



**URBANTECH<sup>®</sup>**

**FUNCTIONAL SERVICING AND STORMWATER  
MANAGEMENT REPORT**

**3085 Hurontario**

City of Mississauga

Prepared for

**Equity Three Holdings Inc.**

Project #: 20-653

First Submission: June 2021

**Second Submission: August 2023**

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- VO6 Model Output
- Water Balance
- Stormceptor Sizing Report

### Appendix C – Wastewater Servicing

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## 1. INTRODUCTION

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Urbantech has been retained as consulting engineers by 3085 Hurontario Limited Partnership to complete a Functional Servicing Report in support of an official plan amendment and zoning bylaw amendment for the proposed 1.5 ha development located at 3085 Hurontario Street in the City of Mississauga.

The site is bounded:

- To the north by commercial buildings and Kirwin Avenue
- To the south by commercial and residential buildings
- To the east by residential buildings and Jaguar Valley Drive
- To the west by Hurontario Street

The site is comprised of Lot 9 in registered plan TOR-12, Lot 15, Concession 1 North of Dundas Street and Block A Registered Plan 645 as shown on R-PE Surveying Sketch Showing Elevations, dated November 25<sup>th</sup>, 2020.

The site is currently occupied by commercial businesses and a parking garage.

The subject development lies within the limits of the Lake Ontario Shoreline East (Cooksville Creek) subwatershed, under the Credit Valley Conservation Authority (CVC) jurisdiction. The site falls within the City of Mississauga Hurontario/Main Street Corridor Master Plan area.

### 1.1 Study Purpose

The objective of this study is to outline the servicing requirements of the subject lands at a functional design level. This study will:

1. Recommend site grading, water supply and wastewater servicing strategies for the site.
2. Demonstrate compliance with City, Conservation and MECP design criteria for municipal services and stormwater management (SWM) measures.

The functional servicing design has been prepared in accordance with design criteria and requirements of the City of Mississauga, Region of Peel and Credit Valley Conservation Authority. The information in this report is intended to assist the regulatory agencies in their review of the planning applications for the proposed development.



## 2. DEVELOPMENT CONCEPT

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Refer to the development concept plan prepared by Diamond Schmitt Architects Inc. The development plan consists of:

1. Tower 1 with 430 units and 1,148 m<sup>2</sup> of retail.
2. Tower 2 with 501 units
3. Tower 3 with 355 units.
4. Tower 4 with 372 units.
5. 4 levels of underground parking.

The proposed development will connect to both Hurontario Street and Kirwin Avenue via private driveways.

### 2.1 Background Studies

The servicing and development concepts presented within this report are an extension of the information contained in the following reports:

1. Geohydrology Assessment – 3085-3105 Hurontario Street (August 2023) – McClymont and Rak Engineers Inc.
2. Cooksville Creek Flood Evaluation Master Plan EA (July 2012) by Aquafor Beech
3. Hurontario/Main Street Corridor Master Plan (October 2010) by MMM Group

### 3. EXISTING CONDITIONS

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#### 3.1 Land Use

The site is fully developed under existing conditions and consists of commercial businesses and an above grade parking garage.

#### 3.2 Geotechnical and Hydrogeology

In support of the draft plan application, a geohydrology study was prepared by McClymont and Rak Engineers Inc in August 2023. This study is reproduced in **Appendix E**.

The report states that the site's soil stratigraphy is generally characterized by native clayey silt till overlain by native sand. Underlying bedrock was found to be Dundas Shale.

- The parking lot was found to consist of approximately 100 to 200 mm of asphaltic concrete overlying 150 to 250 mm of granular fill.
- Beneath the pavement was loose to very dense sand/silty sand till which extended to depths of 1.75 to 3.65 m.
- Stiff to hard clayey silt overburden that was encountered up to a depth of 2.45-4.3 m below the existing grade.
- The overburden was underlain by highly weathered Dundas shale bedrock.

The report found the site's average groundwater level to be at a depth of approximately 3.28 m below the existing grade.

The report also indicated the following:

- Discharging groundwater to municipal storm sewers would require filtration/treatment for Biological Oxygen Demand. This treatment will be developed by a dewatering contractor.
- Dewatering during construction would require a daily dewatering rate of 306 m<sup>3</sup>/day during steady state conditions when incorporating a factor of safety.
- A Permit to Take Water will be required for pumping during the excavation.
- Permanent dewatering of 282 m<sup>3</sup>/day is estimated.

## 4. GRADING DESIGN

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### 4.1 Design Standards

The proposed grading design for the site takes into consideration the following requirements and constraints:

1. Conforms to the City of Mississauga design criteria.
2. Match existing boundary lot and road grading conditions to be compatible with abutting properties.
3. Provides overland flow conveyance for major storm conditions.
4. Minimizes the need for retaining walls.
5. Provides appropriate cover on proposed servicing.
6. Ensures compatibility of driveway access to surrounding public streets.

### 4.2 Grading Design

A grading plan for the subject property has been prepared in conjunction with the storm, sanitary, and water servicing system design for the subject development.

**Drawing GR-1** illustrate the proposed grading plan for the site.

Due to perimeter grading constraints adjacent to Hurontario Street and Kirwin, a minor portion of the site (0.068 ha) will drain uncontrolled to the public right of way.

## 5. STORM DRAINAGE AND STORMWATER MANAGEMENT

### 5.1 Drainage Criteria

The City of Mississauga and Credit Valley Conservation outline the following design criteria for the site as follows:

1. Meeting Cooksville Creek Subwatershed quantity control criteria of 100-year post development to 2-year predevelopment control.
2. Pre-development runoff coefficients are to not exceed 0.5 for a site that is already developed.
3. Ensure minimum 80% TSS removal on site for quality control.
4. First 5 mm of runoff to be retained on-site.
5. Provide safe overland flow conveyance of the 100-year event.

### 5.2 Storm Sewer Design

Storm sewers within the site will be sized to convey the 10-year storm in accordance with the City of Mississauga standards. The site is full coverage with underground parking. All surface drainage will be collected by area drains and catchbasins that are connected to the building plumbing system.

Routing of the storm sewers within the building will be determined at a later date as the building design is advanced. All stormwater within the site is conveyed to the storage tank, which is situated in the west portion of the site within the P1 level of the underground parkade.

The site will connect to the 450 mm storm sewer in Hurontario Street being installed by Metrolinx as part of the Hurontario Light Rail Transit project.

Flows from 0.068 ha of the site along the boundary are not able to be captured by area drains and will flow uncontrolled towards Hurontario Street (0.046 ha) and Kirwin Avenue (0.022 ha).

### 5.3 Quality Control

As identified in section 5.1 above, the site is required to meet a minimum of 80% TSS removal on site for quality control.

To achieve the required TSS removal an Oil Grit Separator (OGS) will be used downstream of the proposed storage tank. An Stormceptor OGS is proposed, which is ETC certified, to provide quality control for the development.

**Table 1** below outlines preliminary sizing for the OGS. Sizing specifications are to be verified by the manufacturer during detailed design.

**Table 1: OGS Parameters**

OGS #	Size	Area (ha)	Efficiency (%)
1	EFO6	1.5	84

Refer to **Appendix B** for the Stormceptor Sizing Report. Refer to **Drawing STM-1** for the location of the OGS.

## 5.4 Quantity Control

A Visual Otthymo (VO6) model was created to determine the pre-development 2-year flow from the subject property. A 24-hour Chicago rainfall distribution was used to simulate the rainfall on the site using the Pearson International Airport IDF parameters. As the site is fully developed under existing conditions, a runoff coefficient of 0.5 was used as prescribed by the City of Mississauga standards. **Table 2** below outlines the pre-development 2-year flow.

**Table 2 - 2-year Pre-development Target**

Area (ha)	Runoff Coefficient	2-year Target (m <sup>3</sup> /s)
1.5	0.5	0.176

As the properties allocation in the 450 mm storm sewer being constructed by Metrolinx is unknown at this time, quantity control has been designed to conservatively pump the flows from the tank over a 24 hour period. For the 1.5 ha site and a runoff volume of 118 mm from VO6, the required flow rate over 24 hours would be approximately 20 L/s. **Table 3** summarizes the flow and storage required based on the VO6 model.

**Table 3: Flow and Required Storage Volume Results**

Outlet	Area (ha)	Runoff Coefficient	Post Development Flows (m <sup>3</sup> /s)	Required Volume (m <sup>3</sup> )
Tank	1.5	0.9	0.02	913

In addition to the stormwater flows from the development, there is also a permanent dewatering of approximately 3 L/s. The total flow to the 450 mm pipe is proposed to be 23 L/s from the subject property which represents only approximately 11% of the pipe capacity.

When the site's allocation in the 450 mm storm sewer is known the target release rate and proposed storage will be revised as required.

Refer to SWM Calculations in **Appendix B** for supporting calculations.

## 5.5 Water Balance/Water Re-use

As shown in section 5.1 above, the first 5 mm of a rain event are required to be retained onsite. For a site of 1.5 ha this results in a total volume of 74.95 m<sup>3</sup>. Due to the high groundwater table and extent of the underground parking garage, there are no options for infiltrating the water. The storage tank will be designed to capture the first 5 mm for reuse in a sump. The end use of this water will be determined at detailed design.

Refer to the Water Balance in **Appendix B** for the supporting calculations.

## 6. WASTEWATER SERVICING

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### 6.1 Existing Conditions

The existing sanitary sewer in proximity to the site is as follows:

1. 300 mm diameter located within Hurontario Street flowing south.

The location of the existing sewer is shown on **Drawing SER-1**.

### 6.2 Design Criteria

Wastewater sewers will be designed in accordance with Region of Peel standards and specifications. The following criteria were used:

- 1.7 people/unit for small apartments (less than or equal to one bedroom)
- 3.1 people/unit for larger apartments (greater than 1 bedroom)
- 50 people/ha for commercial areas
- 0.26 L/s/ha for infiltration
- 290 L/person/day for domestic sewage flow

### 6.3 Local Wastewater Design

The estimated sanitary flow from the subject lands is 51.10 L/s. Refer to Wastewater Demand Calculations in **Appendix C** for calculations.

Sanitary servicing within the site will be designed by the project mechanical engineer as the building design advances. Proposed sanitary flows from the subject property have an outlet to Hurontario Street as confirmed by Metrolinx via a new 200 mm service connection to the existing public sewer on Hurontario Street. A second outlet via Kirwin Avenue is contemplated based on discussions with the Region of Peel. Refer to **Drawing SER-1** for the anticipated connection locations.

The estimated flow was provided to the Region of Peel to verify sewer capacity using their model. The Region of Peel has previously advised that two lengths of public downstream sanitary sewer will be at or above capacity.

Region of Peel indicated the following external upgrades may be required:

- replacement of 15m of existing 375mm diameter sanitary sewer at Jaguar Valley at Dundas Street.

Consideration should be given to monitoring the capacity of the existing sewers to confirm the actual existing utilization. Due to the conservative nature of flow calculations and population estimates, the degree of surcharge could be overstated.

The Region indicated that these improvements would be at the developers' expense.

## 7. WATER SERVICING

### 7.1 Existing Conditions

The existing water network, which falls under the jurisdiction of the Region of Peel, in the vicinity of the site includes:

1. A 400 mm local watermain on Hurontario Street
2. A 300 mm local watermain on Kirwin Avenue

### 7.2 Design Criteria

The proposed watermain design will comply with the Region of Peel design criteria as follows:

- Residential Consumption = 280 l/c/day, max day = 3
- Commercial Consumption = 300 l/employee/day, max day = 1.4
- Residential and Commercial Peak Hour = 3
- Minimum operating pressure = 40 psi
- Maximum operating pressure = 100 psi

### 7.3 Local Watermains

Water servicing will be provided to the site via three new water services as shown on **Drawing SER-1**. Region of Peel has indicated that a redundant water service with isolation between the services will be required. The water service size is estimated to be 200 mm which will be confirmed as the project advances. A 250 mm connection will be made to the existing 300 mm watermain on Kirwin Avenue and two 300 mm connections will be made to the proposed 600 mm on Hurontario Street. The onsite water supply system will be designed by the project mechanical engineer as the building design advances.

The total proposed fire flow from the subject lands is estimated to be 116.7 L/s (1849 USGPM) and the average day demand is approximately 15 L/s (129 USGPM).

A hydrant flow test was conducted on the hydrant adjacent to the site on Hurontario Street as well as at 3094 Jaguar Valley Drive. The results of the test are shown in **Table 4**.

**Table 4: Fire Flow Tests**

Pressure (psi)	Flow (USGPM)
<b>3085 Hurontario Street</b>	
80.2	0
73.2	4725
20	15139
<b>3094 Jaguar Valley Drive</b>	
82.6	0
78.7	5586
20	25144

Water demand and the results of the hydrant flow test were provided to the Region of Peel and no water capacity constraints were found.

Refer to **Appendix D** for water demand calculation and hydrant flow test results.

## **8. EROSION AND SEDIMENT CONTROL AND CONSTRUCTION DEWATERING**

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Erosion and sediment controls measures as follows:

1. Installing heavy duty silt control fencing along the perimeter of the site at strategic locations.
2. Installing a temporary mud mat at the construction site entrance.
3. Wrapping the tops of all inlet structures with filter fabric and using install silt sacks.
4. Inspecting all sediment and erosion control controls to maintain them in good repair until such time as the Engineer or the City approves their removal.
5. Safe discharge of construction water in accordance with City and provincial guidelines.

Site-specific ESC and Groundwater disposal measures will be determined during the detailed design / site alteration application stage of the project.



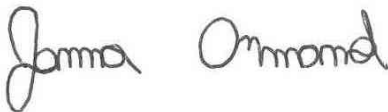
## 9. CONCLUSIONS

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This report has demonstrated that:

- The proposed site will be graded to match to existing elevations at all property lines. A retaining wall will be required at the east property limit.
- Building Storm drains will be designed by the project mechanical engineer at the building permit stage.
- Water quality will be provided through the use of an OGS device.
- Storm water quantity control estimated to be 913 m<sup>3</sup> will be required to pump flows from the post development 100 year storm over 24-hours. This flow is less than that of the predevelopment 2 year storm in accordance with Mississauga standards.
- Storage will be provided with a tank located at the west portion of the building, adjacent to Hurontario Street, that will be integrated with the building parking structure.
- The site will utilize the 450 mm storm sewer connection proposed by Metrolinx; target release rates and storage will be updated based on the site's allocation in this sewer, when known.
- Water balance objectives will be met by retaining the first 5 mm of rain events onsite in the storage tank. Retained water will be re-used for irrigation purposes.
- Wastewater servicing to the site will be provided by a new 200 mm diameter connection to the 250 mm diameter existing sewer on Hurontario Street. A second connection has also been considered via the 200 mm sanitary sewer on Kirwin Avenue.
- Region of Peel has indicated that some of the existing sewers in the vicinity if the site may require capacity augmentation.
- Water servicing to the site will be provided by the existing 300 mm watermain on Kirwin Avenue as directed by the Region as well as the proposed 600 mm watermain on Hurontario Street.
- Erosion and sediment control and groundwater control measures will be implemented during construction in accordance with City and Provincial requirements.

