SS	2	2,5,7,8	12			75 PPM
6 / 2	79.90	Transition to more till-like material, occasional cobbles inclusions.		SS	3	7,8,10,11	18			0 PPM
9 / 3				SS	4	9,9,26,22	35			0 PPM
10 / 3	78.70			SS	5	14,21,50/6"	71			0 PPM
11 / 4	78.44	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.								
		End of Borehole Spoon Refusal on Assumed Bedrock								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on September 14, 2023 to spoon refusal on assumed bedrock at a depth of 3.5 metres.

2. Borehole was recorded as open and 'dry' below the ground surface upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Auger
Drill Date: September 14, 2023
Hole Size: 150 millimetres
Drilling Contractor: Davis Drilling Ltd.

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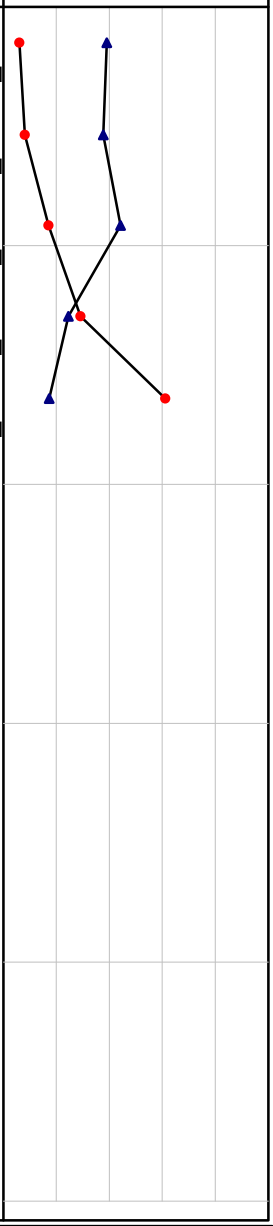
Log of Borehole No. 10

Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797684
E: 597890

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.93	Ground Surface								
0 / 0		**Topsoil** Approximately 125 millimetres of topsoil.		SS	1	3,4,2,4	6			80 PPM
1 / 0		**Pavement Structure** Approximately 100 millimetres of compact granular base.		SS	2	3,4,4,4	8			0 PPM
2 / 1		**Silty Sand/Sandy Silt** Brown, some clay, reworked in appearances in the upper levels, loose to compact.		SS	3	4,8,9,10	17			0 PPM
7 / 2	79.60	Transition to more till-like material, occasional cobbles inclusions.		SS	4	3,11,18,17	29			0 PPM
10 / 3	78.50	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	4,11,50/6"	61			0 PPM
30 / 9	72.73	End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 13, 2023 to termination at a depth of 9.2 metres.
2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 7.24 metres bgs.
October 17, 2023 - 7.26 metres bgs.

Drill Method: HS/HQ
Drill Date: September 13, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

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Log of Borehole No. 11

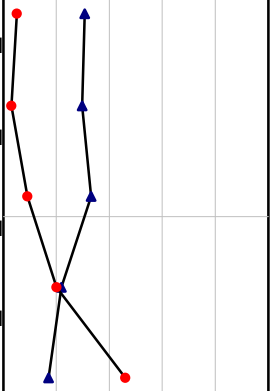
Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797674
E: 597872

Depth (ft / m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.96	Ground Surface							
0 / 0	81.70	**Pavement Structure** — Approximately 50 millimetres of asphaltic concrete over 150 millimetres of compact granular base.							
0 / 0		**Silty Sand/Sandy Silt** — Brown, trace gravel, some to trace clay, reworked in appearances in the upper levels, very loose to compact.	SS	1	5,2,3,2	5			0 PPM
4 / 1			SS	2	3,2,1,2	3			0 PPM
7 / 2			SS	3	3,2,7,10	9			0 PPM
8 / 2	79.60	Transition to more till-like material.							
10 / 3	78.80	**Queenston Shale** — Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	SS	4	5,9,11,14	20			0 PPM
11 / 3			SS	5	5,21,25,50/4"	46			0 PPM
30 / 9	72.76	End of Borehole							

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 14, 2023 to termination at a depth of 9.2 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 6.42 metres bgs.
October 17, 2023 - 8.14 metres bgs.

Drill Method: HS/HQ
Drill Date: September 14, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

Soil-Mat Engineers & Consultants Ltd.
401 Grays Road · Hamilton, Ontario · L8E 2Z3
T: 905.318.7440 · TF: 800.243.1922 · F: 905.318.7455
www.soil-mat.ca · E: info@soil-mat.ca

Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 1 of 1

Log of Borehole No. 12

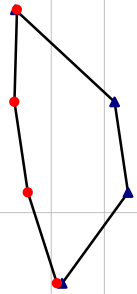
Project No: SM 230469-G
Project: Proposed High-Rise Structure
Location: 2076 Old Lakeshore Road, Burlington
Client: 1959025 Ontario Inc.

Project Manager: Stephen R. Sears, P. Eng., QP ESA
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4797669
E: 597887

Depth (ft / m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	81.81	Ground Surface							
0 / 0	81.60	**Pavement Structure** Approximately 50 millimetres of asphaltic concrete over 150 millimetres of compact granular base.							
1 / 0		**Silty Sand/Sandy Silt** Brown, trace gravel, some clay, occasional sandy seams, reworked in appearances in the upper levels, loose to compact.	SS	1	9,4,3,3	7			0 PPM
3 / 1			SS	2	1,2,4,3	6			35 PPM
6 / 2			SS	3	2,5,6,6 Wet Spoon	11			0 PPM
7 / 2	79.40	Transition to more till-like material, occasional cobbles inclusions.							
9 / 3	78.80	**Queenston Shale** Red, with more resistant grey layers, highly weathered in upper levels, becoming more sound with depth, hard.	SS	4	9,10,12,38	22			0 PPM
30 / 9	72.61	End of Borehole							

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger and HQ coring equipment on September 13, 2023 to termination at a depth of 9.2 metres.

2. Borehole was recorded as open upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:
October 4, 2023 - 3.2 metres bgs.
October 17, 2023 - 8.64 metres bgs.

Drill Method: HS/HQ
Drill Date: September 13, 2023
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling Ltd.

Soil-Mat Engineers & Consultants Ltd.
401 Grays Road · Hamilton, Ontario · L8E 2Z3
T: 905.318.7440 · TF: 800.243.1922 · F: 905.318.7455
www.soil-mat.ca · E: info@soil-mat.ca

Datum: Geodetic Benchmark
Field Logged by: PTT
Checked by: SRS
Sheet: 1 of 1

Terraprobe

LOG OF BOREHOLE 3

Project No. : 7-21-0052-01	Client : Shoreplan Engineering Limited	Originated by : KG
Date started : July 16, 2021	Project : 2076 Old Lakeshore Road	Compiled by : AF
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : AF

Position : E: 597912, N: 4797859 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Mini Mole, track-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
	82.5	**GROUND SURFACE**					
0	82.3	100mm **ASPHALTIC CONCRETE**					
	0.2	200mm **FILL**, granular base		1	SS	9	
		FILL, clayey silt, loose, brown					82
	81.6						
1	0.9	**SANDY SILT**, compact, brown		2	SS	21	
							81
	80.6			3	SS	19	
2	1.9	...wet at 1.8m depth					
		CLAYEY SILT, trace gravel, trace sand, hard, reddish brown (GLACIAL TILL)		4	SS	50 / 125mm	80
		...trace shale fragments at 2.3m depth					
3				5	SS	67	
	78.7						79
	3.8	**WEATHERED SHALE**, hard, reddish brown (QUEENSTON FORMATION)		6	SS	50 / 50mm	
4	77.9						
	4.6	**END OF BOREHOLE**		7	SS	50 / 25mm	78

Borehole was dry and open upon completion of drilling.

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40

Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit, Natural Water Content, Liquid Limit: PL, MC, LL; 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Lab Data and Comments — GRAIN SIZE DISTRIBUTION (%) (MIT): GR SA SI CL

file:7-21-0052-01 2076 old lakeshore road.gpj

Appendix B

Hydrographs

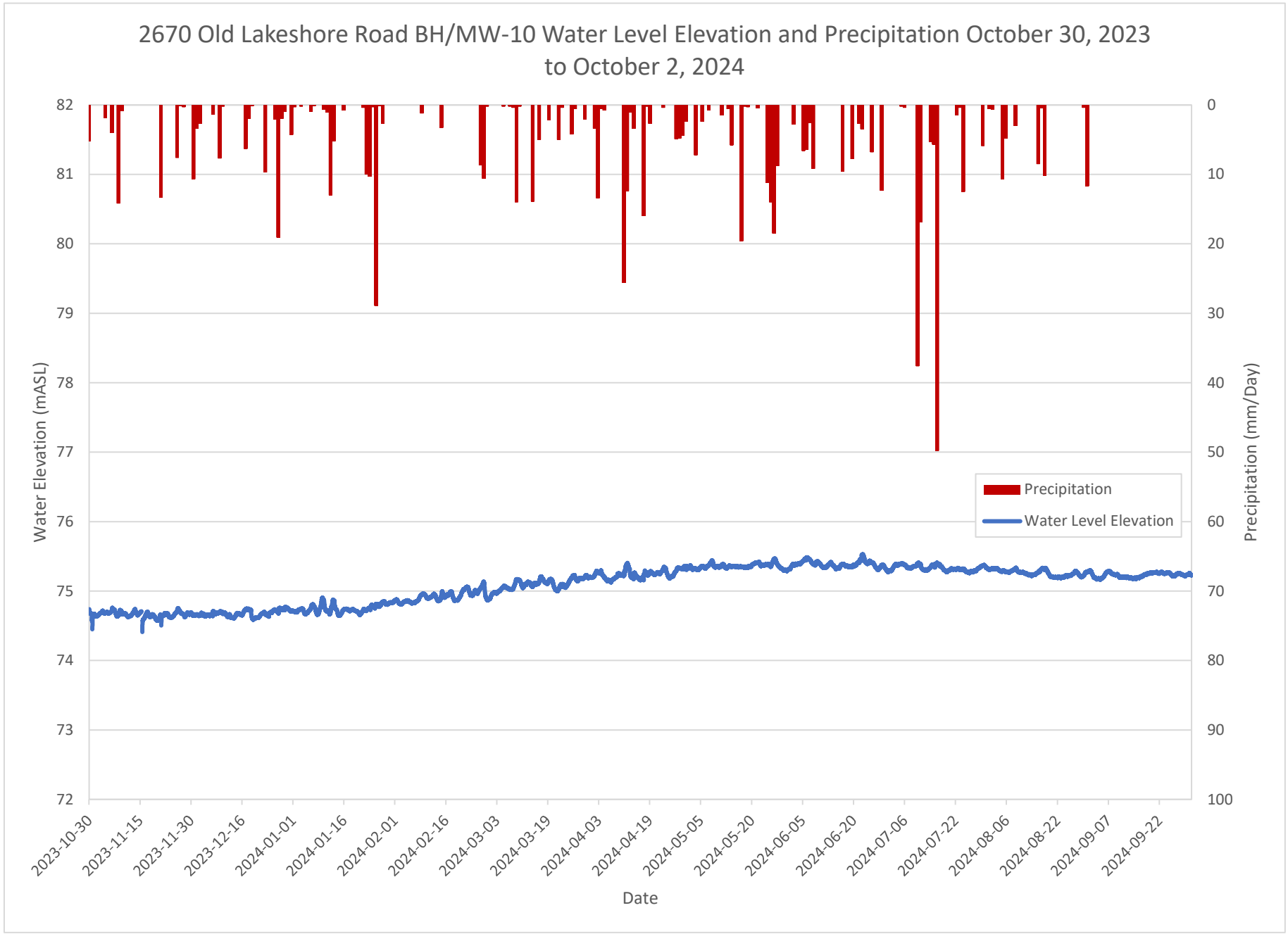

2670 Old Lakeshore Road BH/MW-10 Water Level Elevation and Precipitation October 30, 2023 to October 2, 2024
Water Elevation (mASL)
Precipitation (mm/Day)
Date
Precipitation
Water Level Elevation
82
81
80
79
78
77
76
75
74
73
72
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-11-15
2023-11-30
2023-12-16
2024-01-01
2024-01-16
2024-02-01
2024-02-16
2024-03-03
2024-03-19
2024-04-03
2024-04-19
2024-05-05
2024-05-20
2024-06-05
2024-06-20
2024-07-06
2024-07-22
2024-08-06
2024-08-22
2024-09-07
2024-09-22