Report Prepared by:



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## **APPENDIX A**

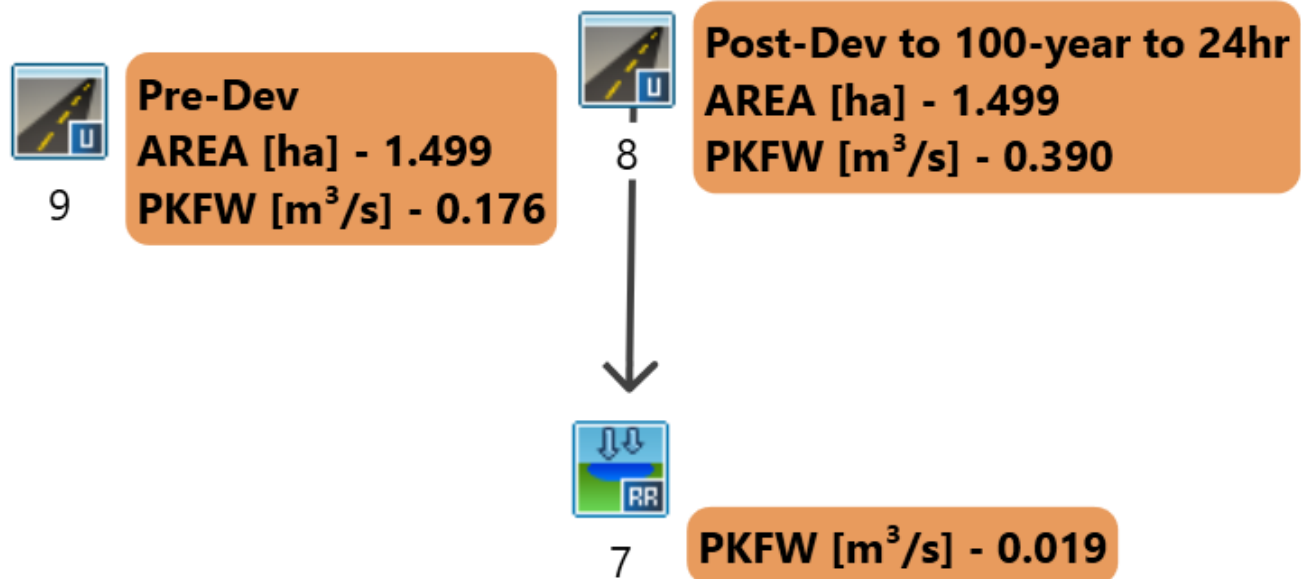
### **Drawings and Figures**

Drawing GR-1 Grading Plan  
Drawing STM-1 Storm Drainage Plan  
Drawing SER-1 Servicing Plan

## **APPENDIX B**

### **SWM Calculations**

# VO6 Schematic



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V V I SSSSS U U A L (v 6.2.2006)  
V V I SS U U A A L  
V V I SS U U AAAAA L  
V V I SS U U A A L  
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM  
O O T T H H Y Y MM MM O O  
O O T T H H Y M M O O  
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\*\*\*\*\* D E T A I L E D O U T P U T \*\*\*\*\*

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

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Summary filename:

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DATE: 08-10-2023

TIME: 09:35:29

USER:

COMMENTS: \_\_\_\_\_

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\*\*\*\*\*  
\*\* SIMULATION : 100-year chicago - 24 hour - \*\*  
\*\*\*\*\*

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| CHICAGO STORM |  
Ptotal=119.37 mm

IDF curve parameters: A=1450.000  
B= 4.900  
C= 0.780

used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs

Storm time step = 5.00 min

Time to peak ratio = 0.33

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.08	1.12	6.08	3.49	12.08	3.29	18.08	1.59
0.17	1.13	6.17	3.62	12.17	3.24	18.17	1.58
0.25	1.14	6.25	3.76	12.25	3.18	18.25	1.57
0.33	1.15	6.33	3.92	12.33	3.14	18.33	1.56
0.42	1.16	6.42	4.09	12.42	3.09	18.42	1.55
0.50	1.17	6.50	4.27	12.50	3.04	18.50	1.54
0.58	1.18	6.58	4.48	12.58	3.00	18.58	1.53
0.67	1.19	6.67	4.72	12.67	2.95	18.67	1.53
0.75	1.20	6.75	4.98	12.75	2.91	18.75	1.52
0.83	1.21	6.83	5.28	12.83	2.87	18.83	1.51
0.92	1.22	6.92	5.62	12.92	2.83	18.92	1.50
1.00	1.23	7.00	6.02	13.00	2.79	19.00	1.49
1.08	1.24	7.08	6.49	13.08	2.76	19.08	1.48
1.17	1.26	7.17	7.05	13.17	2.72	19.17	1.47
1.25	1.27	7.25	7.72	13.25	2.69	19.25	1.46
1.33	1.28	7.33	8.57	13.33	2.65	19.33	1.45
1.42	1.29	7.42	9.66	13.42	2.62	19.42	1.45
1.50	1.31	7.50	11.12	13.50	2.59	19.50	1.44
1.58	1.32	7.58	13.17	13.58	2.56	19.58	1.43
1.67	1.33	7.67	16.30	13.67	2.53	19.67	1.42
1.75	1.35	7.75	21.69	13.75	2.50	19.75	1.41
1.83	1.36	7.83	33.28	13.83	2.47	19.83	1.40
1.92	1.38	7.92	76.62	13.92	2.44	19.92	1.40
2.00	1.39	8.00	242.53	14.00	2.41	20.00	1.39
2.08	1.41	8.08	98.69	14.08	2.39	20.08	1.38
2.17	1.42	8.17	54.64	14.17	2.36	20.17	1.37
2.25	1.44	8.25	37.73	14.25	2.33	20.25	1.37
2.33	1.46	8.33	28.91	14.33	2.31	20.33	1.36
2.42	1.47	8.42	23.53	14.42	2.29	20.42	1.35
2.50	1.49	8.50	19.90	14.50	2.26	20.50	1.35
2.58	1.51	8.58	17.30	14.58	2.24	20.58	1.34
2.67	1.53	8.67	15.34	14.67	2.22	20.67	1.33
2.75	1.55	8.75	13.80	14.75	2.20	20.75	1.32
2.83	1.57	8.83	12.57	14.83	2.17	20.83	1.32
2.92	1.59	8.92	11.55	14.92	2.15	20.92	1.31
3.00	1.61	9.00	10.71	15.00	2.13	21.00	1.30
3.08	1.63	9.08	9.98	15.08	2.11	21.08	1.30
3.17	1.65	9.17	9.36	15.17	2.09	21.17	1.29
3.25	1.68	9.25	8.82	15.25	2.07	21.25	1.28
3.33	1.70	9.33	8.35	15.33	2.05	21.33	1.28
3.42	1.72	9.42	7.92	15.42	2.04	21.42	1.27
3.50	1.75	9.50	7.55	15.50	2.02	21.50	1.27

3.58	1.78	9.58	7.21	15.58	2.00	21.58	1.26
3.67	1.80	9.67	6.90	15.67	1.98	21.67	1.25
3.75	1.83	9.75	6.62	15.75	1.97	21.75	1.25
3.83	1.86	9.83	6.37	15.83	1.95	21.83	1.24
3.92	1.89	9.92	6.13	15.92	1.93	21.92	1.24
4.00	1.92	10.00	5.92	16.00	1.92	22.00	1.23
4.08	1.96	10.08	5.72	16.08	1.90	22.08	1.22
4.17	1.99	10.17	5.54	16.17	1.89	22.17	1.22
4.25	2.02	10.25	5.37	16.25	1.87	22.25	1.21
4.33	2.06	10.33	5.21	16.33	1.86	22.33	1.21
4.42	2.10	10.42	5.06	16.42	1.84	22.42	1.20
4.50	2.14	10.50	4.92	16.50	1.83	22.50	1.20
4.58	2.18	10.58	4.78	16.58	1.81	22.58	1.19
4.67	2.23	10.67	4.66	16.67	1.80	22.67	1.19
4.75	2.27	10.75	4.54	16.75	1.79	22.75	1.18
4.83	2.32	10.83	4.43	16.83	1.77	22.83	1.18
4.92	2.37	10.92	4.33	16.92	1.76	22.92	1.17
5.00	2.42	11.00	4.23	17.00	1.75	23.00	1.16
5.08	2.48	11.08	4.14	17.08	1.73	23.08	1.16
5.17	2.54	11.17	4.05	17.17	1.72	23.17	1.15
5.25	2.60	11.25	3.96	17.25	1.71	23.25	1.15
5.33	2.67	11.33	3.88	17.33	1.70	23.33	1.14
5.42	2.74	11.42	3.80	17.42	1.68	23.42	1.14
5.50	2.81	11.50	3.73	17.50	1.67	23.50	1.14
5.58	2.89	11.58	3.66	17.58	1.66	23.58	1.13
5.67	2.97	11.67	3.59	17.67	1.65	23.67	1.13
5.75	3.06	11.75	3.53	17.75	1.64	23.75	1.12
5.83	3.16	11.83	3.46	17.83	1.63	23.83	1.12
5.92	3.26	11.92	3.40	17.92	1.62	23.92	1.11
6.00	3.37	12.00	3.35	18.00	1.61	24.00	1.11

### 100-year Post-Development

CALIB	Area (ha)=	1.50
STANDHYD ( 0008)	Total Imp(%)=	99.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)=	99.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.48	0.01
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	99.97	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	242.53	*****
over (min)	5.00	5.00
Storage Coeff. (min)=	1.79 (ii)	2.58 (ii)
Unit Hyd. Tpeak (min)=	5.00	5.00
Unit Hyd. peak (cms)=	0.32	0.29

				*TOTALS*
PEAK FLOW	(cms)=	0.96	0.01	0.963 (iii)
TIME TO PEAK	(hrs)=	8.00	8.00	8.00
RUNOFF VOLUME	(mm)=	118.37	73.54	117.92
TOTAL RAINFALL	(mm)=	119.37	119.37	119.37
RUNOFF COEFFICIENT	=	0.99	0.62	0.99

\*\*\*\*\* WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 80.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| RESERVOIR( 0007) | OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 5.0 min      |
-----
| OUTFLOW          | STORAGE          | OUTFLOW          | STORAGE          |
| (cms)            | (ha.m.)         | (cms)            | (ha.m.)         |
| 0.0000          | 0.0000         | 0.0200          | 0.0913         |
| 0.0190          | 0.0010         | 0.0000          | 0.0000         |

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 ( 0008)	1.499	0.963	8.00	117.92
OUTFLOW: ID= 1 ( 0007)	1.499	0.020	10.58	117.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.08  
TIME SHIFT OF PEAK FLOW (min)=155.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0913

```

-----
| CALIB           | 100-year Pre-Development
| STANDHYD ( 0009) | Area (ha)= 1.50
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00
-----

```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.64	0.85
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	99.97	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	242.53	107.89
over (min)	5.00	10.00
Storage Coeff. (min)=	1.79 (ii)	8.64 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00



Unit Hyd. peak (cms)=	0.32	0.12	
			*TOTALS*
PEAK FLOW (cms)=	0.42	0.18	0.521 (iii)
TIME TO PEAK (hrs)=	8.00	8.08	8.00
RUNOFF VOLUME (mm)=	118.37	73.54	92.82
TOTAL RAINFALL (mm)=	119.37	119.37	119.37
RUNOFF COEFFICIENT =	0.99	0.62	0.78

\*\*\*\*\* WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 80.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----  
FINISH  
=====

```

V  V  I  SSSSS  U  U  A  L          (v 6.2.2006)
V  V  I  SS    U  U  A  A  L
V  V  I  SS    U  U  AAAAA  L
V  V  I  SS    U  U  A  A  L
  VV  I  SSSSS  UUUUU  A  A  LLLLL

```

```

000  TTTTT  TTTTT  H  H  Y  Y  M  M  000  TM
O  O  T  T  H  H  Y  Y  MM  MM  O  O
O  O  T  T  H  H  Y  M  M  O  O
000  T  T  H  H  Y  M  M  000

```

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\*\*\*\*\* D E T A I L E D O U T P U T \*\*\*\*\*

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\jannaormond\AppData\Local\Civica\XH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\1cbae860-19f9-4e79-90cd-4773a31c79d9\

Summary filename:

C:\Users\jannaormond\AppData\Local\Civica\XH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\

1cbae860-19f9-4e79-90cd-4773a31c79d9\

DATE: 08-10-2023

TIME: 09:35:29

USER:

COMMENTS: \_\_\_\_\_

-----

\*\*\*\*\*

\*\* SIMULATION : 2 year - 24 hour chicago - mi \*\*

\*\*\*\*\*

-----

CHICAGO STORM
Ptotal= 50.23 mm

-----

IDF curve parameters: A= 610.000  
 B= 4.600  
 C= 0.780

used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs  
 Storm time step = 5.00 min  
 Time to peak ratio = 0.33

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.08	0.47	6.08	1.47	12.08	1.38	18.08	0.67
0.17	0.47	6.17	1.52	12.17	1.36	18.17	0.67
0.25	0.48	6.25	1.58	12.25	1.34	18.25	0.66
0.33	0.48	6.33	1.64	12.33	1.32	18.33	0.66
0.42	0.49	6.42	1.71	12.42	1.30	18.42	0.65
0.50	0.49	6.50	1.79	12.50	1.28	18.50	0.65
0.58	0.49	6.58	1.88	12.58	1.26	18.58	0.65
0.67	0.50	6.67	1.98	12.67	1.24	18.67	0.64
0.75	0.50	6.75	2.09	12.75	1.22	18.75	0.64
0.83	0.51	6.83	2.21	12.83	1.21	18.83	0.63
0.92	0.51	6.92	2.36	12.92	1.19	18.92	0.63
1.00	0.52	7.00	2.52	13.00	1.17	19.00	0.63
1.08	0.52	7.08	2.72	13.08	1.16	19.08	0.62
1.17	0.53	7.17	2.95	13.17	1.14	19.17	0.62
1.25	0.53	7.25	3.23	13.25	1.13	19.25	0.61
1.33	0.54	7.33	3.59	13.33	1.11	19.33	0.61
1.42	0.54	7.42	4.04	13.42	1.10	19.42	0.61
1.50	0.55	7.50	4.65	13.50	1.09	19.50	0.60
1.58	0.55	7.58	5.50	13.58	1.07	19.58	0.60
1.67	0.56	7.67	6.80	13.67	1.06	19.67	0.60

1.75	0.57	7.75	9.03	13.75	1.05	19.75	0.59
1.83	0.57	7.83	13.85	13.83	1.04	19.83	0.59
1.92	0.58	7.92	32.04	13.92	1.02	19.92	0.59
2.00	0.59	8.00	104.51	14.00	1.01	20.00	0.58
2.08	0.59	8.08	41.36	14.08	1.00	20.08	0.58
2.17	0.60	8.17	22.75	14.17	0.99	20.17	0.58
2.25	0.61	8.25	15.69	14.25	0.98	20.25	0.57
2.33	0.61	8.33	12.03	14.33	0.97	20.33	0.57
2.42	0.62	8.42	9.80	14.42	0.96	20.42	0.57
2.50	0.63	8.50	8.29	14.50	0.95	20.50	0.57
2.58	0.63	8.58	7.21	14.58	0.94	20.58	0.56
2.67	0.64	8.67	6.40	14.67	0.93	20.67	0.56
2.75	0.65	8.75	5.76	14.75	0.92	20.75	0.56
2.83	0.66	8.83	5.25	14.83	0.91	20.83	0.55
2.92	0.67	8.92	4.83	14.92	0.90	20.92	0.55
3.00	0.68	9.00	4.47	15.00	0.90	21.00	0.55
3.08	0.69	9.08	4.17	15.08	0.89	21.08	0.55
3.17	0.69	9.17	3.92	15.17	0.88	21.17	0.54
3.25	0.70	9.25	3.69	15.25	0.87	21.25	0.54
3.33	0.71	9.33	3.49	15.33	0.86	21.33	0.54
3.42	0.72	9.42	3.32	15.42	0.86	21.42	0.53
3.50	0.74	9.50	3.16	15.50	0.85	21.50	0.53
3.58	0.75	9.58	3.02	15.58	0.84	21.58	0.53
3.67	0.76	9.67	2.89	15.67	0.83	21.67	0.53
3.75	0.77	9.75	2.77	15.75	0.83	21.75	0.52
3.83	0.78	9.83	2.67	15.83	0.82	21.83	0.52
3.92	0.79	9.92	2.57	15.92	0.81	21.92	0.52
4.00	0.81	10.00	2.48	16.00	0.81	22.00	0.52
4.08	0.82	10.08	2.40	16.08	0.80	22.08	0.51
4.17	0.84	10.17	2.32	16.17	0.79	22.17	0.51
4.25	0.85	10.25	2.25	16.25	0.79	22.25	0.51
4.33	0.87	10.33	2.18	16.33	0.78	22.33	0.51
4.42	0.88	10.42	2.12	16.42	0.77	22.42	0.51
4.50	0.90	10.50	2.06	16.50	0.77	22.50	0.50
4.58	0.92	10.58	2.01	16.58	0.76	22.58	0.50
4.67	0.94	10.67	1.95	16.67	0.76	22.67	0.50
4.75	0.95	10.75	1.91	16.75	0.75	22.75	0.50
4.83	0.97	10.83	1.86	16.83	0.74	22.83	0.49
4.92	1.00	10.92	1.82	16.92	0.74	22.92	0.49
5.00	1.02	11.00	1.77	17.00	0.73	23.00	0.49
5.08	1.04	11.08	1.74	17.08	0.73	23.08	0.49
5.17	1.07	11.17	1.70	17.17	0.72	23.17	0.49
5.25	1.09	11.25	1.66	17.25	0.72	23.25	0.48
5.33	1.12	11.33	1.63	17.33	0.71	23.33	0.48
5.42	1.15	11.42	1.60	17.42	0.71	23.42	0.48
5.50	1.18	11.50	1.57	17.50	0.70	23.50	0.48
5.58	1.21	11.58	1.54	17.58	0.70	23.58	0.48
5.67	1.25	11.67	1.51	17.67	0.69	23.67	0.47
5.75	1.29	11.75	1.48	17.75	0.69	23.75	0.47
5.83	1.33	11.83	1.45	17.83	0.68	23.83	0.47

5.92	1.37	11.92	1.43	17.92	0.68	23.92	0.47
6.00	1.41	12.00	1.40	18.00	0.67	24.00	0.47

## 2-year Post-Development

```

| CALIB
| STANDHYD ( 0008)
| ID= 1 DT= 5.0 min

```

```

Area (ha)= 1.50
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.48	0.01	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	99.97	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	104.51	*****	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.51 (ii)	3.61 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.29	0.25	
			*TOTALS*
PEAK FLOW (cms)=	0.39	0.00	0.390 (iii)
TIME TO PEAK (hrs)=	8.00	8.00	8.00
RUNOFF VOLUME (mm)=	49.23	18.81	48.92
TOTAL RAINFALL (mm)=	50.23	50.23	50.23
RUNOFF COEFFICIENT =	0.98	0.37	0.97

\*\*\*\*\* WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 80.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

| RESERVOIR( 0007)
| IN= 2---> OUT= 1
| DT= 5.0 min

```

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0200	0.0913
0.0190	0.0010	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 ( 0008)	1.499	0.390	8.00	48.92
OUTFLOW: ID= 1 ( 0007)	1.499	0.019	9.00	48.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.96  
 TIME SHIFT OF PEAK FLOW (min)= 60.00  
 MAXIMUM STORAGE USED (ha.m.)= 0.0297

CALIB  
 STANDHYD ( 0009)  
 ID= 1 DT= 5.0 min

## 2-year Pre-Development

Area (ha)= 1.50  
 Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.64	0.85	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	99.97	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	104.51	19.91	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.51 (ii)	15.97 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.29	0.07	
			*TOTALS*
PEAK FLOW (cms)=	0.17	0.03	0.176 (iii)
TIME TO PEAK (hrs)=	8.00	8.25	8.00
RUNOFF VOLUME (mm)=	49.23	18.81	31.89
TOTAL RAINFALL (mm)=	50.23	50.23	50.23
RUNOFF COEFFICIENT =	0.98	0.37	0.63

\*\*\*\*\* WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 80.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.



# URBANTECH®

## SWM DESIGN CALCULATIONS WATER BALANCE

**Project Name:** 3085 Hurontario - Doracin  
**Municipality:** City of Mississauga  
**Project No.:** 20-653

**Prepared by:** JPO  
**Checked by:** SH  
**Last Revised:** 10-Aug-23

For this site, the minimum on-site runoff retention will require the site to retain all runoff from the first 5 mm of rainfall through infiltration, evapotranspiration or rainwater reuse, per CVC SWM Criteria (Section 4.2).

Site Area = 14990 m<sup>2</sup>  
Required Water Balance Volume = 74.95 m<sup>3</sup>  
Runoff Coefficient<sup>1</sup> = 0.9  
Equivalent Imperviousness = 100% (based on  $I = (C - 0.2) / 0.7$ )

<sup>1</sup> Runoff Coefficient for high density residential  
City of Mississauga, *Development Requirements Manual, Section 8*

Proposed Site Area Breakdown			
Cover	A (m <sup>2</sup> )	IA (mm)	IA Volume (m <sup>3</sup> )
Impervious	14,990	0	0.0
Pervious	0	0	0.0
Total	14,990		0.0

Total Initial Abstraction Volume = 0.0 m<sup>3</sup>

Required Reuse Volume = SWM Tank Sump Volume  
= 74.95 m<sup>3</sup>

Stormceptor® EF Sizing Report

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

08/09/2023

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Project Name:	3085 Hurontario
Project Number:	20-653
Designer Name:	Janna Ormond
Designer Company:	Urbantech
Designer Email:	jannaormond@urbantech.com
Designer Phone:	289-887-3057
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Site Name:	
------------	--

Drainage Area (ha):	1.499
Runoff Coefficient 'c':	0.90

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	41.95
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	20.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1546
Estimated Average Annual Sediment Volume (L/yr):	1257

Net Annual Sediment (TSS) Load Reduction Sizing Summary	
Stormceptor Model	TSS Removal Provided (%)
EFO4	73
<b>EFO6</b>	<b>84</b>
EFO8	91
EFO10	96
EFO12	99

Recommended Stormceptor EFO Model: **EFO6**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **84**

Water Quality Runoff Volume Capture (%): **> 90**



Stormceptor® **EF** Sizing Report

**THIRD-PARTY TESTING AND VERIFICATION**

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

**PERFORMANCE**

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

**PARTICLE SIZE DISTRIBUTION (PSD)**

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

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





Stormceptor® EF Sizing Report

Upstream Flow Controlled Results

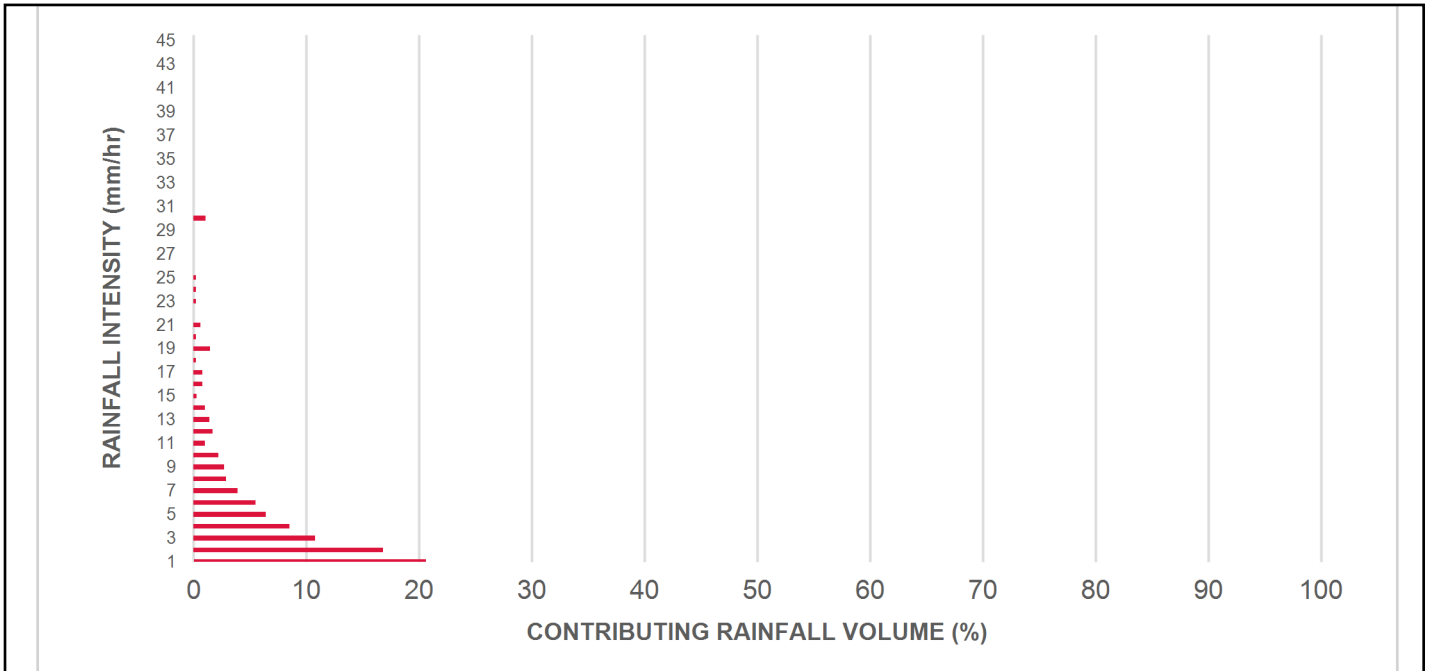
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	1.88	113.0	43.0	100	8.5	8.5
1.00	20.6	29.1	3.75	225.0	86.0	98	20.3	28.8
2.00	16.8	45.9	7.50	450.0	171.0	87	14.6	43.4
3.00	10.8	56.7	11.25	675.0	257.0	81	8.7	52.1
4.00	8.5	65.2	15.00	900.0	342.0	77	6.5	58.6
5.00	34.8	100.0	18.75	1125.0	428.0	73	25.4	84.0
6.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
7.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
8.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
9.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
10.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
11.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
12.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
13.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
14.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
15.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
16.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
17.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
18.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
19.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
20.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
21.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
22.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
23.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
24.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
25.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
30.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
35.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
40.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
45.00	0.0	100.0	20.00	1200.0	456.0	72	0.0	84.0
<b>Estimated Net Annual Sediment (TSS) Load Reduction =</b>								<b>84 %</b>

Climate Station ID: 6158731 Years of Rainfall Data: 20

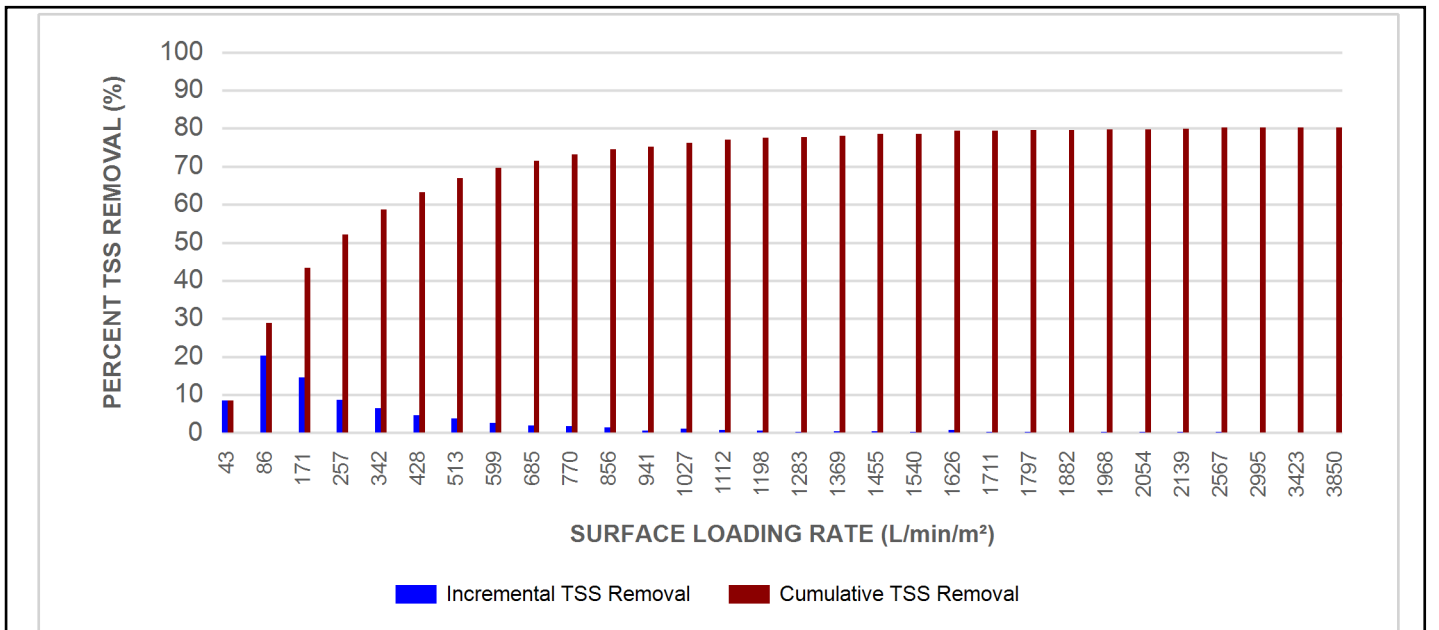


Stormceptor® EF Sizing Report

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® **EF** Sizing Report

Maximum Pipe Diameter / Peak Conveyance

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

**SCOUR PREVENTION AND ONLINE CONFIGURATION**

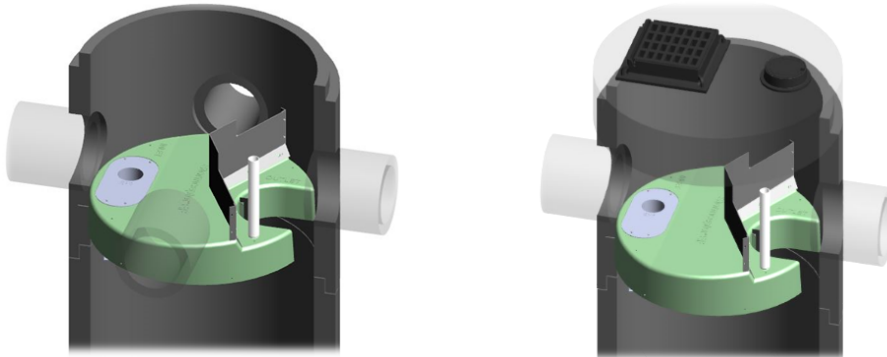
► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance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

**DESIGN FLEXIBILITY**

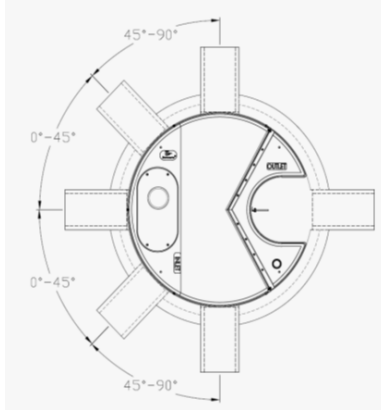
► Stormceptor® EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle,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

**OIL CAPTURE AND RETENTION**

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



Stormceptor® EF Sizing Report



**INLET-TO-OUTLET DROP**

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

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

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

**HEAD LOSS**

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure.