Chart B-1

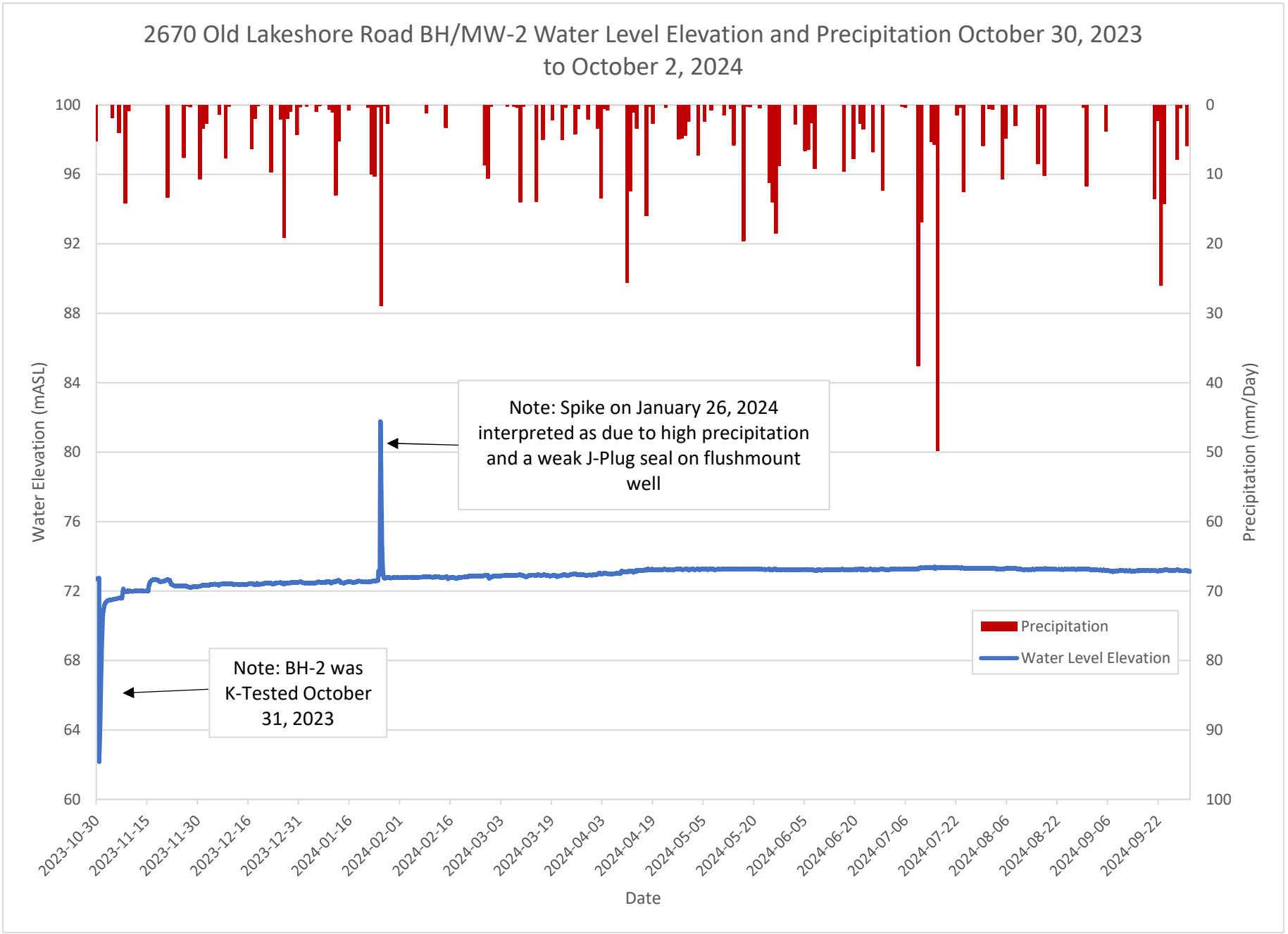

2670 Old Lakeshore Road BH/MW-2 Water Level Elevation and Precipitation October 30, 2023 to October 2, 2024
Water Elevation (mASL)
Precipitation (mm/Day)
Date
Note: Spike on January 26, 2024 interpreted as due to high precipitation and a weak J-Plug seal on flushmount well
Note: BH-2 was K-Tested October 31, 2023
Precipitation
Water Level Elevation

Chart B-2

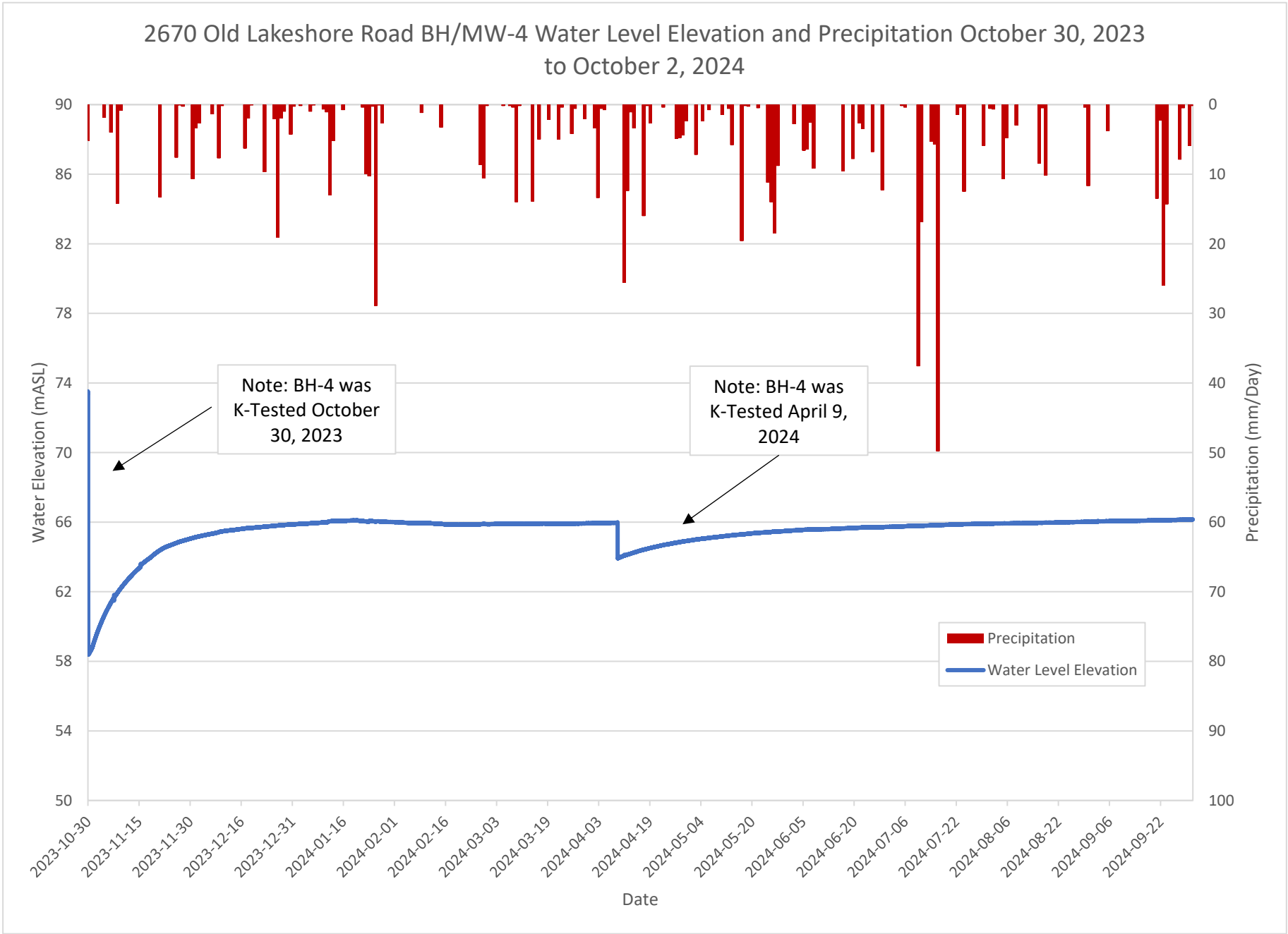

2670 Old Lakeshore Road BH/MW-4 Water Level Elevation and Precipitation October 30, 2023 to October 2, 2024
Water Elevation (mASL)
Precipitation (mm/Day)
Date
Note: BH-4 was K-Tested October 30, 2023
Note: BH-4 was K-Tested April 9, 2024
Precipitation
Water Level Elevation
90
86
82
78
74
70
66
62
58
54
50
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-11-15
2023-11-30
2023-12-16
2023-12-31
2024-01-16
2024-02-01
2024-02-16
2024-03-03
2024-03-19
2024-04-03
2024-04-19
2024-05-04
2024-05-20
2024-06-05
2024-06-20
2024-07-06
2024-07-22
2024-08-06
2024-08-22
2024-09-06
2024-09-22

Chart B-3

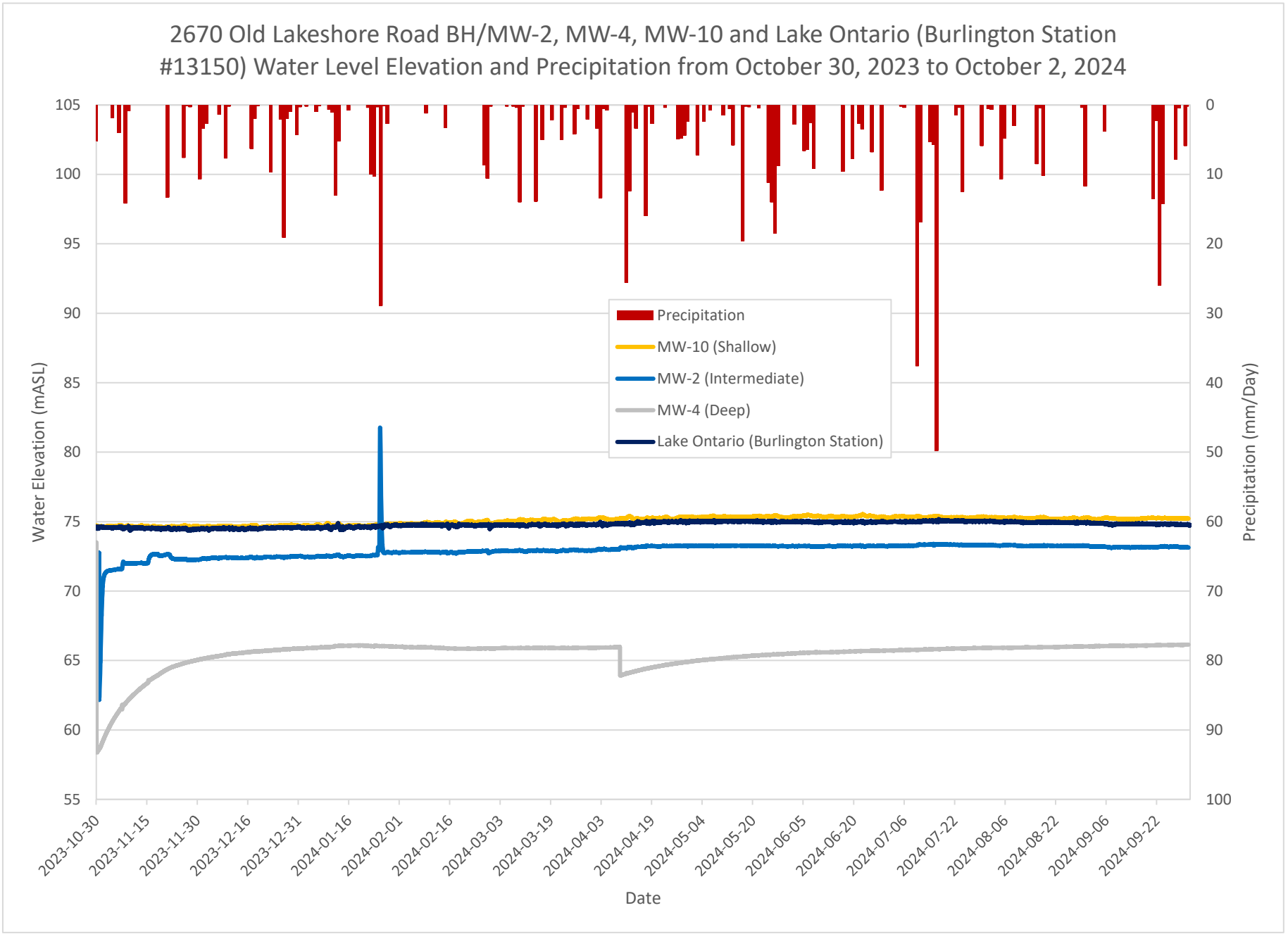

2670 Old Lakeshore Road BH/MW-2, MW-4, MW-10 and Lake Ontario (Burlington Station #13150) Water Level Elevation and Precipitation from October 30, 2023 to October 2, 2024
Water Elevation (mASL)
Precipitation (mm/Day)
Date
Precipitation
MW-10 (Shallow)
MW-2 (Intermediate)
MW-4 (Deep)
Lake Ontario (Burlington Station)
105
100
95
90
85
80
75
70
65
60
55
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-11-15
2023-11-30
2023-12-16
2023-12-31
2024-01-16
2024-02-01
2024-02-16
2024-03-03
2024-03-19
2024-04-03
2024-04-19
2024-05-04
2024-05-20
2024-06-05
2024-06-20
2024-07-06
2024-07-22
2024-08-06
2024-08-22
2024-09-06
2024-09-22

Chart B-4

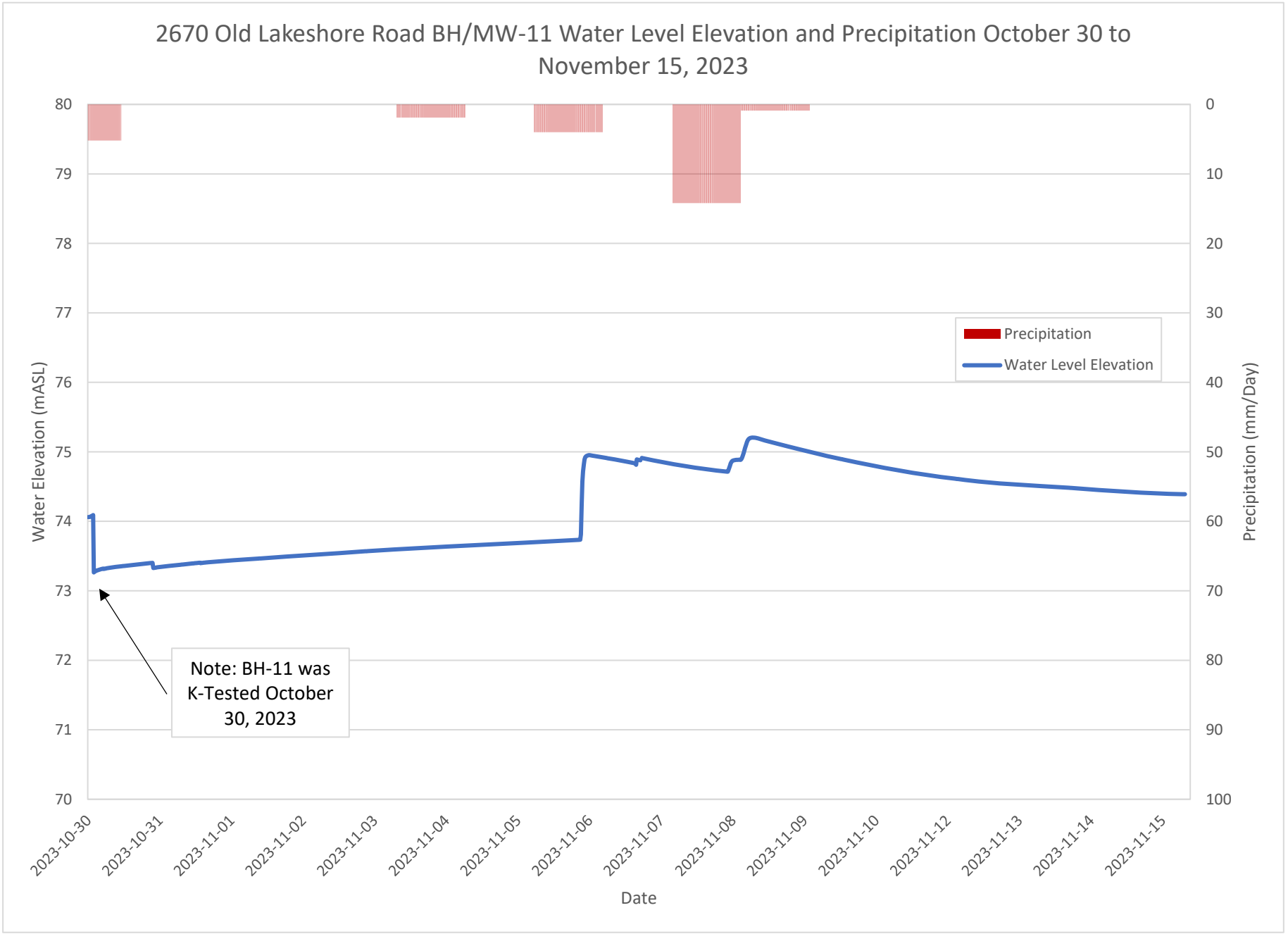

2670 Old Lakeshore Road BH/MW-11 Water Level Elevation and Precipitation October 30 to November 15, 2023
Water Elevation (mASL)
Precipitation (mm/Day)
Precipitation
Water Level Elevation
Note: BH-11 was K-Tested October 30, 2023
Date
80
79
78
77
76
75
74
73
72
71
70
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-10-31
2023-11-01
2023-11-02
2023-11-03
2023-11-04
2023-11-05
2023-11-06
2023-11-07
2023-11-08
2023-11-09
2023-11-10
2023-11-12
2023-11-13
2023-11-14
2023-11-15

Chart B-5

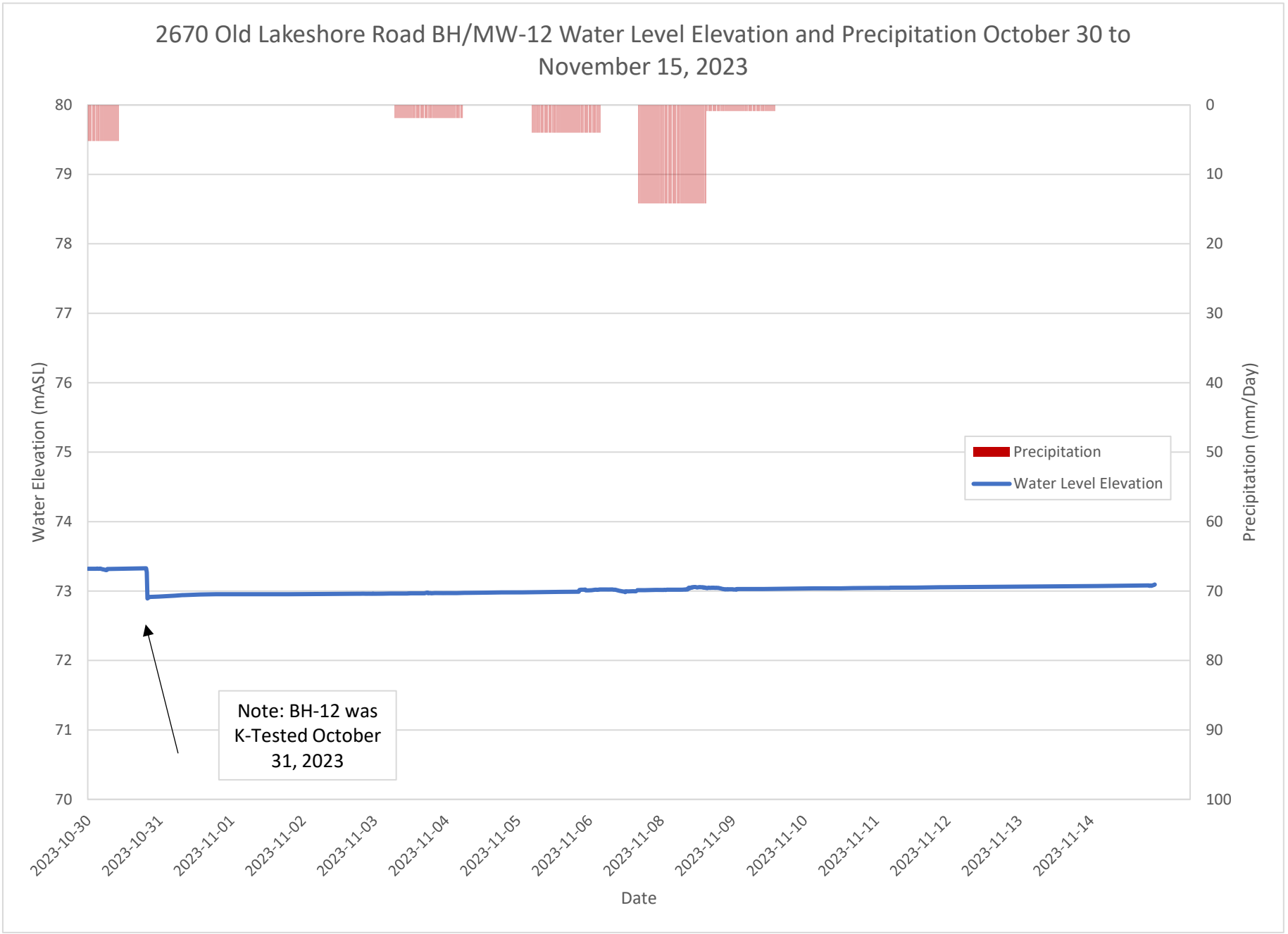

2670 Old Lakeshore Road BH/MW-12 Water Level Elevation and Precipitation October 30 to November 15, 2023
Water Elevation (mASL)
Precipitation (mm/Day)
Date
Precipitation
Water Level Elevation
Note: BH-12 was K-Tested October 31, 2023
80
79
78
77
76
75
74
73
72
71
70
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-10-31
2023-11-01
2023-11-02
2023-11-03
2023-11-04
2023-11-05
2023-11-06
2023-11-08
2023-11-09
2023-11-10
2023-11-11
2023-11-12
2023-11-13
2023-11-14

Chart B-6

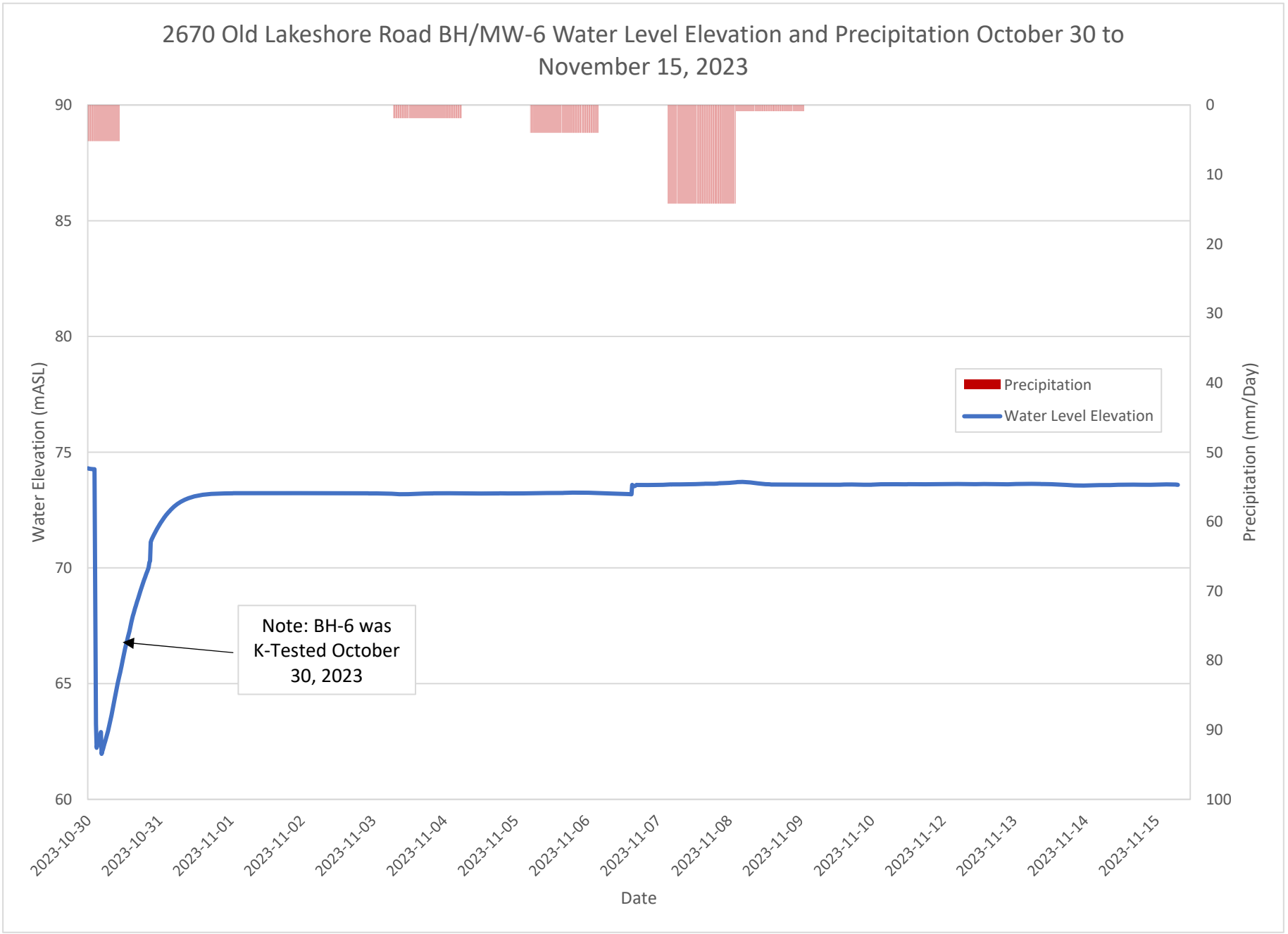

2670 Old Lakeshore Road BH/MW-6 Water Level Elevation and Precipitation October 30 to November 15, 2023
Water Elevation (mASL)
Precipitation (mm/Day)
Precipitation
Water Level Elevation
Note: BH-6 was K-Tested October 30, 2023
Date
90
85
80
75
70
65
60
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-10-31
2023-11-01
2023-11-02
2023-11-03
2023-11-04
2023-11-05
2023-11-06
2023-11-07
2023-11-08
2023-11-09
2023-11-10
2023-11-12
2023-11-13
2023-11-14
2023-11-15