The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

**Pollutant Capacity**

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

\*\* Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³ )

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

**STANDARD STORMCEPTOR EF/EFO DRAWINGS**

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

**STANDARD STORMCEPTOR EF/EFO SPECIFICATION**

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

**STANDARD PERFORMANCE SPECIFICATION FOR  
“OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE**

**PART 1 – GENERAL**

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

**PART 2 – PRODUCTS**

2.1 OGS POLLUTANT STORAGE

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

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

**PART 3 – PERFORMANCE & DESIGN**

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall



## Stormceptor® EF Sizing Report

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

### 3.2 SIZING METHODOLOGY

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

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

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

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

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

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

### 3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

### 3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

## Stormceptor® EF Sizing Report

assess whether light liquids captured after a spill are effectively retained at high flow rates.

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

## **APPENDIX C**

### **Wastewater Servicing**





# URBANTECH®

## WASTEWATER DEMAND CALCULATIONS

**Project Name:** 3085 Hurontario Street  
**Municipality:** City of Mississauga  
**Project No.:** 20-653

**Prepared by:** J.P.O  
**Last Revised:** 28-Aug-23

### Proposed Conditions

#### Residential

	# of Units	PPU*
Small Apartments (less than or equal to 1 bedroom) =	380	1.7
Large Apartment (greater than 1 bedroom) =	1278	3.1

\*PPU from 2020 Region of Peel DC Background Study

Total Units = 1658  
Population = 4608 persons

Harmon Peak Factor for Site, Me =  $(1+14/(4+P^{0.5}))$   
3.28  
Unit Sewage Flow = 290.0 L/person/day  
Domestic Sewage Flow = 50.69 L/s

#### Retail in Tower 1

Population Density = 50 p/ha  
Area = 0.11 ha  
Population = 6 persons  
Unit Sewage Flow = 270.0 L/person/day  
Commercial Sewage Flow = 0.02 L/s

Site Area = 1.50 ha  
Infiltration Allowance = 0.26 L/s/ha  
Total Infiltration = 0.39 L/s

Total wastewater flow =	51.10	L/s
-------------------------	-------	-----

# Water and Wastewater Modelling Demand Table - Site Plan applications

Version - January 2023



	units	persons
Proposed Residential <sup>1)</sup>		
Singles/Semis		
townhouses		
large apartments (>750sqft)	1278	3,962
small apartments (<=750sqft)	380	646
Total Proposed Residential	1,658	4,608
Proposed Institutional Population <sup>2)</sup>		
Proposed Employment Population <sup>3)</sup>		6
Total		4,614

Proposed GFA (commercial/retail) (sqm)	1,148
--	-------

## WATER CONNECTION

Hydrant flow test						
Hydrant flow test locations <sup>4)</sup>						
Jaguar Valley Drive				Hurontario Street		
	Pressure (kPa)	Flow (in l/s)	Time	Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure	137	1586	10:10 am	137	955	9:50 am
Maximum water pressure	542	347	10:10 am	504	303	9:50 am

No.	Demand type	Demand (in l/s)			Total
		Use 1 <sup>6)</sup>	Use 2 <sup>6)</sup>	Use 3 <sup>6)</sup>	
1	Average day flow	14.9	0.02		15
2	Maximum day flow	29.9	0.029		29.9
3	Peak hour flow	44.8	0.06		44.9
4	Fire flow <sup>5)</sup>				116.7
<b>Analysis</b>					
5	Maximum day plus fire flow				146.6

Use 1 - Residential  
Use 2 - Retail

## WASTEWATER CONNECTION

	Discharge Location <sup>7)</sup>	Flow
6 Wastewater sewer effluent (in l/s)	Kirwin Avenue	13.1
7 Wastewater sewer effluent (in l/s)	Hurontario Street	38
8 Wastewater sewer effluent (in l/s)		
9 Total Wastewater sewer effluent (in l/s)		51.1

<sup>1)</sup> For the design flow calculations, please consider the following PPU's, which are found in the Region of Peel 2020 DC Background Study

□Singles/Semi – 4.2

- Multiples (Townhouses) – 3.4
- Large Apartments (larger than 750 square feet) – 3.0
- Small Apartments (equal to or less than 750 square feet) – 1.6

2) refer to Region of Peel design criteria

3) For the commercial and industrial design flow calculations, please use your site specific estimated population or the most current Ontario Building Code Occupant Load determination

4) Please include the graphs associated with the hydrant flow test information table

4) Hydrant flow tests should be performed within 2 years of submission to the Region.

The Region will not permit hydrant flow tests during the winter, please check with the Region for scheduling

5) Please reference the Fire Underwriters Survey Document

6) Please identify the flows for each use type, if applicable

7) Please include drainage plan for multiple discharge locations

The calculations should be based on the development proposal

All required calculations must be submitted with the demand table submission

Table shall include Professional Engineer's signature and stamp

Site servicing concept shall be included

**This table will be deemed complete when all the above is submitted and/or included.  
Modelling will commence with a complete table.**

## **APPENDIX D**

### **Water Servicing**

WATER DEMAND CALCULATIONS

**Project Name:** 3085 Hurontario Street  
**Municipality:** City of Mississauga  
**Project No.:** 20-653

**Prepared by:** M. B.  
**Checked by:**  
**Last Revised:** 28-Aug-23

**Fire Flow Calculations**

Based on the *Water Supply for Public Fire Protection, 2020* by Fire Underwriters Survey

1 Estimate of Fire Flow

$$F = 220 C (A)^{1/2}$$

F = Fire Flow (L/min)

C = Construction Type Coefficient  
 = 0.6

,for fire-resistive construction (fully protected frame, floors, roof)

A = Total flow area (m<sup>2</sup>)

= If vertical openings and exterior vertical communications are properly protected (one hour rating), Largest Floor + 25% of two immediately adjoining floors

**Building 3**

Floor	Area (m <sup>2</sup> )	%
Level 2	1,919	25%
Level 3	2,197	100%
Level 4	1,600	25%

$$= 3077 \text{ m}^2$$

$$F = 7323 \text{ L/min}$$

$$= 7000 \text{ L/min, rounded to the nearest 1000 L/min}$$

WATER DEMAND CALCULATIONS

**Project Name:** 3085 Hurontario Street  
**Municipality:** City of Mississauga  
**Project No.:** 20-653

**Prepared by:** M. B.  
**Checked by:**  
**Last Revised:** 28-Aug-23

2 Occupancy Reduction

F = 15% for low hazard occupancies (apartments)  
 5950 L/min

3 Sprinkler Reduction

F = 30% for adequately designed sprinkler protection  
 conforming to NFPA 13 and other NFPA sprinkler  
 standards  
 4165 L/min

4 Separation Charge

Direction	Separation (m)	Charge
North	20.2	10%
West	1.7	25%
South		
East	25.3	10%

Total Charge = 45%  
 F = 2678 L/min

Required Fire Flow

F = 6843 L/min  
 = 7000 L/min, rounded to the nearest 1000 L/min

Fire Flow Demand =	116.7 L/s
=	1849 USGPM

## WATER DEMAND CALCULATIONS

**Project Name:** 3085 Hurontario Street  
**Municipality:** City of Mississauga  
**Project No.:** 20-653

**Prepared by:** M. B.  
**Checked by:**  
**Last Revised:** 28-Aug-23

### Domestic Flow Calculations

Residential Population = 4608 persons, from Sanitary Calculations  
Average Day Demand = 280 L/person/day, from Region of Peel design criteria  
= 14.9 L/s

ICI Population = 6 persons, from Sanitary Calculations  
Average Day Demand = 300 L/person/day, from Region of Peel design criteria  
= 0.02 L/s

### Use Peaking Factor the Greater of

Residential Max Daily Demand PF = 2, from Region of Peel design criteria  
Max Daily Demand = 29.9 L/s

ICI Max Daily Demand PF = 1.4, from Region of Peel design criteria  
Max Daily Demand = 0.029 L/s

or

Residential Max Peak Hour PF = 3, from Region of Peel design criteria  
Max Peak Hour Demand = 44.8 L/s

ICI Max Peak Hour PF = 3, from Region of Peel design criteria  
Max Peak Hour Demand = 0.06 L/s



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# Fire Flow Testing Report

Residual Hydrant #  
NFWA Colour Code

**HY2020343**  
**BLUE**

## RESIDUAL HYDRANT INFO.

HYDRANT # HY2020343  
N.F.P.A. COLOUR CODE BLUE  
STATIC PRESSURE 80.2 psi  
RESIDUAL PRESSURE 73.2 psi  
PRESSURE DROP 6.99 psi  
% PRESSURE DROP 8.7 % psi

DATE 22-Apr-21  
TIME 9:50 AM

ADDRESS 3085 Hurontario St  
Mississauga, ON  
L5A 2G9

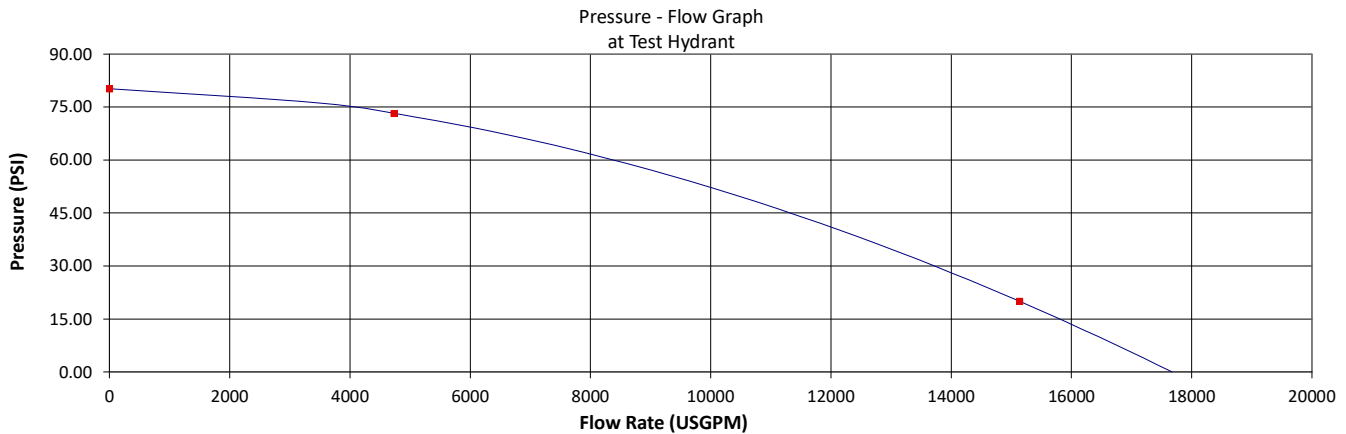
SIZE-inches/mm 16 **400**  
CPP  
Urbantech Consulting  
Rob Merwin, P.Eng.  
P : 905-829-6901  
E : rmerwin@urbantech.com

Flow on Water Main At Test Hydrant - 20 psi 15139 USGPM

## FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
HY2020342	2	2.5	Round	Swivel	1.00	49.8	2367	0
		2.5	Round	Swivel	1.00	49.8	2367	0
								0
								0
Total Flow (USGPM)							4735	0
Total Flow (USGPM)							4735	

## FIRE FLOW CHART



## COMMENTS

OPERATOR FMX Jordan Whitlock  
OPERATOR FMX Denis Kriventsev  
OPERATOR Peel Region  
  
PRESSURE ZONE n/a  
TOWER LEVEL ft n/a  
PUMPS (ON/OFF) n/a  
OTHER-1 n/a  
OTHER-2 n/a





FLOWMETRIX  
INDU-TECH  
PROCESS  
WESTCAN

# Fire Flow Testing Report

Residual Hydrant #  
NFWA Colour Code

**HY6525644**  
**BLUE**

## RESIDUAL HYDRANT INFO.

HYDRANT # HY6525644  
 N.F.P.A. COLOUR CODE BLUE  
 STATIC PRESSURE 82.6 psi  
 RESIDUAL PRESSURE 78.7 psi  
 PRESSURE DROP 3.86 psi  
 % PRESSURE DROP 4.7 % psi

DATE 22-Apr-21  
 TIME 10:10 AM

ADDRESS 3094 Jaguar Valley Drive  
Mississauga, ON  
L5A 2J4

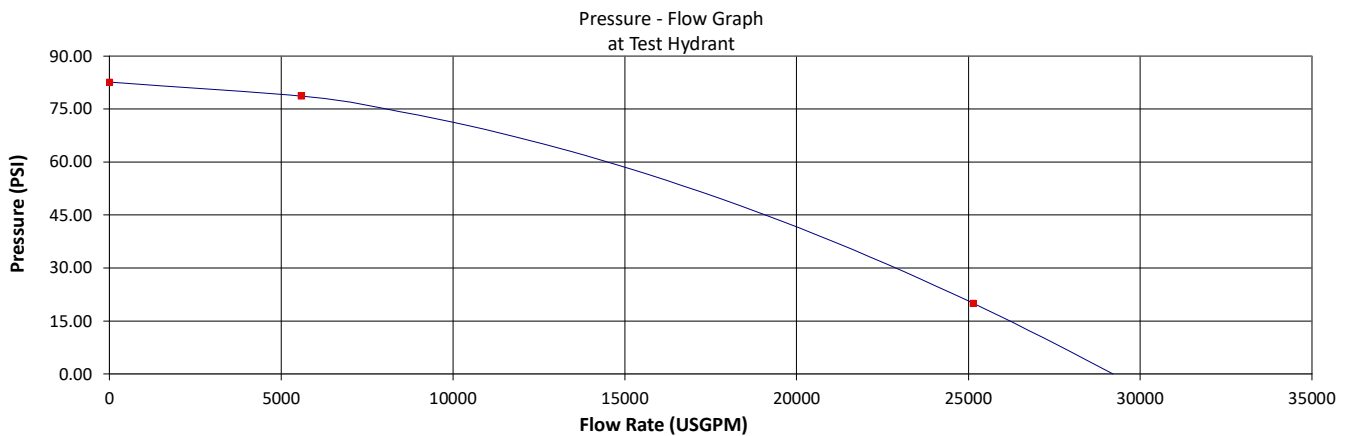
SIZE-inches/mm 12 300  
PVC  
Urbantech Consulting  
Rob Merwin, P.Eng.  
P : 905-829-6901  
E : rmerwin@urbantech.com