Chart B-7

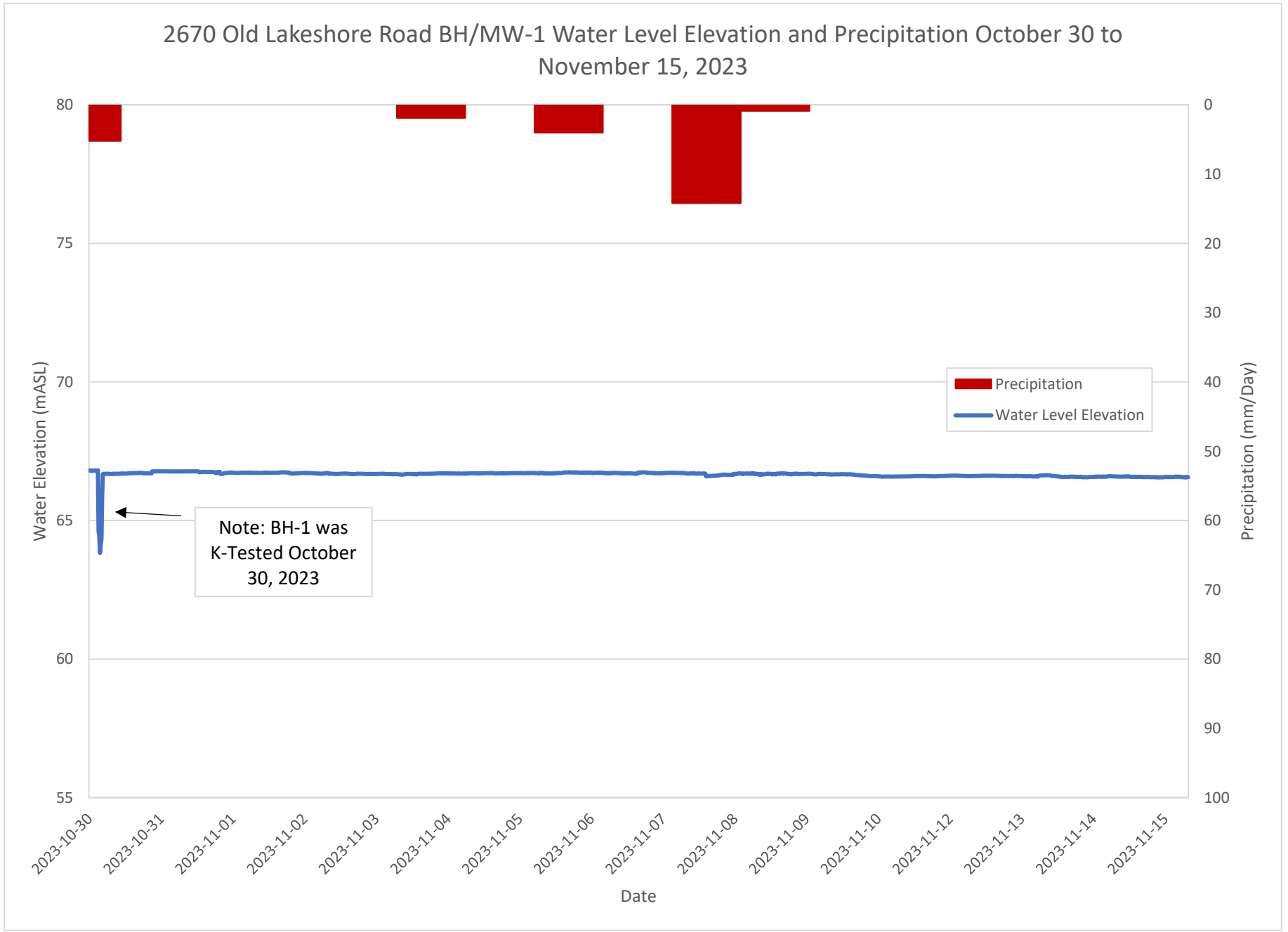
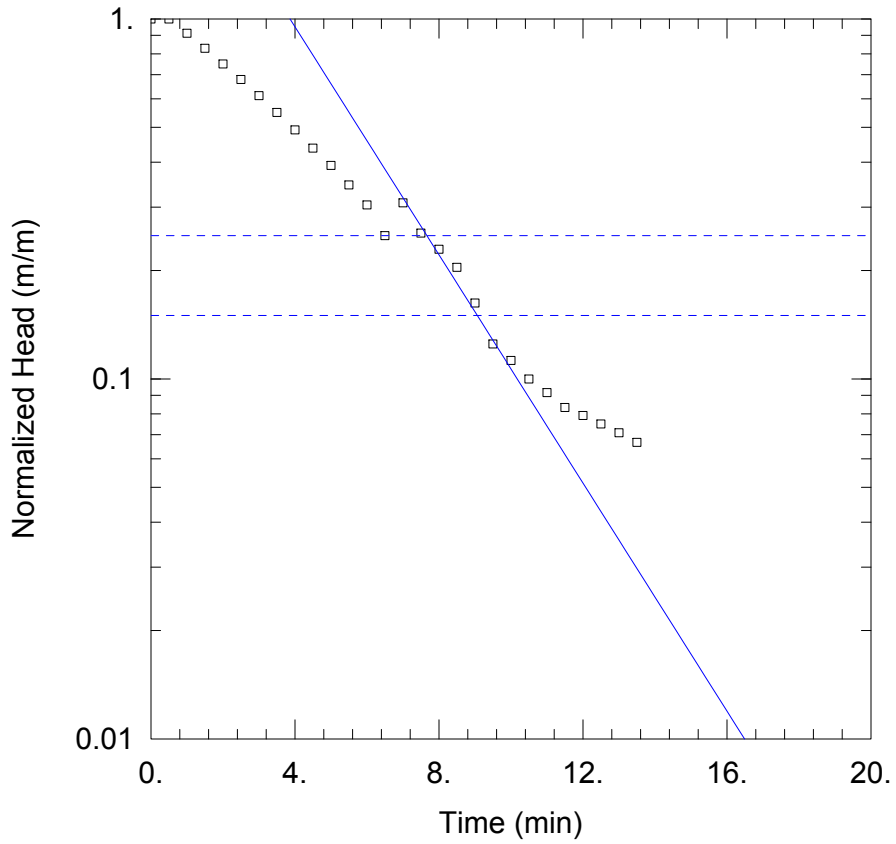

2670 Old Lakeshore Road BH/MW-1 Water Level Elevation and Precipitation October 30 to November 15, 2023
Water Elevation (mASL)
Precipitation (mm/Day)
Precipitation
Water Level Elevation
Note: BH-1 was K-Tested October 30, 2023
Date
80
75
70
65
60
55
0
10
20
30
40
50
60
70
80
90
100
2023-10-30
2023-10-31
2023-11-01
2023-11-02
2023-11-03
2023-11-04
2023-11-05
2023-11-06
2023-11-07
2023-11-08
2023-11-09
2023-11-10
2023-11-12
2023-11-13
2023-11-14
2023-11-15

Chart B-8

Appendix C

Hydraulic Conductivity Analyses



WELL TEST ANALYSIS

Data Set: C:\...\MW1_Hvor.aqt
Date: 02/12/24 Time: 14:43:15

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-1
Test Date: October 30, 2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

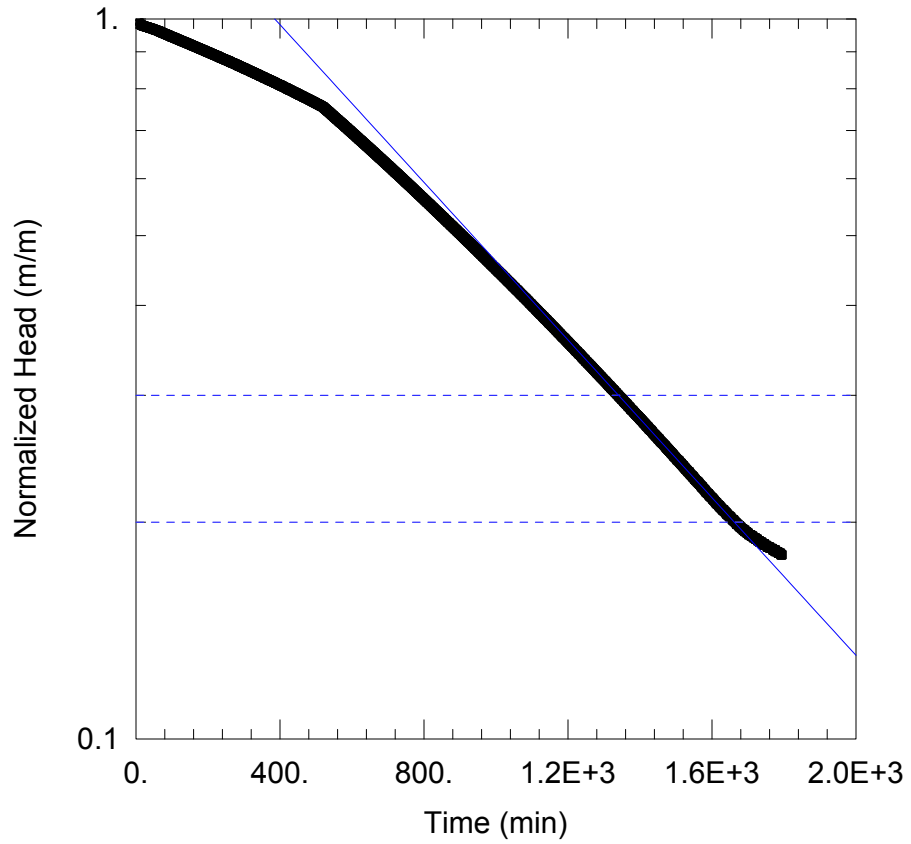
K = 2.223E-6 m/sec
y0 = 9.814 m

AQUIFER DATA

Saturated Thickness: 10.81 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 2.4 m
Total Well Penetration Depth: 10.81 m
Casing Radius: 0.0254 m
Static Water Column Height: 10.81 m
Screen Length: 3. m
Well Radius: 0.1 m



WELL TEST ANALYSIS

Data Set: C:\...\MW2_BR.aqt
Date: 02/13/24 Time: 16:42:26

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-2
Test Date: October 31, 2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

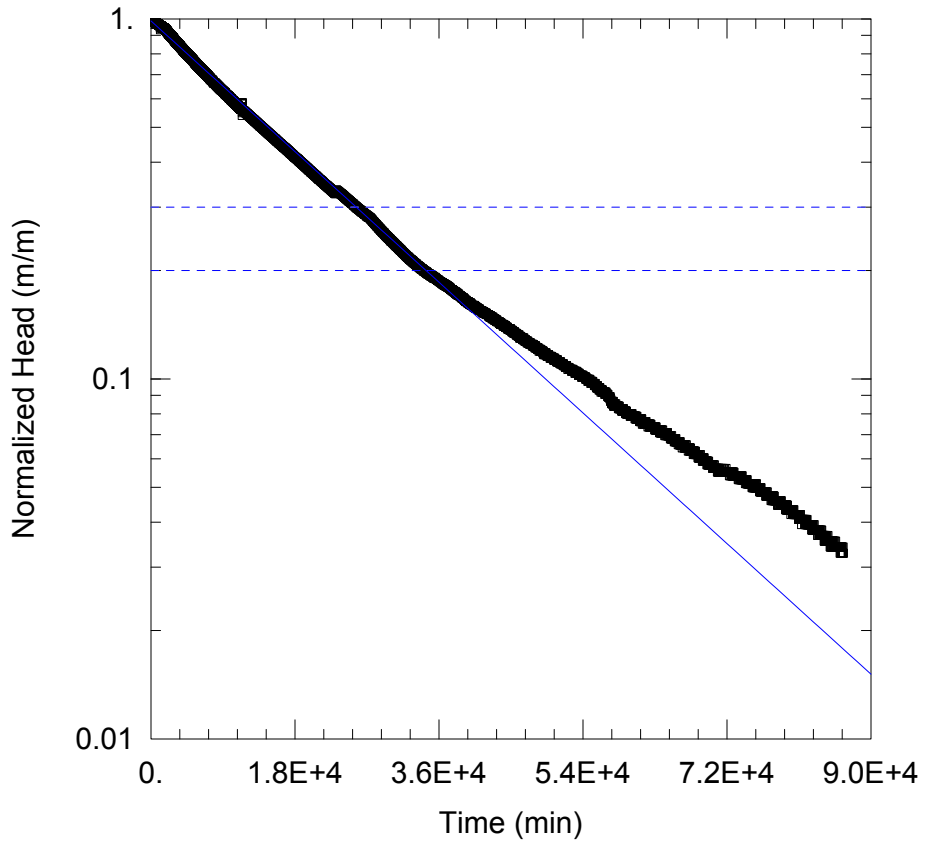
K = 6.449E-9 m/sec
y0 = 17.51 m

AQUIFER DATA

Saturated Thickness: 11.17 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2)

Initial Displacement: 10.77 m
Total Well Penetration Depth: 10.15 m
Casing Radius: 0.0254 m
Static Water Column Height: 11.17 m
Screen Length: 3. m
Well Radius: 0.1 m



WELL TEST ANALYSIS

Data Set: C:\...\MW4_BR_Revised.aqt
Date: 04/18/24 Time: 13:41:17

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-4
Test Date: October 30, 2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

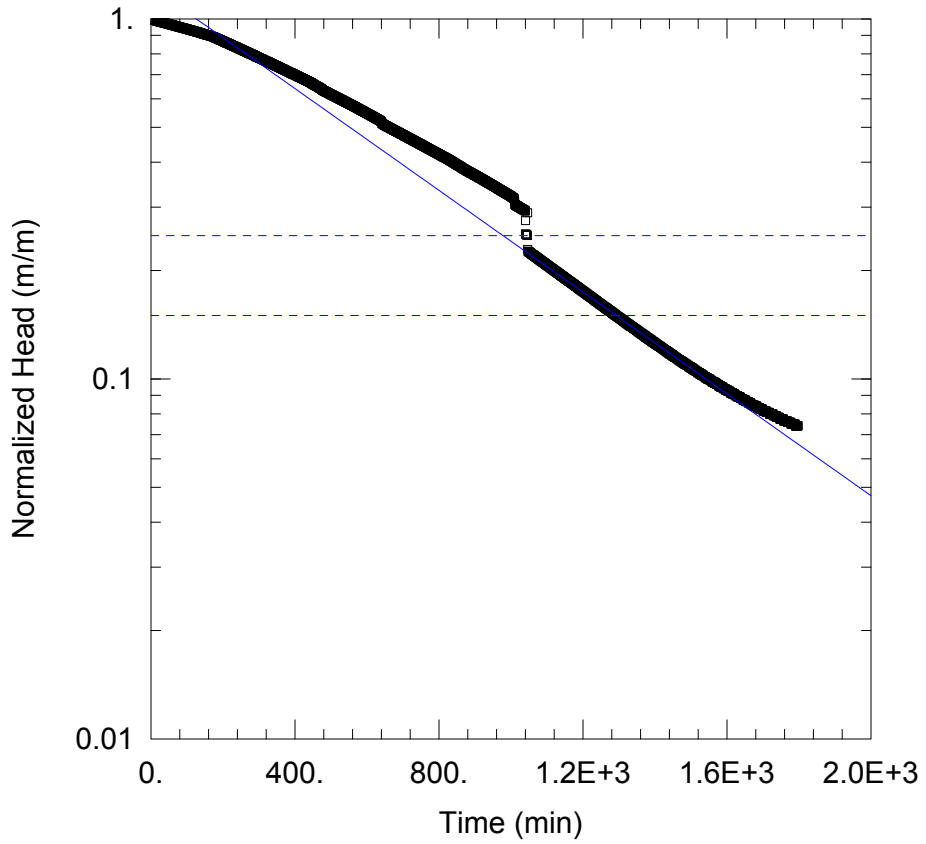
K = 2.586E-10 m/sec
y0 = 7.524 m

AQUIFER DATA

Saturated Thickness: 9.83 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-4)

Initial Displacement: 7.62 m
Total Well Penetration Depth: 9.73 m
Casing Radius: 0.0254 m
Static Water Column Height: 9.83 m
Screen Length: 3. m
Well Radius: 0.1 m



WELL TEST ANALYSIS

Data Set: C:\...\MW6_BR.aqt
Date: 02/13/24 Time: 16:27:27

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-6
Test Date: October 30, 2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

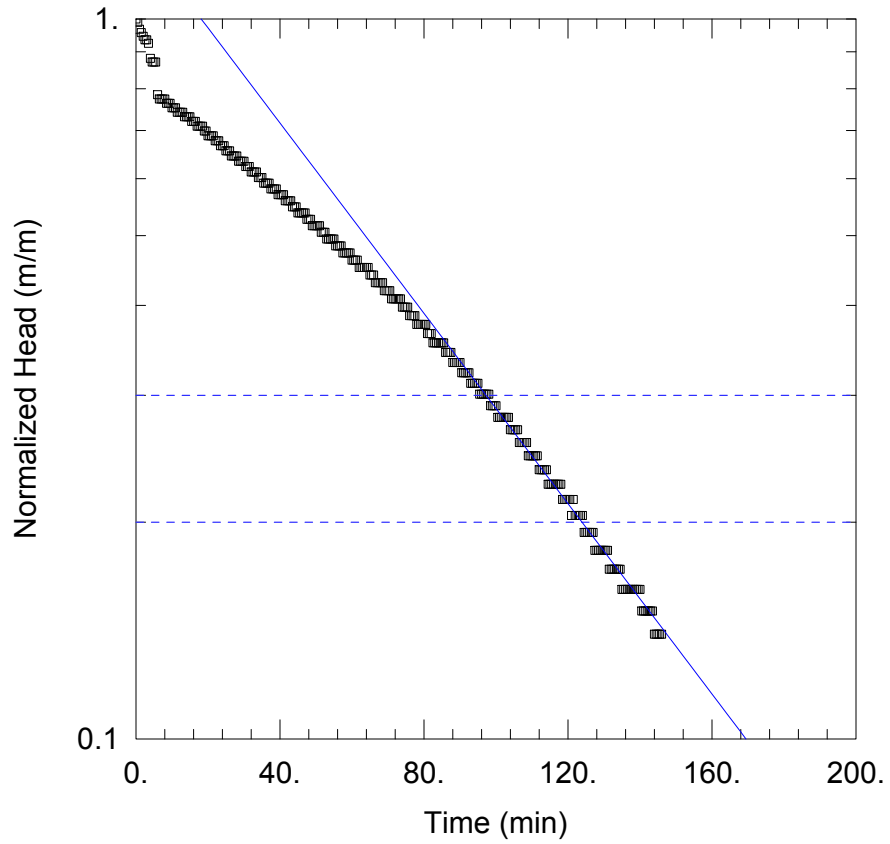
K = 9.923E-9 m/sec
y0 = 14.76 m

AQUIFER DATA

Saturated Thickness: 12.64 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-6)

Initial Displacement: 12.02 m
Total Well Penetration Depth: 11.65 m
Casing Radius: 0.0254 m
Static Water Column Height: 12.64 m
Screen Length: 3. m
Well Radius: 0.1 m



WELL TEST ANALYSIS

Data Set: C:\...\MW10_BR.aqt
Date: 02/13/24 Time: 16:51:18

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-10
Test Date: October 31, 2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

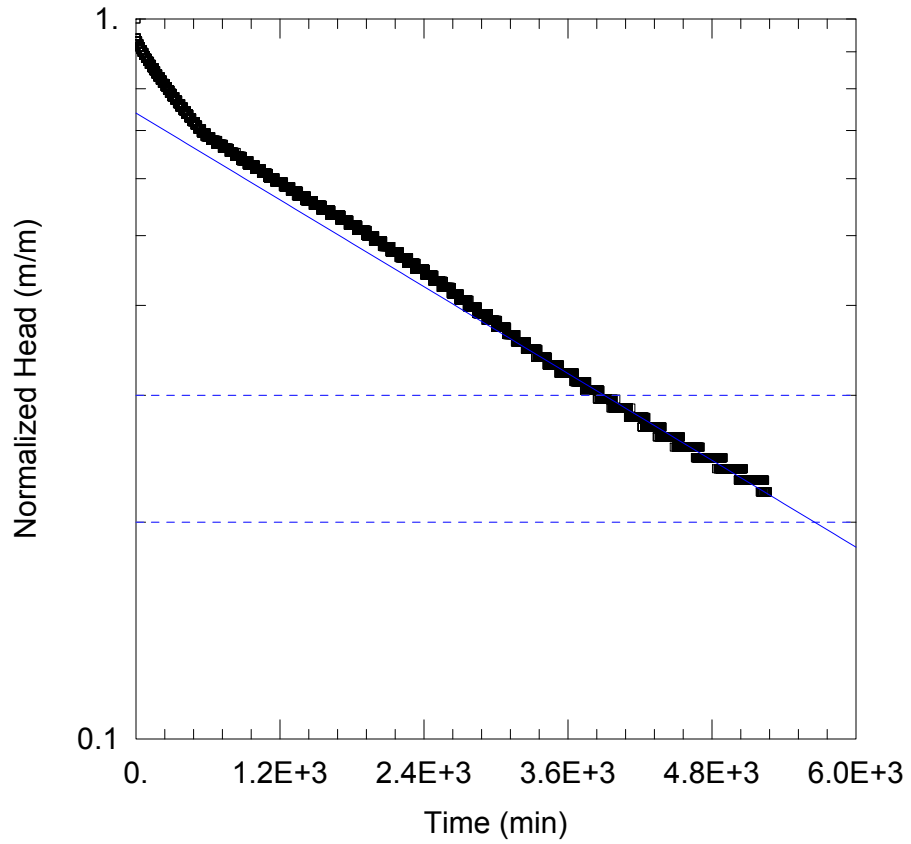
K = 1.038E-7 m/sec
y0 = 1.225 m

AQUIFER DATA

Saturated Thickness: 1.93 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 0.93 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 1.93 m
Screen Length: 3. m
Well Radius: 0.1 m



WELL TEST ANALYSIS

Data Set: C:\...\MW11.aqt
Date: 04/18/24 Time: 15:08:59

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-11
Test Date: February 22, 2024

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

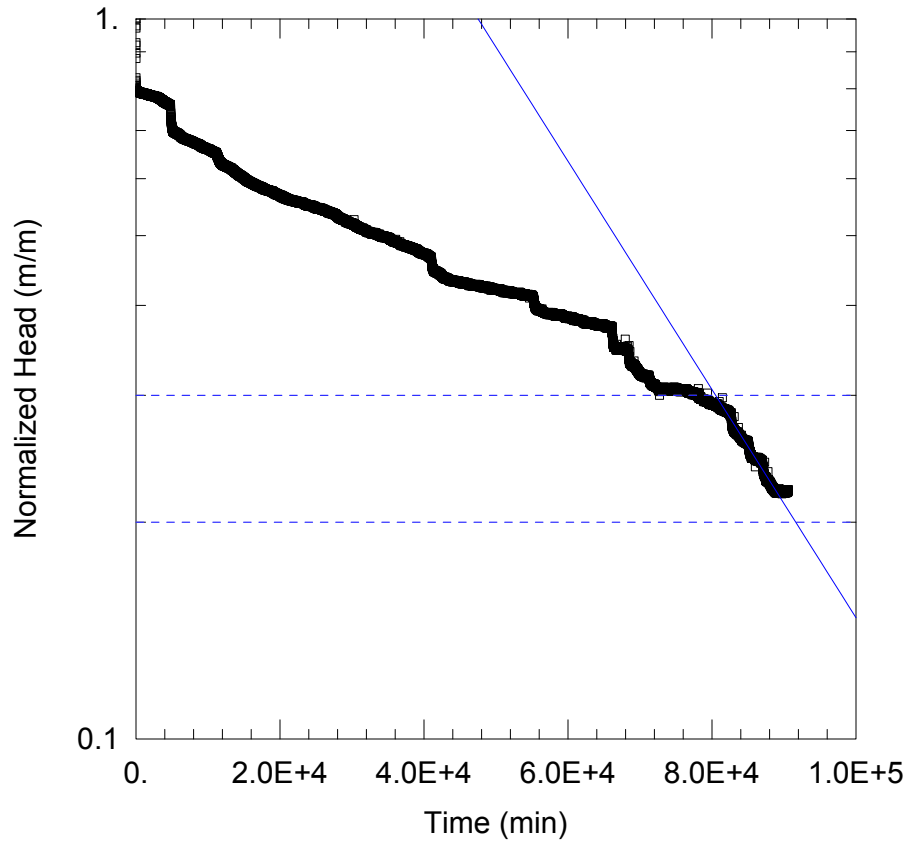
K = 1.495E-9 m/sec
y0 = 0.8734 m

AQUIFER DATA

Saturated Thickness: 2.055 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-11)

Initial Displacement: 1.18 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 2.055 m
Screen Length: 3. m
Well Radius: 0.1 m



WELL TEST ANALYSIS

Data Set: C:\...\MW12.aqt
Date: 10/08/24 Time: 11:02:35

PROJECT INFORMATION

Company: Terra-Dynamics Consulting Inc.
Client: 1959025 Ontario Inc.
Location: 2076 Old Lakeshore Road
Test Well: MW-12
Test Date: April 9, 2024

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.914E-10 m/sec
y0 = 7.762 m

AQUIFER DATA

Saturated Thickness: 2.6 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-12)

Initial Displacement: 1.37 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 2.6 m
Screen Length: 3. m
Well Radius: 0.1 m

Appendix D

Water Quality Analyses





FINAL REPORT

CA15289-NOV23 R2

Prepared for

Terra-Dynamics Consulting Inc.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Terra-Dynamics Consulting Inc.
Address	432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3. Canada
Contact	David Slaine
Telephone	905-646-7931
Facsimile	
Email	dslaine@terra-dynamics.com; kslaine@terra-dynamics.com; br
Project	
Order Number	
Samples	Solution (2)

LABORATORY DETAILS

Project Specialist	Alisha Kelly, B.Sc.,
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2000
Facsimile	705-652-6365
Email	
SGS Reference	CA15289-NOV23
Received	11/22/2023
Approved	11/30/2023
Report Number	CA15289-NOV23 R2
Date Reported	11/30/2023

COMMENTS

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

.

SIGNATORIES

Alisha Kelly, B.Sc.,



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Client: Terra-Dynamics Consulting Inc.
Project:
Project Manager: David Slaine
Samplers: Dan Baker

MATRIX: WATER

L1 = SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022

Sample Number	8	9
Sample Name	BH-10	BH-11
Sample Matrix	Solution	Solution
Sample Date	21/11/2023	21/11/2023

Parameter	Units	RL	L1	Result	Result
General Chemistry					
Temperature @ pH	°C	0		21.2	20.8
Biochemical Oxygen Demand (BOD5)	mg/L	2	15	< 4 ↑	5
Total Suspended Solids	mg/L	2	15	563	442
Metals and Inorganics					
Cyanide (total)	mg/L	0.01	0.02	< 0.01	< 0.01
Arsenic (total)	mg/L	0.0002	0.02	0.0113	0.0116
Cadmium (total)	mg/L	0.000003	0.008	0.000069	0.000187
Chromium (total)	mg/L	0.00008	0.08	0.0105	0.0423
Cobalt (total)	mg/L	0.000004		0.00367	0.0160
Copper (total)	mg/L	0.0002	0.04	0.0076	0.0275
Lead (total)	mg/L	0.00009	0.12	0.00522	0.0183
Manganese (total)	mg/L	0.00001	0.05	0.359	0.969
Nickel (total)	mg/L	0.0001	0.08	0.0092	0.0379
Phosphorus (total)	mg/L	0.003	0.4	0.441	1.02
Selenium (total)	mg/L	0.00004	0.02	0.00071	0.00039
Silver (total)	mg/L	0.00005	0.12	0.00033	0.00126
Zinc (total)	mg/L	0.002	0.04	0.035	0.147

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Sample Number	8	9
Sample Name	BH-10	BH-11
Sample Matrix	Solution	Solution
Sample Date	21/11/2023	21/11/2023

Parameter	Units	RL	L1	Result	Result
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.001	< 0.001	< 0.001
Nonylphenol diethoxylate	mg/L	0.01		< 0.01	< 0.01
Nonylphenol Ethoxylates	mg/L	0.01	0.01	< 0.01	< 0.01
Nonylphenol monoethoxylate	mg/L	0.01		< 0.01	< 0.01
Other (ORP)					
pH	No unit	0.05	8.5	7.71	7.93
Mercury (total)	mg/L	0.00001	0.0004	< 0.00001	< 0.00001
Chromium VI	mg/L	0.0002	0.04	< 0.0002	0.0002
PAHs					
Benzo(b+j)fluoranthene	mg/L	0.0001		< 0.0001	< 0.0001
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.0004	< 0.0001	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.001	0.008	< 0.001	< 0.001