Flow on Water Main At Test Hydrant - 20 psi 25144 USGPM

## FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
HY6525624	2	2.5	Round	Swivel	1.00	69.3	2793	0
		2.5	Round	Swivel	1.00	69.3	2793	0
								0
								0
								0
Total Flow (USGPM)							5586	0
Total Flow (USGPM)							5586	

## FIRE FLOW CHART



## COMMENTS

OPERATOR FMX Jordan Whitlock  
 OPERATOR FMX Denis Kriventsev  
 OPERATOR Peel Region  
 PRESSURE ZONE n/a  
 TOWER LEVEL ft n/a  
 PUMPS (ON/OFF) n/a  
 OTHER-1 n/a  
 OTHER-2 n/a

## **APPENDIX E**

### **Geohydrology Study**



**G5822**

**AUGUST 2023**

**GEOHYDROLOGY ASSESSMENT  
3085 – 3105 HURONTARIO STREET  
MISSISSAUGA, ONTARIO**

**DISTRIBUTION:**

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1 COPY (electronic)	MATTAMY HOMES CANADA
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3300 BLOOR ST. WEST, SUITE 1800,  
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M8X 2X2

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**FIGURES**

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Drawing No. 1	Borehole Location Plan
Drawing No. 2	Cross Section A-A'
Drawing No. 3	Cross Section B-B'
Drawing No. 4	Private Water Drainage System

**TABLES**

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Table 1	Construction Details and Elevation of Monitoring Wells
Table 2	Groundwater Analytical Results – Mississauga Sewers By-Law Discharge Criteria
Table 3	Groundwater Monitoring Data
Table 4	Discharge Estimation of Construction Dewatering
Table 5	Discharge Estimation of Permanent Drainage System

**APPENDICES**

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Appendix A	Legal Survey
Appendix B	Proposed Redevelopment Drawings
Appendix C	Borehole Logs by MCR
Appendix D	Borehole Logs by Others
Appendix E	Certificates of Analysis



## 1.0 INTRODUCTION

Mattamy Homes Canada intends to redevelop the property located at 3085 – 3105 Hurontario Street, Mississauga, Ontario (hereafter referred to as ‘the Site’). MCR Engineers Ltd. (MCR) was retained to conduct a Geohydrology Assessment for the Site to evaluate the requirement for temporary dewatering and permanent drainage in relation to the proposed redevelopment.

### 1.1 SCOPE OF WORK

The objectives of the Geohydrology Assessment are to determine the following:

- Determine Hydrogeological conditions of the Site, including the groundwater and phreatic surface, subsurface elevations and flow patterns and the interaction with the design and construction of the proposed development.
- Review the available background information for the Site obtained from MCR’s files, City of Toronto, and architectural drawings.
- Estimate the potential temporary dewatering flow rates during construction and assessment of potential impacts on the surrounding environment.
- Estimate the long term flow rates from the Private Water Drainage System (PWDS) of the proposed building.
- Assess the permitting requirements for both dewatering and discharge with the Ministry of Environment, Conservation and Parks (MECP) and the City of Toronto – Toronto Water (the City), respectively.
- Summarize the findings in a Geohydrology Assessment Report.

### 1.2 SITE DESCRIPTION

The site is located on the east side of Hurontario Street, between Kirwin Avenue and Dundas Street East, in the City of Mississauga.

The Site is presently occupied by two [2] storey commercial building in the southwestern portion and a two [2] storey above grade parking structure on the eastern portion of the Site. The Site is bounded by Kirwin Avenue to the north, residential building to the east, commercial buildings to the south and Hurontario

Street to the west.

According to a Survey Plan by R-PE Surveying Ltd. presented in Appendix A, the Site is legally described as: Lot 15, Concession 1, North of Dundas Street, Part of Blocks A and B, Registered Plan 645 and Part of Village Lot 9, Savigney's Plan of Cooksville (Plan TOR-12), City of Mississauga, Regional Municipality of Peel.

### **1.3 PROPOSED DEVELOPMENT**

The Site is proposed for a residential and commercial development consisting of a forty [40] storey building with four [4] storey podium (Building 1), a forty-four [44] storey building with four [4] storey podium (Building 2), a twenty-eight [28] storey building with six [6] storey podium (Building 3) and a twenty-four [24] storey building with six [6] storey podium (Building 4) over four [4] levels of combined underground parking (Appendix B).

It is understood that the ground floor finished elevation (FFE) ranges from 117.96 to 116.00 masl and P4 FFE will be at 100.95 masl.

Presently, it is assumed that the proposed building structure can be supported on conventional spread/strip footings. The size of the shoring plan layout was assumed to cover approximately 100 m by 130 m.

A sub-floor Private Water Drainage System (PWDS) with perimeter weeping tile will be required. A soldier pile and lagging shoring system is expected for temporary dewatering/excavation except where adjacent structures exist, or heritage structures are to remain, in which case a caisson shoring system would be necessary.

### **1.4 PROPERTY OWNERSHIP**

The Site is intended for redevelopment by Mattamy Homes Canada. The Client is represented by Ms. Helen Xie with the following contact information:

Mattamy Homes Canada  
3300 Bloor St. West, Suite 1800



Toronto, Ontario  
M8X 2X2  
Ms. Helen Xie  
Development Manager  
Email: [Helen.Xie@mattamycorp.com](mailto:Helen.Xie@mattamycorp.com)

## **1.5 REVIEW OF PREVIOUS REPORTS**

The following geo-environmental reports were provided for review prior to initiating the investigation:

- MCR report titled, *Geotechnical Report, Proposed Development, 3085 – 3105 Hurontario Street, Mississauga, Ontario*, prepared for Mattamy Homes Canada., dated August 2023.

## 2.0 HYDROGEOLOGICAL CONDITIONS

### 2.1 PHYSICAL SETTING

The Site is located in the southern portion of the City of Mississauga and is situated in a mixed-use residential and commercial area. The nearest major intersection is Hurontario Street and Dundas Street East, approximately 300 m south of the Site. There are no areas of natural significance within 250 m. There are no water bodies or areas of natural significance within 30 m of the Site boundaries. The nearest surface water bodies are Cooksville Creek, at approximately 0.3 km east of the Site and Mary Fix Creek, at approximately 1.3 km west of the Site

The Site is located at an elevation of approximately 115 m above sea level (asl) (377 ft) and the topography across the Site is generally flat. Surrounding area slopes gently down to the southwest.

The Site is bounded by the following properties/features:

<b>North</b>	Residential buildings and asphalt parking area
<b>South</b>	Hurontario Street
<b>East</b>	Residential buildings and asphalt parking area
<b>West</b>	Hurontario Street and Kirwin Ave

### 2.2 TOPOGRAPHY

According to the topographic map, Map 30 M/11, 9th Edition published by Government of Canada; Natural Resources Canada; Earth Sciences Sector; Canada Centre for Mapping and Earth Observation, on July 19, 2013, the ground surface at the Site is relatively flat with the surrounding area sloping gently to the southwest towards Credit River.

### 2.3 REGIONAL GEOLOGY AND HYDROGEOLOGY

According to the geological map entitled "Quaternary Geology of Ontario, Southern Sheet" Map 2556, published by the Ontario Ministry of Development and Mines, dated 1991, the overburden in the study area consists of predominantly undifferentiated carbonate and clastic sedimentary rock, exposed at surface or

covered by a discontinuous, thin layer of drift. The groundwater typically tends to flow southwest, towards Lake Ontario.

According to Ontario Ministry of Development and Mines, Map No. 2544, “Bedrock Geology of Ontario, Southern Sheet, 1991”, the bedrock typically consists of Upper Ordovician shale, limestone, dolostone and siltstone. Groundwater tends to flow south-west, towards the Credit River.

## **2.4 LOCAL GEOLOGY AND HYDROGEOLOGY**

On a local scale, geological conditions and hydrogeology are similar to the ones at a regional scale. Locally, near surface groundwater flow may be influenced by underground structures (e.g., service trenches, catch basins, and building foundations or surface watercourses). No surface water features are present onsite and there are no Provincially Significant Wetlands in the vicinity of the Site.

### **3.0 SCOPE OF INVESTIGATION**

#### **3.1 OVERVIEW OF SITE INVESTIGATION**

- Three [3] boreholes, BH 1, BH 2 and BH 101, were drilled at the subject site by Soil-Mat on April 8, 2019, and March 12, 2020 to depths of 7.90, 4.65 and 13.85 m.
- Two [2] boreholes, BH 19-3 and BH 19-4, were drilled at the subject site by WSP on July 3, 2019, to depths of 4.40 m.
- Two [2] supplementary boreholes, BH 101 and BH 102, were drilled at the subject site by MCR on March 15 and 16, 2023, to depths of 5.05 and 5.35 m.
- All boreholes, except borehole 1, were equipped with wells for long-term groundwater monitoring and sampling.
- The borehole locations are shown in Drawing No. 1 and the records are presented in Appendices C&D.
- Groundwater levels were recorded from the available monitoring well over various dates and the data is presented in Table 1.
- Groundwater samples were collected from BH 102 in April 2023 for chemical analysis of the City of Mississauga Sewers By-Law criteria.

#### **3.2 MONITORING WELL INSTALLATION**

All MCR monitoring wells were installed with a 50 mm diameter schedule 40 PVC pipe and a 3.05m long slotted well screen. Well screens were surrounded by a silica sand pack to at least 0.6 m above the top of screen with a bentonite seal extending from above the sand pack to within 0.5 m of the ground surface. All monitoring wells were completed with a flush mounted cover at ground surface. Monitoring well installation was done in accordance with the *Ontario Water Resources Act*, Sections 35 to 50.

#### **3.3 ELEVATION SURVEYING**

Elevations referred to in this report are geodetic and metric and were interpolated from the topographic survey by R-PE Surveying Ltd. The borehole logs are

presented in Appendices C&D.

### **3.4 GROUNDWATER SAMPLING**

All groundwater sampling activities were conducted in accordance with Ontario Regulation (O.Reg.)153/04, as amended to O.Reg.511/09, July 2011. All monitoring wells were developed prior to sampling activities using a Waterra Hydrolift II (HL-1217) inertial lift pump by purging at least three well volumes or until the monitoring well was purged dry. Groundwater samples were obtained at least 24 hours' post-development under static conditions. No samples were field filtered prior to laboratory analysis, in accordance with the standard.

### **3.5 GROUNDWATER ANALYSIS**

All groundwater samples were submitted to ALS Laboratory Group (ALS) of Richmond Hill, Ontario, certified by the Canadian Association for Laboratory Accreditation (CALA), for chemical analysis. The Certificates of Analysis received are included in Appendix E. The contact information for the laboratory used is included below.

#### **ALS Laboratory Group**

95 West Beaver Creek Road  
Richmond Hill, ON L4B 1H2

All groundwater samples were submitted for bulk chemical analysis for the criteria provided in the *Toronto Municipal Code, Chapter 681, Sewers By-law*. The results of chemical analysis were compared to the criteria provided in *Table 1 – Limits for Sanitary and Combined Sewers Discharge* and *Table 2 – Limits for Storm Sewer Discharge*. These guidelines establish the maximum allowable concentrations of specific analytical parameters for water discharged into either the municipal sanitary and/or storm sewer system respectively.

## 4.0 INVESTIGATION RESULTS

### 4.1 GEOLOGY

The ground surface elevation for the boreholes ranges from 118.26 masl (BH 19-4) to 115.51 masl (BH 19-3). Based on the investigation, the geologic formations beneath the Site are illustrated in the borehole logs (Appendices C&D), Drawing No. 2&3 and include the following (from surface to depth):

**Pavement:** A layer of asphalt, 100 to 200 mm in thickness, was present at the surface of BH 1, BH 2, and BH 101 (by Soil-Mat) and BH 101 (by MCR) and was followed by 150 to 250 mm of granular fill. A layer of concrete, 165 to 200 mm in thickness, was present at the surface of BH 19-3 (by WSP) and BH 102 (by MCR) and was followed by 150 to mm of granular fill in BH 102.

Possible topsoil with approximate 100 mm thickness was observed at the surface of BH 19-4 (by WSP).

**For the purpose of offsite disposal, the type/quantity and extent of the existing fill layer should be explored by further test pit investigation, prior to contract award.**

**Sand/Silty Sand Till:** Loose to very dense layer sand/silty sand till was detected below the pavement/possible topsoil in all boreholes and extended to depths of 1.75 to 3.65 m. The brown/light brown/dark brown sand/silty sand till deposit was in moist to wet condition and contained trace gravel and boulder, some silt and occasional organics in upper level.

**Clayey Silt (Till):** Very stiff to hard clayey stilt (till) was encountered below the sand/silty sand (till) in BH 1, BH 2 and BH 101 (by Soil-Mat), BH 19-3 and BH19-4 (by WSP) and BH 102 (by MCR) and extended to the underlying weathered shale at depths of 2.45 to 4.30 m. The grey clayey silt (till) deposit was in a moist to wet condition and contained trace of sand and gravel.

**Silty Sand Till/Weathered Shale Complex:** Very dense silty sand till/weathered shale complex was found below the silty sand till in BH 101 (by MCR) and

extended to the underlying weathered shale at a depth of 4.60 m. The brown silty sand till/weathered shale complex was in a wet condition and contained trace gravel.

**It should be noted that the till/sand soil is unsorted sediment; therefore, boulders and cobbles are anticipated.**

**Shale Bedrock:** Weathered shale bedrock was spotted below the clayey silt (till)/silty sand till/weathered shale complex in all boreholes at about depth of 2.45 to 4.60 m, i.e., at about Elevations of 114.00 to 111.25 m, and extended to the maximum depth of the borehole.

**The surface of the shale bedrock will vary across the site; therefore, it should be confirmed by further borehole investigation and during shoring/foundation installations.**

**Groundwater:** Upon completion of drilling, BH 101 (by Soil-Mat) remained dry. Groundwater level was not measured in BH 101 and BH 102 (by MCR) upon completion of drilling. The results are summarized on the Record of Borehole Sheets in Appendices C&D and Table 1.