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Sample Number	8	9
Sample Name	BH-10	BH-11
Sample Matrix	Solution	Solution
Sample Date	21/11/2023	21/11/2023

Parameter	Units	RL	L1	Result	Result
SVOCs					
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.0088	< 0.002	< 0.002
Pentachlorophenol	mg/L	0.0005	0.002	< 0.0005	< 0.0005
di-n-Butyl Phthalate	mg/L	0.002	0.015	< 0.002	< 0.002
3,3-Dichlorobenzidine	mg/L	0.0005	0.0008	< 0.0005	< 0.0005
PAHs (Total)	mg/L		0.002	< 0.001	< 0.001
Perylene	mg/L	0.0005		< 0.0005	< 0.0005
SVOCs - PAHs					
7Hdibenzo(c,g)carbazole	mg/L	0.0001		< 0.0001	< 0.0001
Anthracene	mg/L	0.0001		< 0.0001	< 0.0001
Benzo(a)anthracene	mg/L	0.0001		< 0.0001	< 0.0001
Benzo(a)pyrene	mg/L	0.0001		< 0.0001	< 0.0001
Benzo(e)pyrene	mg/L	0.0001		< 0.0001	< 0.0001
Benzo(ghi)perylene	mg/L	0.0002		< 0.0002	< 0.0002
Benzo(k)fluoranthene	mg/L	0.0001		< 0.0001	< 0.0001
Chrysene	mg/L	0.0001		< 0.0001	< 0.0001
Dibenzo(a,h)anthracene	mg/L	0.0001		< 0.0001	< 0.0001
Dibenzo(a,i)pyrene	mg/L	0.0001		< 0.0002↑	< 0.0002↑
Dibenzo(a,j)acridine	mg/L	0.0001		< 0.0001	< 0.0001
Fluoranthene	mg/L	0.0001		< 0.0001	0.0001
Indeno(1,2,3-cd)pyrene	mg/L	0.0002		< 0.0002	< 0.0002
Phenanthrene	mg/L	0.0001		< 0.0001	< 0.0001
Pyrene	mg/L	0.0001		< 0.0001	< 0.0001

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Sample Number	8	9
Sample Name	BH-10	BH-11
Sample Matrix	Solution	Solution
Sample Date	21/11/2023	21/11/2023

Parameter	Units	RL	L1	Result	Result
SVOCs - PAHs (continued)					
VOCs					
Chloroform	mg/L	0.0005	0.002	0.0020	0.0008
1,2-Dichlorobenzene	mg/L	0.0005	0.0056	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.0068	< 0.0005	< 0.0005
Methylene Chloride	mg/L	0.0005	0.0052	< 0.0005	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	0.0044	< 0.0005	< 0.0005
Trichloroethylene	mg/L	0.0005	0.0076	< 0.0005	< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005		< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.0056	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	0.017	< 0.0005	< 0.0005
VOCs - BTEX					
Benzene	mg/L	0.0005	0.002	< 0.0005	< 0.0005
Ethylbenzene	mg/L	0.0005	0.002	< 0.0005	< 0.0005
Toluene	mg/L	0.0005	0.002	< 0.0005	< 0.0005
Xylene (total)	mg/L	0.0005	0.0044	< 0.0005	< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022 L1
BH-10				
Total Suspended Solids	SM 2540D	mg/L	563	15
Manganese	SM 3030/EPA 200.8	mg/L	0.359	0.05
Phosphorus	SM 3030/EPA 200.8	mg/L	0.441	0.4
BH-11				
Total Suspended Solids	SM 2540D	mg/L	442	15
Manganese	SM 3030/EPA 200.8	mg/L	0.969	0.05
Phosphorus	SM 3030/EPA 200.8	mg/L	1.02	0.4
Zinc	SM 3030/EPA 200.8	mg/L	0.147	0.04

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0043-NOV23	mg/L	2	< 2	8	30	111	70	130	104	70	130

Cyanide by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0238-NOV23	mg/L	0.01	<0.01	ND	10	94	90	110	94	75	125

Hexavalent Chromium by SFA

Method: EPA218.6/EPA3060A I Internal ref.: ME-CA-IENVISKA-LAK-AN-012

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chromium VI	SKA0244-NOV23	mg/L	0.0002	<0.0002	ND	20	101	80	120	NV	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0049-NOV23	mg/L	0.00001	< 0.00001	ND	20	101	80	120	83	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0238-NOV23	mg/L	0.00005	<0.00005	ND	20	103	90	110	89	70	130
Arsenic (total)	EMS0238-NOV23	mg/L	0.0002	<0.0002	ND	20	104	90	110	106	70	130
Cadmium (total)	EMS0238-NOV23	mg/L	0.000003	<0.000003	16	20	102	90	110	102	70	130
Cobalt (total)	EMS0238-NOV23	mg/L	0.000004	<0.000004	ND	20	105	90	110	110	70	130
Chromium (total)	EMS0238-NOV23	mg/L	0.00008	<0.00008	7	20	106	90	110	100	70	130
Copper (total)	EMS0238-NOV23	mg/L	0.0002	<0.0002	16	20	108	90	110	81	70	130
Manganese (total)	EMS0238-NOV23	mg/L	0.00001	<0.00001	2	20	101	90	110	126	70	130
Nickel (total)	EMS0238-NOV23	mg/L	0.0001	<0.0001	1	20	106	90	110	109	70	130
Lead (total)	EMS0238-NOV23	mg/L	0.00009	<0.00009	3	20	96	90	110	98	70	130
Phosphorus (total)	EMS0238-NOV23	mg/L	0.003	<0.003	6	20	100	90	110	NV	70	130
Selenium (total)	EMS0238-NOV23	mg/L	0.00004	<0.00004	19	20	102	90	110	100	70	130
Zinc (total)	EMS0238-NOV23	mg/L	0.002	<0.002	3	20	104	90	110	104	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0433-NOV23	mg/L	0.01	<0.01			95	55	120			
Nonylphenol Ethoxylates	GCM0433-NOV23	mg/L	0.01	0								
Nonylphenol monoethoxylate	GCM0433-NOV23	mg/L	0.01	<0.01			95	55	120			
Nonylphenol	GCM0433-NOV23	mg/L	0.001	<0.001			92	55	120			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0563-NOV23	No unit	0.05	NA	0		98			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0247-NOV23	mg/L	0.001	<0.001	ND	10	97	80	120	95	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0420-NOV23	mg/L	0.0001	<0.0001	NSS	30	97	60	140	NSS	60	140

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
3,3-Dichlorobenzidine	GCM0412-NOV23	mg/L	0.0005	< 0.0005	NSS	30	91	30	130	NSS	30	130
7Hdibenzo(c,g)carbazole	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	105	50	140	NSS	50	140
Anthracene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	85	50	140	NSS	50	140
Benzo(a)anthracene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	89	50	140	NSS	50	140
Benzo(a)pyrene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	80	50	140	NSS	50	140
Benzo(b+j)fluoranthene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	90	50	140	NSS	50	140
Benzo(e)pyrene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	95	50	140	NSS	50	140
Benzo(ghi)perylene	GCM0448-NOV23	mg/L	0.0002	< 0.0002	NSS	30	93	50	140	NSS	50	140
Benzo(k)fluoranthene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	101	50	140	NSS	50	140
Bis(2-ethylhexyl)phthalate	GCM0448-NOV23	mg/L	0.002	< 0.002	NSS	30	96	50	140	NSS	50	140
Chrysene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	90	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0448-NOV23	mg/L	0.002	< 0.002	NSS	30	94	50	140	NSS	50	140
Dibenzo(a,h)anthracene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	93	50	140	NSS	50	140
Dibenzo(a,i)pyrene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	100	50	140	NSS	50	140
Dibenzo(a,j)acridine	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	86	50	140	NSS	50	140
Fluoranthene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	91	50	140	NSS	50	140
Indeno(1,2,3-cd)pyrene	GCM0448-NOV23	mg/L	0.0002	< 0.0002	NSS	30	93	50	140	NSS	50	140
Pentachlorophenol	GCM0448-NOV23	mg/L	0.0005	< 0.0005	NSS	30	109	50	140	NSS	50	140
Perylene	GCM0448-NOV23	mg/L	0.0005	< 0.0005	NSS	30	88	50	140	NSS	50	140
Phenanthrene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	85	50	140	NSS	50	140

QC SUMMARY

Semi-Volatile Organics (continued)

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENVIGC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Pyrene	GCM0448-NOV23	mg/L	0.0001	< 0.0001	NSS	30	93	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0573-NOV23	mg/L	2	< 2	0	10	105	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	97	60	130	106	50	140
1,2-Dichlorobenzene	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	97	60	130	106	50	140
1,4-Dichlorobenzene	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	99	60	130	105	50	140
Benzene	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	100	60	130	104	50	140
Chloroform	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	97	60	130	101	50	140
cis-1,2-Dichloroethene	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	99	60	130	104	50	140
Ethylbenzene	GCM0389-NOV23	mg/L	0.0005	<0.0005	9	30	100	60	130	NV	50	140
Methylene Chloride	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	97	60	130	99	50	140
Tetrachloroethylene (perchloroethylene)	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	98	60	130	105	50	140
Toluene	GCM0389-NOV23	mg/L	0.0005	<0.0005	11	30	99	60	130	107	50	140
trans-1,3-Dichloropropene	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	96	60	130	101	50	140
Trichloroethylene	GCM0389-NOV23	mg/L	0.0005	<0.0005	ND	30	95	60	130	101	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.
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This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com

Laboratory Information Section

Received Date (mm/dd/yyyy): 11/21/2023 KL | LAB LIMS #: NOV15289

Received Time (After Hours Only): ___ : ___ | Temperature Upon Receipt (°C): 8 & 10

Billing & Reporting Information

Invoice/Receipt to {3}:

Company:	Terra-Dynamics Consulting
Attention:	David Slaine
Address:	432 Niagara St, Unit 2 St. Catharines, ON L2M 4W3
Email:	Dslaine@Terra-Dynamics.Com & Kslaine@Terra-Dynamics.com & Bmacintyre@terra-dynamics.com

Project Name/Number: 2670 Lakeshore - BH-10& BH11 P.O. #:

Quote #:

Attached Parameter List: ☑ YES ☐ NO

Turnaround Time

Is *Rush Turnaround Time Required? ☐ YES ☑ NO

Specify:

* Rush TA Requests Require Lab Approval

Client Information/Report To:

Client Lab #:

Company Name:	Same as above	**Phone Number:**	
Contact Name:	Same as above	**Fax Number:**	
Address:	Same as above	**E-mail:**	
Copy to:	Same as above		

Sample Information

Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested (please enter the analysis required below and check off which analysis applies to each sample)
				* Please find attached parameter lists *
BH-10	11/21/23	12:50	19	* BH-10 - in cooler #1
BH-11	11/21/23	10:20	19	* BH-11 - in cooler #2
				* This chain of custody has two coolers.

Sampled By {1}:	(Name) Dan Baker	(Signature) Dan Baker	Date:	11/21/23	(mm/dd/yy)
Relinquished by {2}:	(Name) Dan Baker	(Signature) Dan Baker	Date:	11/21/23	(mm/dd/yy)

Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request.

This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

4 AG-IL None

2 AG-IL Sodium thio

6086427 7268

1,250

KL 10.50

KL

Table 1 - Limits for Storm Sewer and Drainage Works Discharge

Parameter	Limit	Unit	Parameter	Limit	Unit
Arsenic (total)	0.02	mg/L	Methylene chloride	0.0052	mg/L
Benzene	0.002	mg/L	Nickel (total)	0.08	mg/L
Biochemical Oxygen Demand	15	mg/L	Nonylphenol ethoxylates	0.01	mg/L
Bis (2-ethylhexyl) phthalate	0.0088	mg/L	Nonylphenols	0.001	mg/L
Cadmium (total)	0.008	mg/L	PCBs	0.0004	mg/L
Chloroform	0.002	mg/L	Pentachlorophenol	0.002	mg/L
Chromium (hexavalent)	0.04	mg/L	pH	6.5 to 8.5	
Chromium (total)	0.08	mg/L	Phenolics (4AAP)	0.008	mg/L
Copper (total)	0.04	mg/L	Phosphorus (total)	0.4	mg/L
Cyanide (total)	0.02	mg/L	Selenium (total)	0.02	mg/L
Dichlorobenzene, 1, 2-	0.0056	mg/L	Silver (total)	0.12	mg/L
Dichlorobenzene, 1, 4-	0.0068	mg/L	Suspended Solids (total)	15	mg/L

Dichlorobenzidine, 3,3'-	0.0008	mg/L	Temperature	< 30	°C
Dichloroethylene, Cis-1,2-	0.0056	mg/L	Tetrachlorethane, 1, 1, 2, 2-	0.017	mg/L
Dichloropropylene, Trans-1,3-	0.0056	mg/L	Tetrachloroethylene	0.0044	mg/L
Di-n-butyl phthalate	0.015	mg/L	Toluene	0.002	mg/L
Ethyl benzene	0.002	mg/L	Total PAHs	0.002	mg/L
Lead (total)	0.12	mg/L	Trichloroethylene	0.0076	mg/L
Manganese (total)	0.05	mg/L	Xylenes (total)	0.0044	mg/L
Mercury (total)	0.0004	mg/L	Zinc (total)	0.04	mg/L





FINAL REPORT

CA15498-NOV23 R3

Prepared for

Terra-Dynamics Consulting Inc.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Terra-Dynamics Consulting Inc.
Address	432 Niagara Street, Unit 2, St. Catharines Canada, L2M 4W3 Phone: 905-646-7931. Fax:
Contact	David Slaine
Telephone	905-646-7931
Facsimile	
Email	dslaine@terra-dynamics.com; kslaine@terra-dynamics.com; br
Project	
Order Number	
Samples	Solution (2)

LABORATORY DETAILS

Project Specialist	Alisha Kelly, B.Sc.,
Laboratory	SGS Canada Inc.
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SGS Reference	CA15498-NOV23
Received	11/16/2023
Approved	11/30/2023
Report Number	CA15498-NOV23 R3
Date Reported	06/05/2024

COMMENTS

Phenol analysis is as low as reasonably achievable due to sample matrix interference

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Total PAH is the sum of anthracene, benzo(a)pyrene, benzo(a)anthracene, benzo(e)pyrene, benzo(b,j)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, dibenzo(a,i)pyrene, dibenzo(a,j)acridine, 7H-dibenzo(c,g)carbazole, fluoranthene, indeno(1,2,3-c,d)pyrene, perylene, phenanthrene and pyrene..