## 4.2 GROUNDWATER LEVEL MONITORING

All current and past groundwater monitoring data is presented in Table 1. It should be noted that groundwater levels are subject to seasonal fluctuations. All groundwater levels were measured manually using an electric water level meter and with respect to the geodetic borehole elevations within the property boundary. The monitoring wells must be decommissioned, prior to construction, in accordance with Regulation 903 by a qualified contractor.

The interpreted groundwater flow direction is based on the 2019, 2020 and 2023 round of water table elevation measurements, to include all the available data. Groundwater levels were measured in all available wells (BH 101 and 102), in April 2023. The interpreted local direction of hydraulic movement across the Site is inferred to be in a south-west direction, towards the Credit River.

### **4.3 GROUNDWATER QUALITY**

The groundwater sample collected from BH 102 in April 2023 was analyzed for the City of Toronto Sewers By-Law criteria. The results of chemical analysis (Table 2) indicate that the sample exceeds the Table 1 Limits for Sanitary & Combined Sewers Discharge for Biological Oxygen Demand (686 mg/L vs. 300 mg/L). The following exceedance was recorded for the Table 2 Limits for Storm Sewer Discharge: Biological Oxygen Demand (686 mg/L vs. 15 mg/L) and Total Manganese (0.136 mg/L vs. 0.05 mg/L).

### **4.4 GROUNDWATER DISCHARGE ASSESSMENT**

Presently, the groundwater onsite can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD). A filtration/treatment system for BOD and manganese will be required prior to discharging to the storm sewer system. A dewatering contractor should be approached to explore the possibility of treatment if discharge to the storm sewer is required.



## **5.0 REVIEW AND EVALUATION**

### **5.1 TEMPORARY DEWATERING ASSESSMENT**

The excavation for the proposed four level underground parking structure will extend into shale bedrock. In order to protect the sides/bottom of the excavation from being disturbed by excess groundwater pressure, i.e., to prevent quicksand/dilating silt conditions, the groundwater will need to be lowered below the top of shale bedrock.

Positive dewatering, such as localized sumps/well points might be required for the proposed excavation. Onsite soils might be subject to localized piping during dewatering. Creation of piping channels may result in a substantial increase in the volume of both temporary dewatering and permanent drainage.

In addition, the (weathered) sedimentary bedrock can be fractured, fissured, or contain water-bearing bedding planes. When these bedding planes are intercepted in rock excavation, a substantial amount of water, often under a significant hydrostatic head, may be encountered. The depths and condition of shale bedrock vary across the Site; therefore, its quality should be confirmed during shoring installation and general excavation through inspections in the field.

For the proposed four underground levels, groundwater is required to be drawn down 1 m below the underside of the footing. The foundation elevation is assumed to be at approximately 100.45 masl. However, for the purpose of temporary/construction dewatering, given the encountered subsurface conditions, groundwater cannot be lowered with well points below the average top elevation of shale bedrock at approximately 112.85 masl. Localized trenches and sumps can be used within bedrock to lower the water level below the underside of the footings, to an approximate elevation of 99.45 masl. This result is preliminary and should be confirmed during the construction phase and final stage of detailed design.

The average groundwater elevation was estimated at approximately 113.47 masl (Table 3), representing an approximate 14 m of hydrostatic head requiring dewatering. The size of the shoring plan layout was assumed to cover the

equivalent of approximately 100 m by 130 m.

Theoretically, the discharge rate for a single pumping well in an unconfined aquifer can be described as:

$$Q = -2\pi rKh \frac{dh}{dr} \quad (1)$$

By integrating Equation (1) and separating variables  $h$  and  $r$ , we obtain

$$h^2 = -\frac{Q}{\pi K} \ln(r/r_w) + h_w^2 \quad (2)$$

where

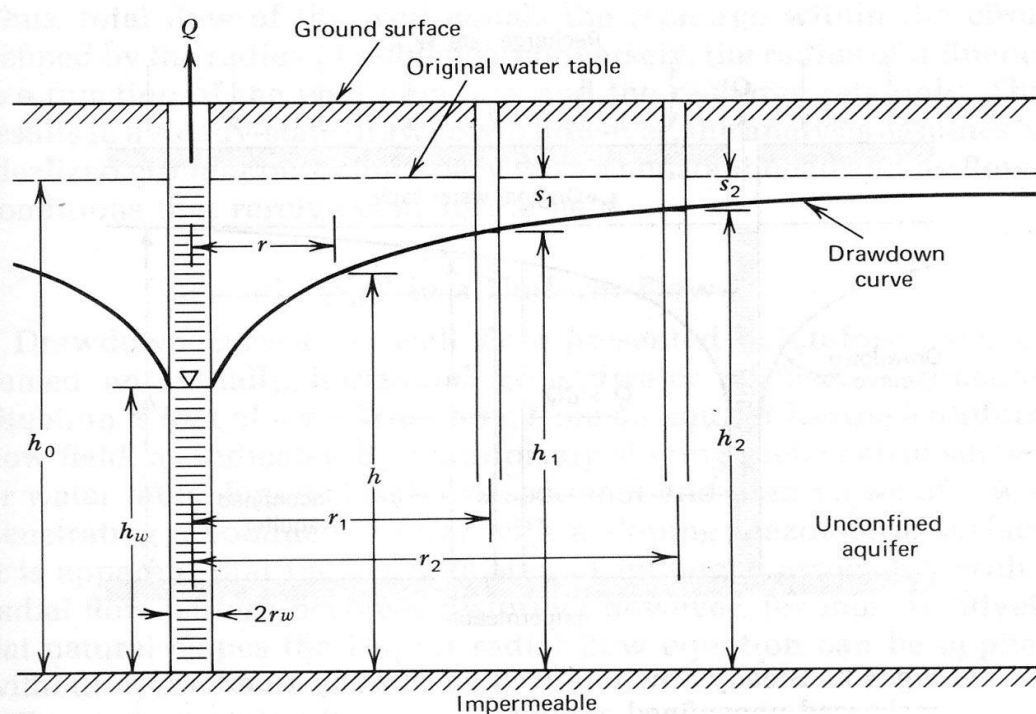
$h$  [m] is the height of the water table above an impervious base

$Q$  [ $m^3/day$ ] is the rate of pumping discharge

$K$  [ $m/day$ ] is hydraulic conductivity

$R$  [m] is the radius from the center of well location

$r_w$  [m] is the radius of pumping well (see Schematic A below).



Schematic A: Radial flow to an unconfined aquifer (Todd, 1980)

### **5.1.1 Numerical Analysis**

The abovementioned Site parameters were used to calculate the estimated steady state discharge rate for temporary construction dewatering. Groundwater monitoring data is presented in Table 3. The calculations for temporary dewatering rates are shown in Table 4.

From the observed soil types and based on soil sample descriptions (Todd, 1980; Mays, 2001; and Craig, 2004), the average hydraulic conductivity (K) of the aquifer was conservatively estimated at 0.2 m/day.

The steady state discharge rate for temporary construction dewatering was calculated at approximately 306 m<sup>3</sup>/day (56 USG/min), with a safety factor of 1.50. The steady state discharge is 204 m<sup>3</sup>/day (38 USG/min), with a safety factor of 1.0.

It should be noted that the initial drawdown pumping rate and accumulation from rainfall will be higher, and this should be confirmed by the dewatering contractor.

## **5.2 PERMANENT FOUNDATION DRAIN FLOW RATES**

For the proposed redevelopment, the ground finished floor elevation (FFE) ranges from 117.96 to 116.00 masl and P4 FFE will be at 100.95 masl.

A sub-floor Private Water Drainage System (PWDS) with perimeter/underfloor weeping tile is proposed below the P4 level slab. The invert of the PWDS is assumed to be approximately 0.5 m below the FFE of the P4 slab, i.e., at approximately 100.45 masl.

The proposed PWDS is shown in Drawing No. 4. The slotted pipes should slope to a minimum 1% slope. Perimeter drainage pipes, with a positive gravity outlet, should be solid PVC with a minimum 0.5% slope. In addition, silt traps must be provided at convenient/accessible locations.

### **5.2.1 Numerical Analysis**

The abovementioned Site parameters were used to calculate the estimated steady state discharge rate for the PWDS. Groundwater monitoring data is presented in Table 3. The calculations for permanent drainage flow rates are shown in Table 5.

From the observed soil types and based on soil sample descriptions (Todd, 1980; Mays, 2001; and Craig, 2004), the average hydraulic conductivity (K) of the aquifer was conservatively estimated at 0.2 m/day.

The estimated steady state discharge rate for the PWDS was calculated at 282 m<sup>3</sup>/day (52 USG/min).

Please note that due to the presence of bedding planes/vertical fissures in the bedrock, the discharge volume might increase with time. Monitoring of permanent sumps is recommended for quality and quantity of discharge.

### **5.3 MECP PERMIT TO TAKE WATER REQUIREMENT**

The Permit to Take Water (PTTW) requirements for construction site dewatering have been updated to the current O.Reg.63/16 amendment to Environmental Protection Act. In accordance with the updated regulation, construction site dewatering will require a complete PTTW application when water takings greater than 400,000 L/day are predicted. Groundwater taking between 50,000 L/day and 400,000 L/day will require a limited PTTW via an online application process through the Environmental Activity and Sector Registry (EASR). Groundwater taking from a proposed building structure by means of a PWDS will require a PTTW when water taking is greater than 50,000 L/day. The complete permit application process for PTTW takes approximately twelve weeks to review and is required prior to applying for the discharge permits.

The estimated steady state discharge rate for temporary construction dewatering was calculated at approximately 306 m<sup>3</sup>/day (56 USG/min). Therefore, a limited PTTW application through the ESAR will be required to be applied for with the MECP.

The estimated steady state discharge rate for PWDS was calculated at approximately 282 m<sup>3</sup>/day (52 USG/min). Therefore, a complete PTTW application for the PWDS will be required for the proposed building.

In accordance with the current Ontario Regulation 387/04 for Water Taking, every person to whom a permit has been issued under Section 34 of the Act shall collect and record data on the volume of water taken daily. The data collected shall be measured by a flow meter or calculated using a method acceptable to a Director.

#### **5.4 MUNICIPAL WATER DISCHARGE PERMIT REQUIREMENTS**

The Municipality requires that any private water to be discharged into the City sewer system must have a permit or agreement in place in order to discharge; this applies to all water not purchased from the City water supply. For temporary dewatering during the construction phase, this includes all groundwater and storm water that is collected or encountered during site excavation. For the PWDS, this includes all groundwater that is constantly pumped as a result of the PWDS elevation located below the groundwater table elevation or through storm water infiltration.

The groundwater quality sample collected in April 2023 indicates that groundwater onsite can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD). A filtration/treatment system for BOD and manganese will be required prior to discharging to the storm sewer system. A dewatering contractor should be approached to explore the possibility of treatment if discharge to the storm sewer is required.

A short-term temporary discharge permit must be applied for construction dewatering with the Municipality. A long-term permanent discharge permit must be applied for the proposed PWDS since the drainage system is located below the long-term groundwater elevation. The permanent discharge permit will involve coordination with the mechanical and site servicing consultant to provide calculations and drawing specifications for the ultimate discharge location and the sampling port required by the Municipality.

## **5.5 ENVIRONMENTAL PROTECTION**

The Site is located within the Credit River basin and the river is 3 km south-west of the Site. There are no surface water features and no areas of natural significance or provincially significant wetlands in the vicinity of the Site. The Site is located in the City of Mississauga urban environment which obtains its municipal water supply from Lake Ontario. Therefore, there are no potable groundwater users within the vicinity of the Site.

The proposed redevelopment plan will remove the overburden to a depth of approximately 16 mbgs, subject to final design. Temporary groundwater dewatering, where required, will lower the groundwater table to below the underground parking foundation levels. The extracted water can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD). A filtration/treatment system for BOD and manganese will be required prior to discharging to the storm sewer system. Updated groundwater monitoring will be conducted by the dewatering contractor prior to and during construction activities to ensure that no additional adverse groundwater impacts are identified throughout the project's construction.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

MCR Engineers Ltd. (MCR) was retained to conduct a Geohydrology Assessment for the Site in relation to the proposed redevelopment. The Site is presently occupied by two [2] storey commercial building in the southwestern portion and a two [2] storey above grade parking structure on the eastern portion.

The Site is proposed for a residential and commercial development consisting of a forty [40] storey building with four [4] storey podium (Building 1), a forty-four [44] storey building with four [4] storey podium (Building 2), a twenty-eight [28] storey building with six [6] storey podium (Building 3) and a twenty-four [24] storey building with six [6] storey podium (Building 4) over four [4] levels of combined underground parking (Appendix B).

It is understood that the ground floor finished elevation (FFE) ranges from 117.96 to 116.00 masl and P4 FFE will be at 100.95 masl.

The average groundwater elevation was estimated at approximately 113.47 masl (Table 3), representing an approximate 14 m of hydrostatic head requiring dewatering. The size of the shoring plan layout was assumed to cover the equivalent of approximately 100 m by 130 m.

A sub-floor Private Water Drainage System (PWDS) with perimeter weeping tile will be required. A soldier pile and lagging shoring system is expected for temporary dewatering/excavation except where adjacent structures exist, or heritage structures are to remain, in which case a caisson shoring system would be necessary.

The excavation for the proposed four level underground parking structure will extend into shale bedrock. In order to protect the sides/bottom of the overburden excavation from being disturbed by excess groundwater pressure, i.e., to prevent quicksand/dilating silt conditions, the groundwater will need to be lowered below the top of shale bedrock.

Positive dewatering, such as localized sumps/well points might be required for the proposed excavation. Onsite soils might be subject to localized piping during dewatering. Creation of piping channels may result in a substantial increase in the



volume of both temporary dewatering and permanent drainage.

In addition, the (weathered) sedimentary bedrock can be fractured, fissured, or contain water-bearing bedding planes. When these bedding planes are intercepted in rock excavation, a substantial amount of water, often under a significant hydrostatic head, may be encountered. The depths and condition of shale bedrock vary across the Site; therefore, its quality should be confirmed during shoring installation and general excavation through inspections in the field.

For the proposed four underground levels, groundwater is required to be drawn down 1 m below the underside of the footing. The foundation elevation is assumed to be at approximately 100.45 masl. However, for the purpose of temporary/construction dewatering, given the encountered subsurface conditions, groundwater cannot be lowered with well points below the average top elevation of shale bedrock at approximately 112.85 masl. Localized trenches and sumps can be used within bedrock to lower the water level below the underside of the footings, to an approximate elevation of 99.45 masl. This result is preliminary and should be confirmed during the construction phase and final stage of detailed design.

The average groundwater elevation was estimated at approximately 113.47 masl (Table 3), representing an approximate 14 m of hydrostatic head requiring dewatering. The size of the shoring plan layout was assumed to cover the equivalent of approximately 100 m by 130 m.

The estimated steady state discharge rate for temporary construction dewatering was calculated at approximately 306 m<sup>3</sup>/day (56 USG/min). Therefore, a limited PTTW application through the ESAR will be required to be applied for with the MECP, and a temporary discharge permit will be required from the Municipality. It should be noted that the initial drawdown pumping rate and accumulation from rainfall will be higher and this should be confirmed by the dewatering contractor.