SIGNATORIES

Alisha Kelly, B.Sc.,



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Client: Terra-Dynamics Consulting Inc.
Project:
Project Manager: David Slaine
Samplers: Scott Funk

MATRIX: WATER

L1 = SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022

Sample Number	8	9
Sample Name	BH-6	BH-1
Sample Matrix	Solution	Solution
Sample Date	15/11/2023	15/11/2023

Parameter	Units	RL	L1	Result	Result
General Chemistry					
Temperature @ pH	°C	0		21.6	21.5
Biochemical Oxygen Demand (BOD5)	mg/L	2	15	< 4 ↑	< 4 ↑
Total Suspended Solids	mg/L	2	15	**228**	**70**
Metals and Inorganics					
Cyanide (total)	mg/L	0.01	0.02	< 0.01	< 0.01
Arsenic (total)	mg/L	0.0002	0.02	0.0058	0.0017
Cadmium (total)	mg/L	0.000003	0.008	0.000202	0.000074
Chromium (total)	mg/L	0.00008	0.08	0.0189	0.00318
Cobalt (total)	mg/L	0.000004		0.00635	0.000493
Copper (total)	mg/L	0.0002	0.04	0.0118	0.0082
Lead (total)	mg/L	0.00009	0.12	0.00395	0.00161
Manganese (total)	mg/L	0.00001	0.05	**0.518**	**0.578**
Nickel (total)	mg/L	0.0001	0.08	0.0156	0.0027
Phosphorus (total)	mg/L	0.003	0.4	0.295	0.070
Selenium (total)	mg/L	0.00004	0.02	0.00030	0.00016
Silver (total)	mg/L	0.00005	0.12	0.00057	0.00009
Zinc (total)	mg/L	0.002	0.04	**0.124**	**0.046**

Client: Terra-Dynamics Consulting Inc.
Project:
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MATRIX: WATER

L1 = SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022

Sample Number	8	9
Sample Name	BH-6	BH-1
Sample Matrix	Solution	Solution
Sample Date	15/11/2023	15/11/2023

Parameter	Units	RL	L1	Result	Result
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.001	< 0.001	< 0.001
Nonylphenol diethoxylate	mg/L	0.01		< 0.01	< 0.01
Nonylphenol Ethoxylates	mg/L	0.01	0.01	< 0.01	< 0.01
Nonylphenol monoethoxylate	mg/L	0.01		< 0.01	< 0.01
Other (ORP)					
pH	No unit	0.05	8.5	7.67	7.30
Mercury (total)	mg/L	0.00001	0.0004	< 0.00001	< 0.00001
Chromium VI	mg/L	0.0002	0.04	< 0.0002	< 0.0002
PAHs					
Benzo(b+j)fluoranthene	mg/L	0.0001		0.0003	0.0006
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.0004	< 0.0001	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.01	0.008	< 0.001↓	< 0.01

Client: Terra-Dynamics Consulting Inc.
Project:
Project Manager: David Slaine
Samplers: Scott Funk

MATRIX: WATER

L1 = SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022

Sample Number	8	9
Sample Name	BH-6	BH-1
Sample Matrix	Solution	Solution
Sample Date	15/11/2023	15/11/2023

Parameter	Units	RL	L1	Result	Result
SVOCs					
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.0088	< 0.002	< 0.002
Pentachlorophenol	mg/L	0.0005	0.002	< 0.0005	< 0.0005
di-n-Butyl Phthalate	mg/L	0.002	0.015	< 0.002	< 0.002
3,3-Dichlorobenzidine	mg/L	0.0005	0.0008	< 0.0005	< 0.0005
PAHs (Total)	mg/L		0.002	0.002	0.004
Perylene	mg/L	0.0005		< 0.0005	< 0.0005
SVOCs - PAHs					
7Hdibenzo(c,g)carbazole	mg/L	0.0001		< 0.0001	< 0.0001
Anthracene	mg/L	0.0001		< 0.0001	< 0.0001
Benzo(a)anthracene	mg/L	0.0001		< 0.0001	0.0002
Benzo(a)pyrene	mg/L	0.0001		0.0001	0.0003
Benzo(e)pyrene	mg/L	0.0001		0.0002	0.0003
Benzo(ghi)perylene	mg/L	0.0002		< 0.0002	0.0003
Benzo(k)fluoranthene	mg/L	0.0001		0.0001	0.0002
Chrysene	mg/L	0.0001		0.0002	0.0004
Dibenzo(a,h)anthracene	mg/L	0.0001		< 0.0001	< 0.0001
Dibenzo(a,i)pyrene	mg/L	0.0001		< 0.0001	< 0.0001
Dibenzo(a,j)acridine	mg/L	0.0001		< 0.0001	< 0.0001
Fluoranthene	mg/L	0.0001		0.0004	0.0008
Indeno(1,2,3-cd)pyrene	mg/L	0.0002		< 0.0002	0.0002
Phenanthrene	mg/L	0.0001		< 0.0001	0.0002
Pyrene	mg/L	0.0001		0.0003	0.0006

Client: Terra-Dynamics Consulting Inc.
Project:
Project Manager: David Slaine
Samplers: Scott Funk

MATRIX: WATER

L1 = SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022

Sample Number	8	9
Sample Name	BH-6	BH-1
Sample Matrix	Solution	Solution
Sample Date	15/11/2023	15/11/2023

Parameter	Units	RL	L1	Result	Result
SVOCs - PAHs (continued)					
VOCs					
Chloroform	mg/L	0.0005	0.002	0.0040	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.0056	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.0068	< 0.0005	< 0.0005
Methylene Chloride	mg/L	0.0005	0.0052	< 0.0005	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	0.0044	< 0.0005	< 0.0005
Trichloroethylene	mg/L	0.0005	0.0076	< 0.0005	< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005		< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.0056	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	ok. tha	0.0005	0.017	< 0.0005	< 0.0005
VOCs - BTEX					
Benzene	mg/L	0.0005	0.002	< 0.0005	< 0.0005
Ethylbenzene	mg/L	0.0005	0.002	< 0.0005	< 0.0005
Toluene	mg/L	0.0005	0.002	< 0.0005	< 0.0005
Xylene (total)	mg/L	0.0005	0.0044	< 0.0005	< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Burlington Sewer Use ByLaw - Storm Sewer Discharge - BL_59_2022 L1
BH-6				
Chloroform	EPA 5030B/8260C	mg/L	0.0040	0.002
Total Suspended Solids	SM 2540D	mg/L	228	15
Manganese	SM 3030/EPA 200.8	mg/L	0.518	0.05
Zinc	SM 3030/EPA 200.8	mg/L	0.124	0.04
BH-1				
PAHs (Total)	EPA 3510C/8270D	mg/L	0.004	0.002
Total Suspended Solids	SM 2540D	mg/L	70	15
Manganese	SM 3030/EPA 200.8	mg/L	0.578	0.05
Zinc	SM 3030/EPA 200.8	mg/L	0.046	0.04
4AAP-Phenolics	SM 5530B-D	mg/L	< 0.01	0.008

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0034-NOV23	mg/L	2	< 2	1	30	103	70	130	94	70	130

Cyanide by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0185-NOV23	mg/L	0.01	<0.01	ND	10	95	90	110	96	75	125
Cyanide (total)	SKA0209-NOV23	mg/L	0.01	<0.01	ND	10	95	90	110	NV	75	125

Hexavalent Chromium by SFA

Method: EPA218.6/EPA3060A I Internal ref.: ME-CA-IENVISKA-LAK-AN-012

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chromium VI	SKA0199-NOV23	mg/L	0.0002	<0.0002	ND	20	98	80	120	NV	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0034-NOV23	mg/L	0.00001	< 0.00001	ND	20	89	80	120	96	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0169-NOV23	mg/L	0.00005	<0.00005	ND	20	108	90	110	86	70	130
Arsenic (total)	EMS0169-NOV23	mg/L	0.0002	<0.0002	20	20	101	90	110	106	70	130
Cadmium (total)	EMS0169-NOV23	mg/L	0.000003	<0.000003	0	20	108	90	110	115	70	130
Cobalt (total)	EMS0169-NOV23	mg/L	0.000004	<0.000004	0	20	106	90	110	107	70	130
Chromium (total)	EMS0169-NOV23	mg/L	0.00008	<0.00008	5	20	102	90	110	98	70	130
Copper (total)	EMS0169-NOV23	mg/L	0.0002	<0.0002	0	20	104	90	110	105	70	130
Manganese (total)	EMS0169-NOV23	mg/L	0.00001	<0.00001	3	20	101	90	110	102	70	130
Nickel (total)	EMS0169-NOV23	mg/L	0.0001	<0.0001	5	20	104	90	110	103	70	130
Lead (total)	EMS0169-NOV23	mg/L	0.00009	<0.00009	4	20	107	90	110	99	70	130
Phosphorus (total)	EMS0169-NOV23	mg/L	0.003	<0.003	ND	20	96	90	110	NV	70	130
Selenium (total)	EMS0169-NOV23	mg/L	0.00004	<0.00004	ND	20	104	90	110	115	70	130
Zinc (total)	EMS0169-NOV23	mg/L	0.002	<0.002	4	20	107	90	110	96	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0305-NOV23	mg/L	0.01	<0.01			86	55	120			
Nonylphenol Ethoxylates	GCM0305-NOV23	mg/L	0.01	0								
Nonylphenol monoethoxylate	GCM0305-NOV23	mg/L	0.01	<0.01			92	55	120			
Nonylphenol	GCM0305-NOV23	mg/L	0.001	<0.001			90	55	120			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0432-NOV23	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0189-NOV23	mg/L	0.01	<0.001	ND	10	98	80	120	87	75	125
4AAP-Phenolics	SKA0198-NOV23	mg/L	0.01	<0.001	ND	10	99	80	120	79	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0298-NOV23	mg/L	0.0001	<0.0001	NSS	30	98	60	140	NSS	60	140
Polychlorinated Biphenyls (PCBs) - Total	GCM0311-NOV23	mg/L	0.0001	<0.0001	NSS	30	103	60	140	NSS	60	140

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
7Hdibenzo(c,g)carbazole	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	96	50	140	NSS	50	140
Anthracene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	91	50	140	NSS	50	140
Benzo(a)anthracene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	97	50	140	NSS	50	140
Benzo(a)pyrene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	95	50	140	NSS	50	140
Benzo(b+j)fluoranthene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	98	50	140	NSS	50	140
Benzo(e)pyrene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	91	50	140	NSS	50	140
Benzo(ghi)perylene	GCM0341-NOV23	mg/L	0.0002	< 0.0002	NSS	30	97	50	140	NSS	50	140
Benzo(k)fluoranthene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	97	50	140	NSS	50	140
Bis(2-ethylhexyl)phthalate	GCM0341-NOV23	mg/L	0.002	< 0.002	NSS	30	99	50	140	NSS	50	140
Chrysene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	98	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0341-NOV23	mg/L	0.002	< 0.002	NSS	30	101	50	140	NSS	50	140
Dibenzo(a,h)anthracene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	95	50	140	NSS	50	140
Dibenzo(a,i)pyrene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	113	50	140	NSS	50	140
Dibenzo(a,j)acridine	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	88	50	140	NSS	50	140
Fluoranthene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	96	50	140	NSS	50	140
Indeno(1,2,3-cd)pyrene	GCM0341-NOV23	mg/L	0.0002	< 0.0002	NSS	30	92	50	140	NSS	50	140
Pentachlorophenol	GCM0341-NOV23	mg/L	0.0005	< 0.0005	NSS	30	95	50	140	NSS	50	140
Perylene	GCM0341-NOV23	mg/L	0.0005	< 0.0005	NSS	30	91	50	140	NSS	50	140
Phenanthrene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	89	50	140	NSS	50	140
Pyrene	GCM0341-NOV23	mg/L	0.0001	< 0.0001	NSS	30	93	50	140	NSS	50	140

QC SUMMARY

Semi-Volatile Organics (continued)

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
3,3-Dichlorobenzidine	GCM0354-NOV23	mg/L	0.0005	< 0.0005	NSS	30	91	30	130	NSS	30	130