The estimated steady state discharge rate for PWDS was calculated at approximately 282 m<sup>3</sup>/day (52 USG/min). Therefore, a complete PTTW application for the PWDS will be required for the proposed building from the MECP. A long-term permanent discharge permit will be required from the Municipality since the drainage will be installed below the long-term groundwater elevation.



Presently, the groundwater onsite can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD). A filtration/treatment system for BOD and manganese will be required prior to discharging to the storm sewer system. Updated groundwater monitoring will be conducted by the dewatering contractor prior to and during construction activities to ensure that no additional adverse groundwater impacts are identified throughout the project's construction.

The application process, where a PTTW is required, can take at least three months for a review by the MECP and is required to be approved prior to applying for discharge permits. It is recommended that applications to Toronto Water for discharge permits be applied for at least three months prior to the required start dates. Applications are to be supported by drawings and calculations provided by the mechanical and the site servicing consultant and coordination is required amongst all disciplines.

## 7.0 REFERENCES

1. Ontario Ministry of the Environment. *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*. April 15, 2011.
2. Ministry of Northern Development and Mines. *Quaternary Geology of Toronto and Southern Ontario - Southern, Sheet Map 2504*, 1980.
3. Ministry of Northern Development and Mines. *Bedrock Geology of Ontario-Southern Sheet*, 1991.
4. D.K. Todd, *Groundwater Hydrology*, 2<sup>nd</sup> Edition, John Wiley & Sons, New York, 1980.
5. L.W. Mays, *Water Resources Engineering*, 1<sup>st</sup> Edition, John Wiley & Sons, New York, 2001.
6. R.F. Craig, *Soil Mechanics*, 7<sup>th</sup> Edition, Spon Press, London, 2004.
7. MCR report titled, Geotechnical Report, Proposed Development, 3085 – 3105 Hurontario Street, Mississauga, Ontario, prepared for Mattamy Homes Canada., dated August 2023.

## 8.0 STATEMENT OF LIMITATIONS

MCR Engineers Ltd. (MCR) conducted the work associated with this report in accordance with the scope of services, time and budget limitations imposed for this work. The work has been conducted according to reasonable and generally accepted local standards for an environmental consultant at the time of the work. No other warranty or representation, expressed or implied, is included or intended in this report.

The work was designed to provide an overall assessment of the environmental conditions at the Site. The conclusions presented in this report are based on the information obtained during the investigation. The work is intended to reduce the client's risk with respect to environmental impairment. No work can completely eliminate the possibility of further environmental impairment on the Site.

It should be noted that subsurface conditions might vary at locations and depths other than those locations where borings, surveys or explorations were made by MCR. Other contaminants, not tested for in this work, may also potentially be present on the Site. Even with exhaustive investigation, it is not possible to warranty the Site will be free of contaminants. Should conditions, not observed during the work, become apparent, MCR should be immediately notified to assess the situation and conduct additional work, where required. The findings of this report are based on conditions as they were observed at the time of the work.

No assurance is made regarding changes in conditions subsequent to the time of the work. Remediation cost estimates is based on the available information. The estimated costs for remediation only represent the costs for the clean-up of known contaminants that have been identified during the work. Additional costs may be incurred as a result of other contaminants or areas of contamination identified by subsequent work.

Regulatory statutes are subject to interpretation. These statutes and their interpretation may change over time, thus these issues should be reviewed with appropriate legal counsel.

MCR relied on information provided by others in this report. MCR cannot guarantee the accuracy, completeness and reliability of the information provided by others, although MCR staff attempted to seek clarification on information provided and verifies authenticity, where practical.

The information provided in this report can be relied upon by the City of Toronto regarding the short and long term Sanitary Discharge Agreement applications for the Site.

## **9.0 CLOSURE**

In accordance with your request and authorization, MCR Engineers Ltd. completed this Geohydrology Assessment Report. This report presented the methodology, findings and conclusions of the investigation. The Statement of Limitations for all work performed as part of this investigation is included.

We trust that the information provided in this report is sufficient for your present requirements. Should you have any further questions, please do not hesitate to contact our office. Thank you for retaining MCR Engineers Ltd. for this project.

Respectfully,  
MCR Engineers Ltd.



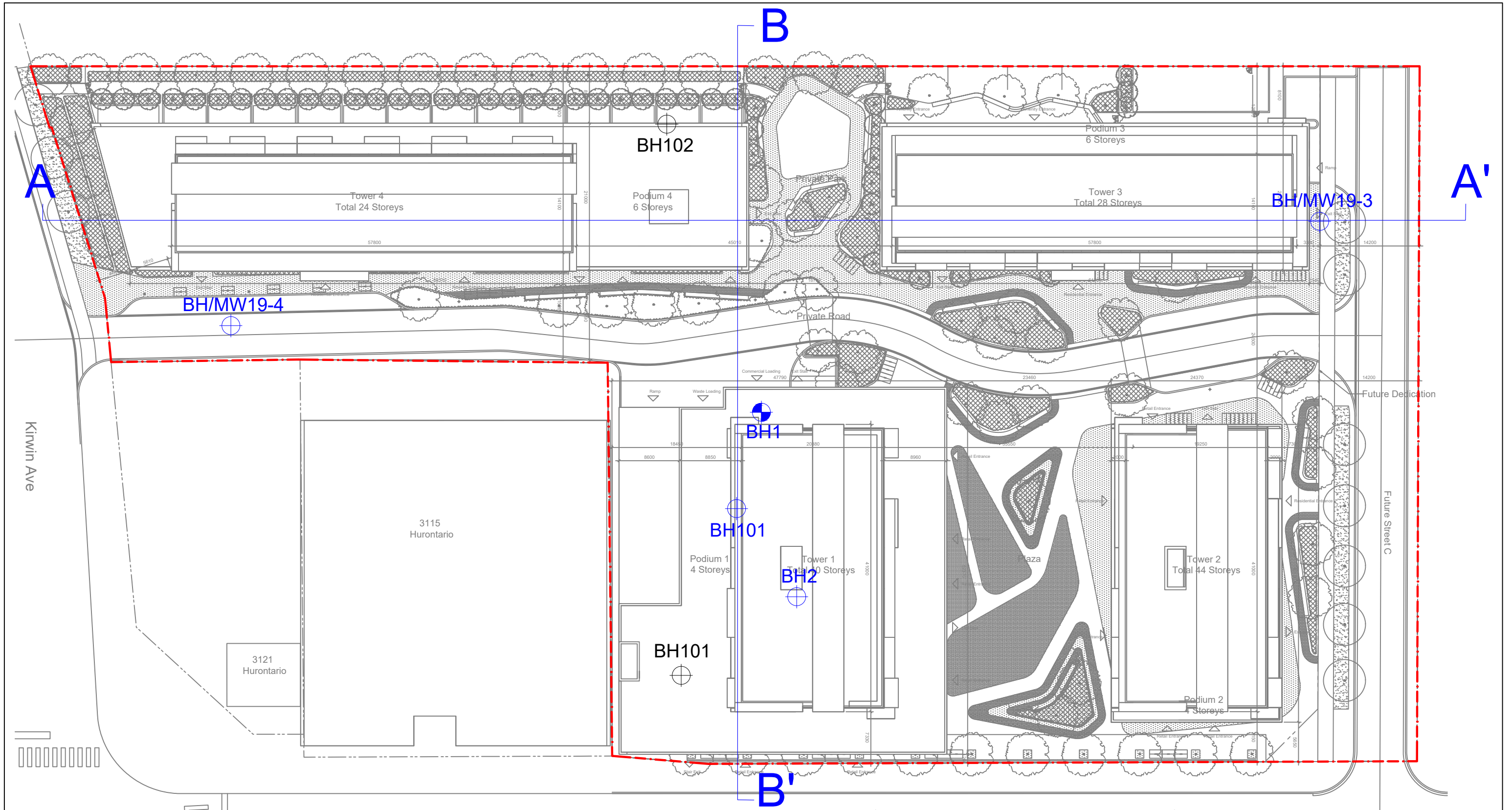
**Prepared By:**  
Salman Tavassoli, M.Sc., E.I.T



**Reviewed By:**  
Lad Rak, P.Eng., M.Eng., QP<sub>ESA</sub>

**Date of Issue: August 21, 2023**


# FIGURES



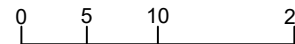
**LEGEND:**

- - - PROPERTY BOUNDARY
- MONITORING WELL INSTALLED BY MCR, 2023
- BORHOLE/MONITORING WELL BY OTHERS, 2019


Drawing Notes: Image drafted from property survey, Toronto Maps, Google Maps, and site inspections. Not for construction purposes.



PROJECT NORTH  
TRUE NORTH



SCALE (m)

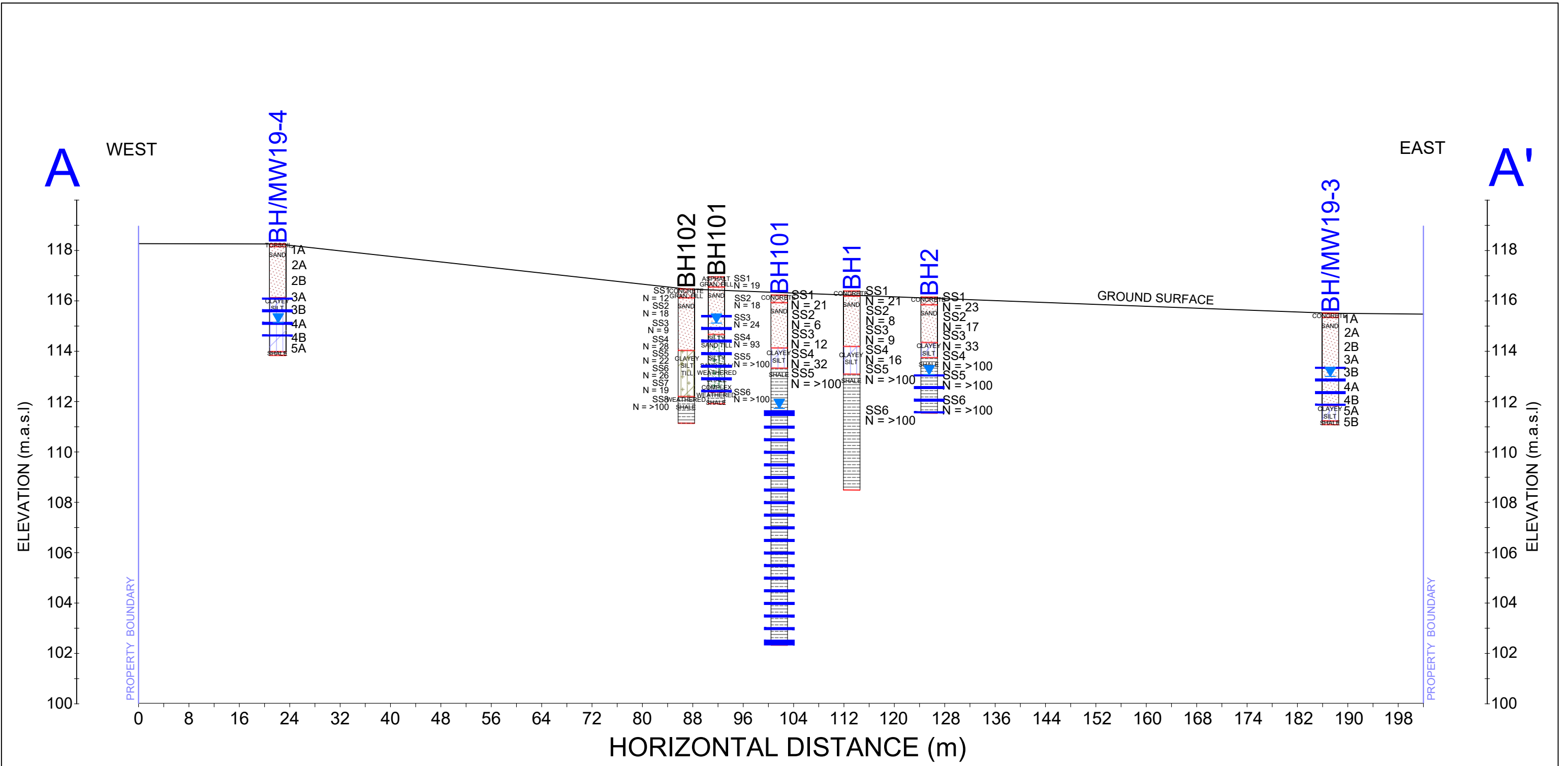


**MCR ENGINEERS LTD**  
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

**BOREHOLE  
LOCATION PLAN**

<small>Project No.</small> GE5822	<small>Date</small> AUGUST 2023	<small>Drawn by:</small> CM	<small>Checked by:</small> ST
<small>Drawing No.</small> 1			



**LEGEND:**

	SCREENED INTERVALS		FILL		SHALE		SANDY SILT
	ELEVATION MARK (masl)		SAND		SILT		
	APPROXIMATE WATER LEVEL		SILTY SAND		CLAYEY SILT		

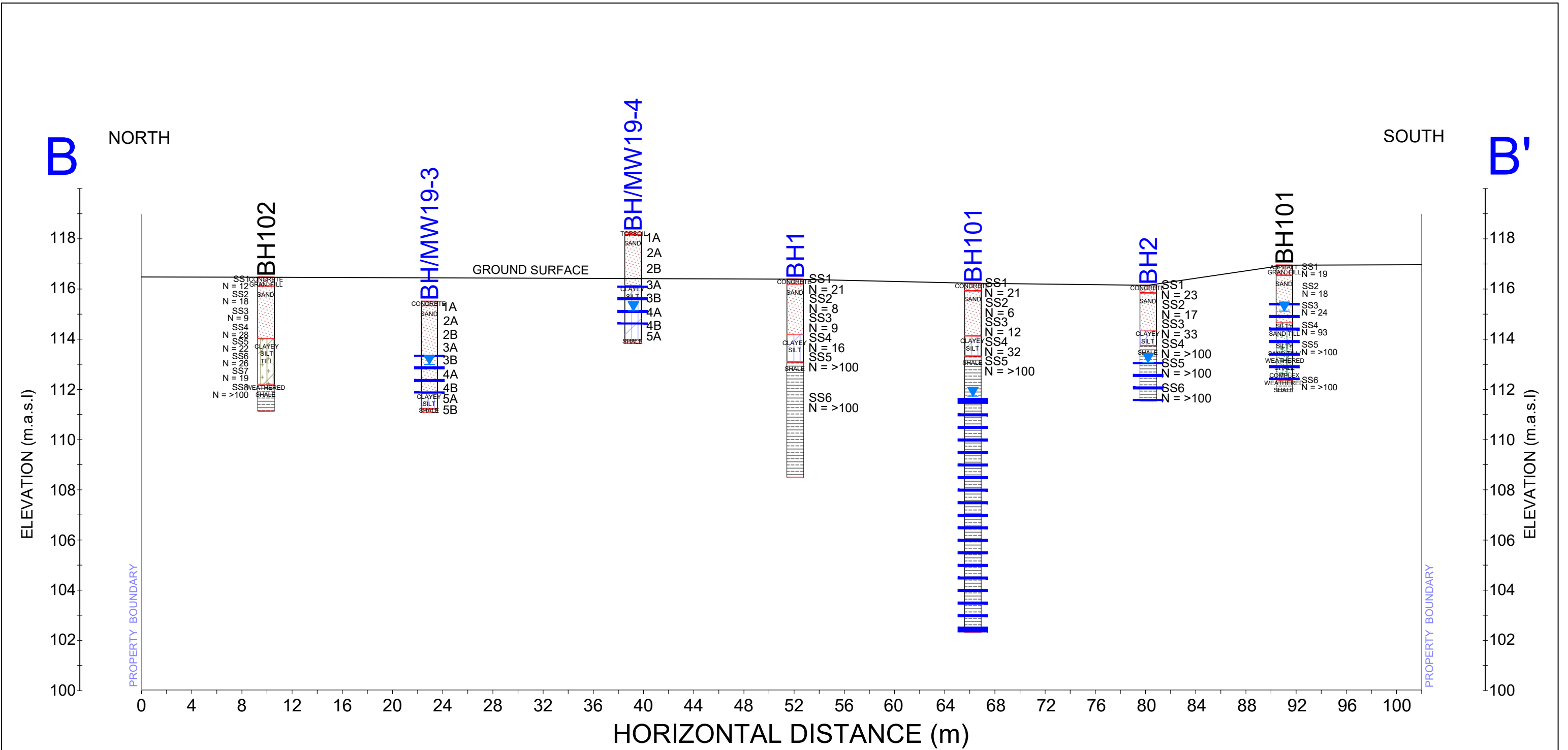
**MOR** | MCR ENGINEERS LTD  
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