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0472-NOV23	mg/L	2	< 2	1	10	95	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	98	60	130	129	50	140
1,2-Dichlorobenzene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	94	60	130	99	50	140
1,4-Dichlorobenzene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	97	60	130	101	50	140
Benzene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	96	60	130	102	50	140
Chloroform	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	93	60	130	98	50	140
cis-1,2-Dichloroethene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	95	60	130	103	50	140
Ethylbenzene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	97	60	130	102	50	140
Methylene Chloride	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	93	60	130	98	50	140
Tetrachloroethylene (perchloroethylene)	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	94	60	130	98	50	140
Toluene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	94	60	130	101	50	140
trans-1,3-Dichloropropene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	93	60	130	98	50	140
Trichloroethylene	GCM0306-NOV23	mg/L	0.0005	<0.0005	ND	30	91	60	130	84	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.
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This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com

Laboratory Information Section

Received Date (mm/dd/yyyy): NOV 16 2023 — LAB LIMS #: Nov 15498

Received Time (After Hours Only): ___ : ___ — Temperature Upon Receipt (°C): 11x3

Billing & Reporting Information

Invoice/Receipt to (3):

Company:	Terra-Dynamics Consulting
Attention:	David Slaine
Address:	432 Niagara St, Unit 2 St. Catharines, ON L2M 4W3
Email:	Dslaine@Terra-Dynamics.Com & Kslaine@Terra-Dynamics.com & Bmacintyre@terra-dynamics.com

Project Name/Number: Old Lake 6, 1 — P.O. #:

Quote #:

Attached Parameter List: [X] YES [ ] NO

Turnaround Time

Is *Rush Turnaround Time Required? [ ] YES [X] NO

Specify:

* Rush TA Requests Require Lab Approval

Client Information/Report To:

Client Lab #:

Company Name:	Same as above	**Phone Number:**	
Contact Name:	Same as above	**Fax Number:**	
Address:	Same as above	**E-mail:**	
Copy to:	Same as above		

Sample Information

Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested (please enter the analysis required below and check off which analysis applies to each sample)
				See attached Analyte list
BH-6	11/15/23	11:05	19	
BH-1	↓	11:45	19	2 coolers
				City of Burlington storm and sanitary Sewer table 1

Sampled By (1):	(Name) Scott Fink	(Signature)		**Date:**	11/15/23	(mm/dd/yy)
Relinquished by (2):	(Name) Scott Fink	(Signature)		**Date:**	11/15/23	(mm/dd/yy)

Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request.

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HCRTN 608642232276

HCRTN 608663731735

Table 1 - Limits for Storm Sewer and Drainage Works Discharge

Parameter	Limit	Unit	Parameter	Limit	Unit
Arsenic (total)	0.02	mg/L	Methylene chloride	0.0052	mg/L
Benzene	0.002	mg/L	Nickel (total)	0.08	mg/L
Biochemical Oxygen Demand	15	mg/L	Nonylphenol ethoxylates	0.01	mg/L
Bis (2-ethylhexyl) phthalate	0.0088	mg/L	Nonylphenols	0.001	mg/L
Cadmium (total)	0.008	mg/L	PCBs	0.0004	mg/L
Chloroform	0.002	mg/L	Pentachlorophenol	0.002	mg/L
Chromium (hexavalent)	0.04	mg/L	pH	6.5 to 8.5	
Chromium (total)	0.08	mg/L	Phenolics (4AAP)	0.008	mg/L
Copper (total)	0.04	mg/L	Phosphorus (total)	0.4	mg/L
Cyanide (total)	0.02	mg/L	Selenium (total)	0.02	mg/L
Dichlorobenzene, 1, 2-	0.0056	mg/L	Silver (total)	0.12	mg/L
Dichlorobenzene, 1, 4-	0.0068	mg/L	Suspended Solids (total)	15	mg/L

Dichlorobenzidine, 3,3'-	0.0008	mg/L	Temperature	< 30	°C
Dichloroethylene, Cis-1,2-	0.0056	mg/L	Tetrachlorethane, 1, 1, 2, 2-	0.017	mg/L
Dichloropropylene, Trans-1,3-	0.0056	mg/L	Tetrachloroethylene	0.0044	mg/L
Di-n-butyl phthalate	0.015	mg/L	Toluene	0.002	mg/L
Ethyl benzene	0.002	mg/L	Total PAHs	0.002	mg/L
Lead (total)	0.12	mg/L	Trichloroethylene	0.0076	mg/L
Manganese (total)	0.05	mg/L	Xylenes (total)	0.0044	mg/L
Mercury (total)	0.0004	mg/L	Zinc (total)	0.04	mg/L

Cooler 1/2

Appendix E

Dewatering Calculations

Table E-1

Horizontal Dewatering Calculation - Peak Flow P4

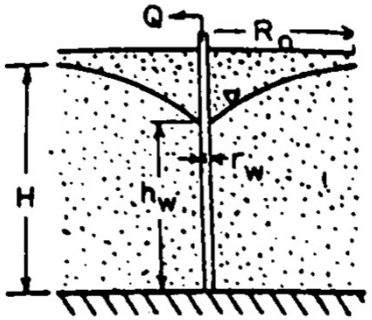
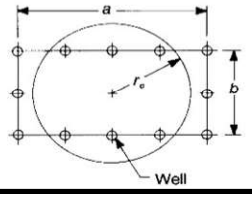
Radial flow, water table aquifer	Inputs	Comments
H=Initial saturated thickness (m)	9.4	
h_w=Remaining saturated thickness (m)	0	
K=Hydraulic Conductivity (m/s)	1.E-07	
a=Rectangular Excavation Length (m)	47	Requirement for a/b < 1.5
b=Rectangular Excavation Width (m)	38	
	Calculations	
R_w=Re=Effective radius Calc (m)	24	$r_e = \sqrt{\frac{ab}{\pi}}$
R_0=Radius of Influence Calc (Sichart & Kryieleis) (m)	33	$R_o = r_e + 3000(H - h_w)\sqrt{k}$
Q_w=Flow Rate (m^3/s)	0.000087	$Q_w = \frac{\pi K(H^2 - h_w^2)}{\ln R_0 / r_w}$
Q_w=Flow Rate (m^3/day)	8	
Q_w=Flow Rate (L/day)	7,550	

Figure E-1
Calculated Daily Dewatering Rate

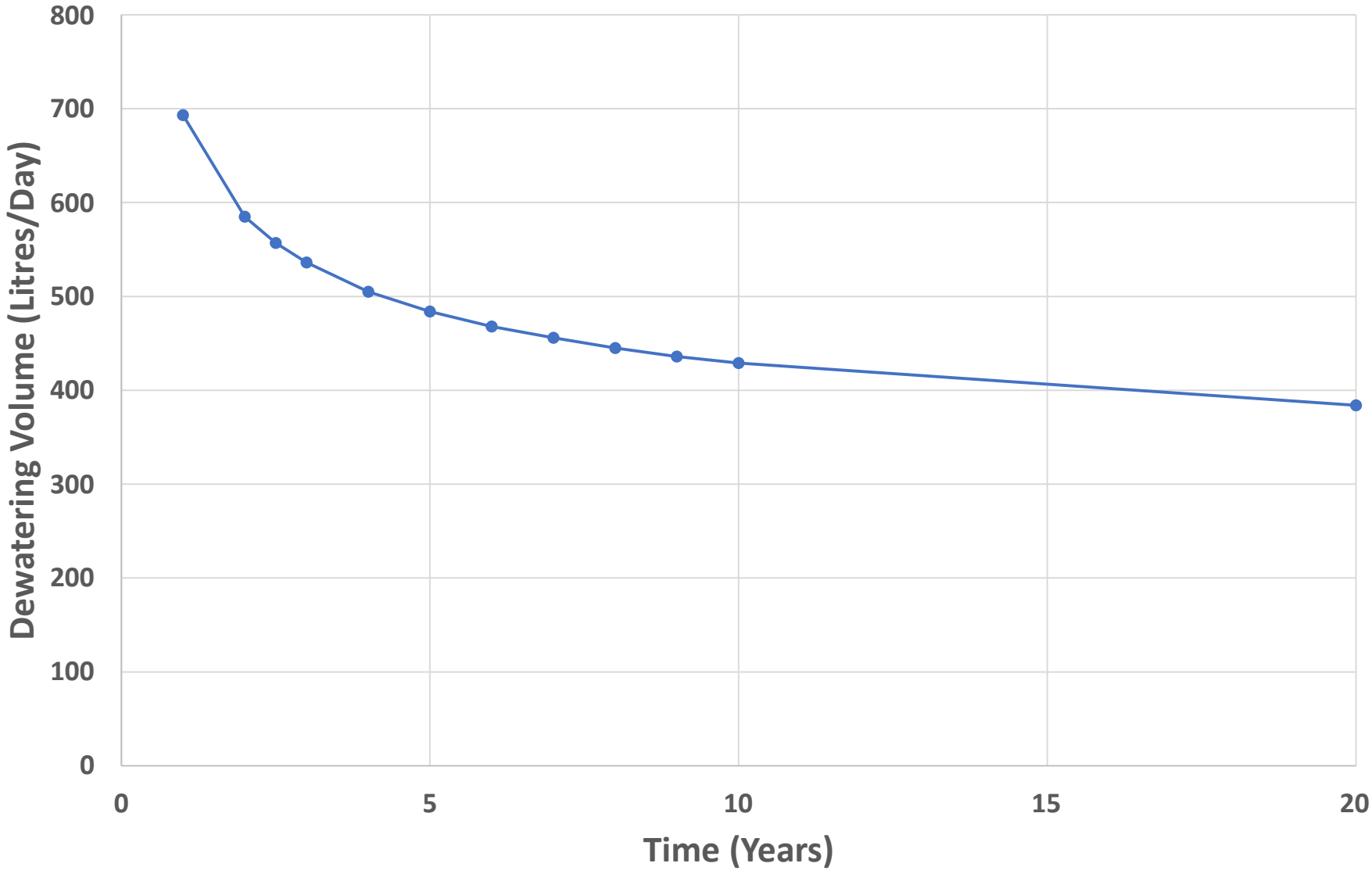
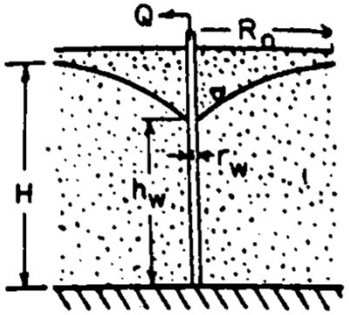
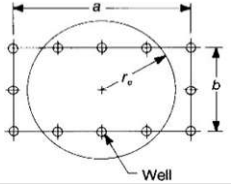


Table E-2

Dewatering Assessment - 5 Years

Radial flow, water table aquifer	Inputs	Comments
H=Initial saturated thickness (m)	6.9	
h_w=Remaining saturated thickness (m)	0	
K=Hydraulic Conductivity (m/s)	1.0E-07	
a=Rectangular Excavation Length (m)	47	Requirement for a/b < 1.5
b=Rectangular Excavation Width (m)	38	
	Calculations	
R_w=Re=Effective radius Calc (m)	24	$r_e = \sqrt{\frac{ab}{\pi}}$
Adjustable Time of dewatering (hours)	43,830	$R_0 = 3000(H - h)\sqrt{K}$
Specific Storage	1.E-04	Sykes et al, 2008 (S_s = 1x10-4)
R_0=Radius of Influence Calc (Cooper&Jacob) (m)	344	$R_o = \sqrt{\frac{2.25kDt}{S}}$
Q_w=Flow Rate (m^3/s)	0.000006	$Q_w = \frac{\pi K(H^2 - h_w^2)}{\ln R_0 / r_w}$
Q_w=Flow Rate (m^3/day)	0	
Q_w=Flow Rate (L/day)	484	

Appendix F

Reliance Letter

Terra-Dynamics Consulting Inc.

404 Queenston Street, St. Catharines, ON L2P 2Y2

905-646-7931 Fax: 905-935-0397 www.terra-dynamics.com

was prepared. No other representation or warranty, either expressed or implied, is made or intended by Terra-Dynamics with respect to any and all services, reports, correspondence, memoranda, goods, products, and equipment provided by Terra-Dynamics.

3. Terra-Dynamics shall not be responsible for the interpretation by others of the information developed by Terra-Dynamics. Our September 2, 2025 report titled *Hydrogeological Dewatering Study, 2076 Old Lakeshore Road, Burlington, ON* is exclusively for the use of our client, 1959025 Ontario Inc. and its, solicitors, lenders, engineers and consultants. The document or correspondence and the findings contained therein shall not, in whole or in part, be disseminated or conveyed to any other party or be used or relied upon by any other party, other than our client, 1959025 Ontario Inc.. and its, solicitors, lenders, engineers and consultants, in whole or in part, without the prior written consent of Terra-Dynamics. Our September 2, 2025 report and this Reliance letter are not transferrable and do not grant rights or benefits to any third party unless written agreement is made between Terra-Dynamics and the third party. We accept no responsibility for any loss or damage suffered by a third party as a result of decisions made or actions based on our September 2, 2025 report or this Letter of Reliance.

4. Should a third party have a concern about the Property and seeks a report upon which it may rely, it is obligated to hire an independent consultant at its own cost.

5. The work product completed under our Authorization to Proceed, and Terra-Dynamics' permission to use the information contained therein, in accordance with the terms described above, is offered in consideration of the understanding that our Client has entered into consideration of an Official Plan and Zoning By-law Amendment for the property located at 2076 Old Lakeshore Road, Burlington, Ontario and that our Client has authorized Terra-Dynamics' to provide this reliance to the City of Burlington and Halton Region herein.

6. Subject to these conditions, as well as the qualifications and limitations contained in the Report, you may rely on the Report for the express purpose which they are prepared, with no greater rights that those of our Client.

Please do not hesitate to contact the undersigned with any questions.

Yours truly,

TERRA-DYNAMICS INC.



Jayme D. Campbell, P. Eng.
Senior Water Resource Engineer, and President