**CROSS-SECTION A-A'**

Project No. GE5822	Date AUGUST 2023	Drawn by: CM	Checked by: ST	Drawing No. 2
-----------------------	---------------------	-----------------	-------------------	------------------





**LEGEND:**

	SCREENED INTERVALS		FILL		SHALE		SANDY SILT
	ELEVATION MARK (masl)		SAND		SILT		
	APPROXIMATE WATER LEVEL		SILTY SAND		CLAYEY SILT		

**MOR** | MCR ENGINEERS LTD  
GEO-ENVIRONMENTAL CONSULTANTS

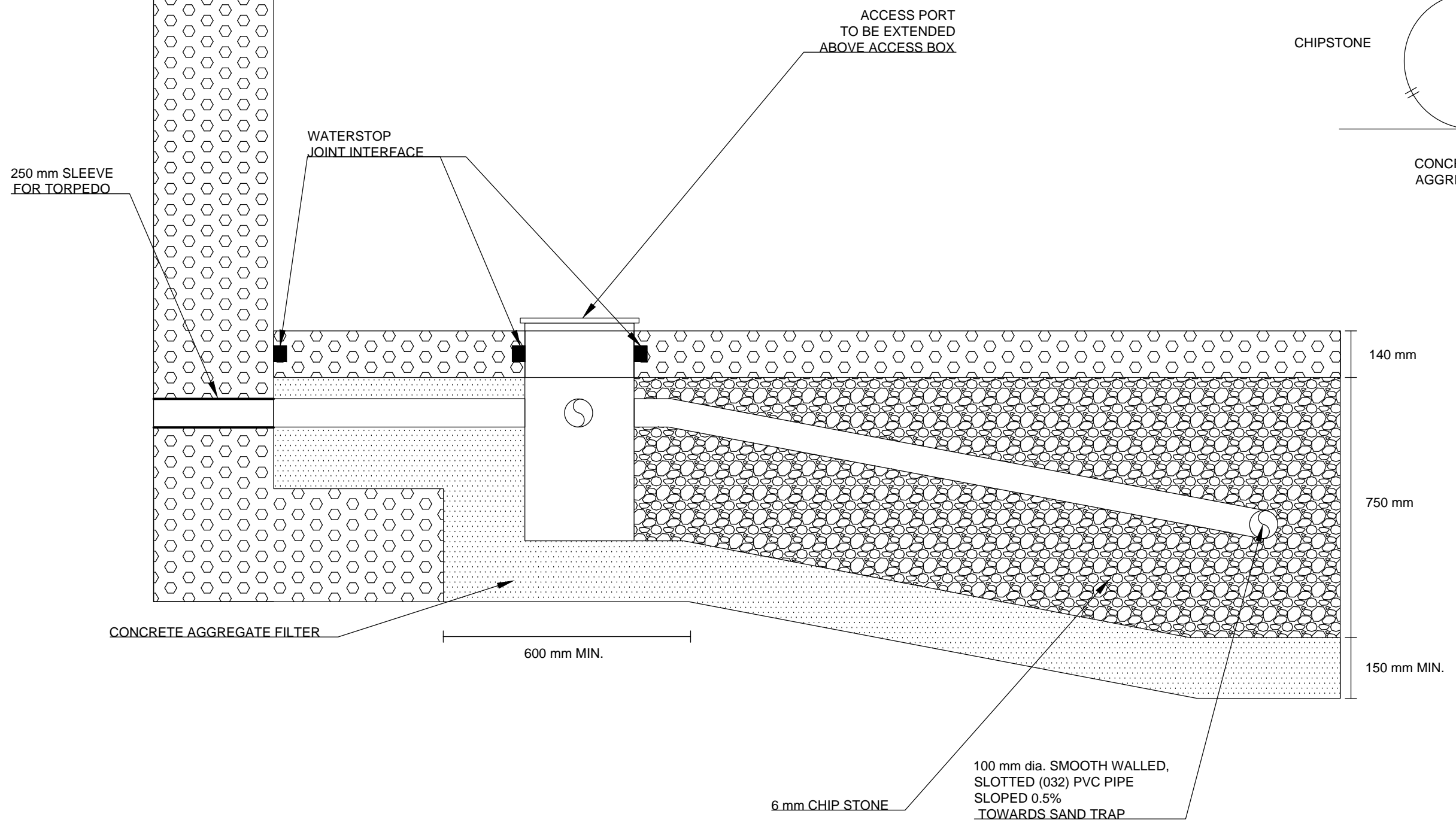
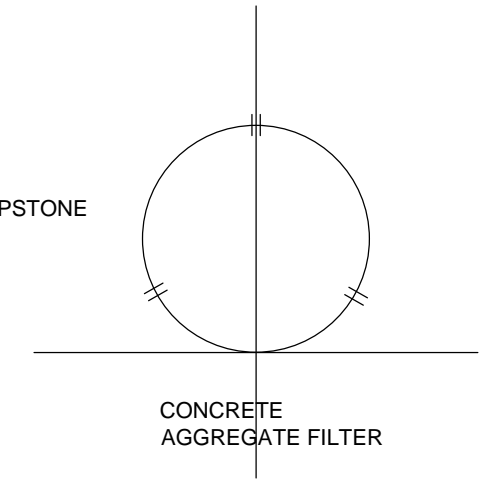
3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

**CROSS-SECTION B-B'**

Project No. GE5822	Date AUGUST 2023	Drawn by: CM	Checked by: ST	Drawing No. 3
-----------------------	---------------------	-----------------	-------------------	------------------



CROSS SECTION:  
100 mm dia.  
SMOOTH PVC PIPE



PRIVATE WATER  
DRAINAGE SYSTEM

# **TABLES**

**TABLE 1**  
**CONSTRUCTION DETAILS AND ELEVATION OF MONITORING WELLS**

MONITORING WELL ID	GROUND SURFACE ELEVATION (masl)	WATER LEVEL (mbgs)	GROUNDWATER ELEVATION (masl)	DATE OF MEASUREMENT (mm/dd/yyyy)	DEPTH OF WELL (mbgs)	DEPTH OF BENTONITE (mbgs)	LENGTH OF SCREEN (m)	INSIDE DIAMETER OF PIPE (mm)	TOP OF MONITORING WELL
<b>Boreholes by Soil-Mat</b>									
BH 2	116.15	3.10	113.05	04/24/2019	4.40	2.80	1.52	50	FLUSH MOUNT
		3.00	113.15	05/07/2019					
		3.10	113.05	04/17/2020					
BH 101	116.23	4.60	111.63	03/27/2020	13.63	4.30	9.20	50	FLUSH MOUNT
		4.50	111.73	04/17/2020					
<b>Boreholes by WSP</b>									
BH 19-3	115.51	2.51	113.00	8/9/2019	3.55	1.85	3.05	50	FLUSH MOUNT
BH 19-4	118.26	3.13	115.13	8/9/2019	3.55	1.85	3.05	50	FLUSH MOUNT
<b>Boreholes by MCR</b>									
BH 101	116.95	1.83	115.12	04/11/2023	4.57	0.91	3.05	50	FLUSH MOUNT
BH 102	116.47	3.71	112.76	04/11/2023	5.33	1.68	3.05	50	FLUSH MOUNT
<b>Min</b>	115.51	1.83	111.63	-	3.55	-	-	-	-
<b>Max</b>	118.26	4.60	115.13	-	13.63	-	-	-	-
<b>Average</b>	116.60	3.28	113.18	-	5.84	-	-	-	-

**NOTE:**

*mbgs - meters below ground surface*

*masl - meters above sea level*

*N/A - Not Applicable*

*NF - Not Found*

**MCR ENGINEERS LTD.**  
**GEO-ENVIRONMENTAL CONSULTANTS**

**TABLE 2**  
**GROUNDWATER ANALYTICAL RESULTS - PEEL REGION SEWERS BY-LAW DISCHARGE CRITERIA**  
**MCR JOB#: G5822**  
**SITE ADDRESS: 3085 - 3105 Hurontario Street, Mississauga, ON**

PARAMETER	UNITS	LIMITS FOR STORM SEWER DISCHARGE	LIMITS FOR SANITARY & COMBINED SEWERS DISCHARGE	BH 102
				13-Apr-23
pH	pH Units	6.0 - 9.0	5.5 - 10.0	8.05
Total Suspended Solids	mg/L	15	350	7
Fluoride (F-)	mg/L	-	10	0.199
Total Kjeldahl Nitrogen (TKN)	mg/L	1	100	0.398
Total Phosphorus (P)	mg/L	0.4	10	0.093
Sulfate (SO4)	mg/L	-	1500	35.5
Total Cyanide (CN)	mg/L	0.02	2	<0.0020
Escherichia Coli	CFU/100mL	200	-	<1
Total Aluminum (Al)	mg/L	-	50	0.357
Total Antimony (Sb)	mg/L	-	5	<0.00100
Total Arsenic (As)	mg/L	0.02	1	<0.00100
Total Cadmium (Cd)	mg/L	0.008	0.7	<0.0000500
Total Chromium (Cr)	mg/L	0.08	5	<0.00500
Total Cobalt (Co)	mg/L	-	5	0.00102
Total Copper (Cu)	mg/L	0.05	3	<0.00500
Total Lead (Pb)	mg/L	0.12	3	0.00119
Total Manganese (Mn)	mg/L	0.05	5	<b>0.136</b>
Total Mercury (Hg)	mg/L	0.0004	0.01	<0.0000050
Total Molybdenum (Mo)	mg/L	-	5	0.0278
Total Nickel (Ni)	mg/L	0.08	3	<0.00500
Total Selenium (Se)	mg/L	0.02	1	0.000566
Total Silver (Ag)	mg/L	0.12	5	<0.000100
Total Tin (Sn)	mg/L	-	5	<0.00100
Total Titanium (Ti)	mg/L	-	5	0.00844
Total Zinc (Zn)	mg/L	0.04	3	<0.0300
Biological Oxygen Demand	mg/L	15	300	<b>686</b>
Total Oil & Grease (Animal/Vegetable)	mg/L	-	150	<5.0
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	<5.0
Phenols-4AAP	mg/L	0.008	1	0.0013
Benzene	µg/L	2	10	<0.50
Chloroform	µg/L	2	40	<0.50
1,2-Dichlorobenzene	µg/L	5.6	50	<0.50
1,4-Dichlorobenzene	µg/L	6.8	80	<0.50
cis-1,2-Dichloroethylene	µg/L	5.6	4000	<0.50
Dichloromethane (Methylene Chloride)	µg/L	5.2	2000	<1.0
trans-1,3-Dichloropropene	µg/L	5.6	140	<0.30
Ethylbenzene	µg/L	2	160	<0.50
Methyl Ethyl Ketone	µg/L	-	8000	<20
Styrene	µg/L	-	200	<0.50
1,1,2,2-Tetrachloroethane	µg/L	17	1400	<0.50
Tetrachloroethylene	µg/L	4.4	1000	<0.50
Toluene	µg/L	2	270	<0.50
Trichloroethylene	µg/L	8	400	<0.50
Xylene (Total)	µg/L	4.4	1400	<0.50
Bis(2-ethylhexyl)phthalate	µg/L	8.8	12	<2.0
Di-n-butylphthalate	µg/L	15	80	<1.0
Total PCBs	µg/L	0.4	1	<0.060
Nonylphenol	µg/L	-	20	<1.0
Total Nonylphenol Ethoxylates	µg/L	-	200	<2.0

**Note:**

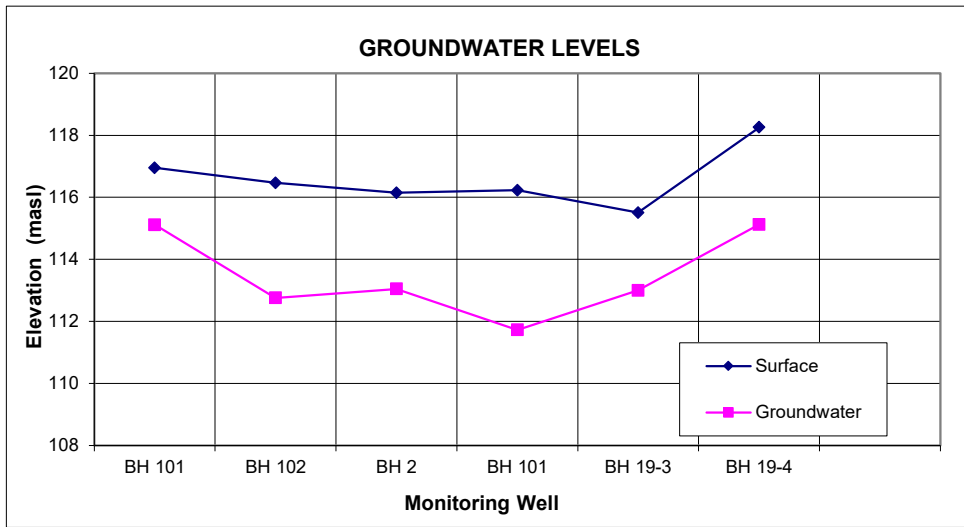
- BOLD** Exceeds Criteria - Peel Region Sanitary By-Law
- BOLD** Non-Detect Exceeds Criteria - Peel Region Sanitary By-Law
- BOLD** Exceeds Criteria - Peel Region Storm By-Law
- BOLD** Non-Detect Exceeds Criteria - Peel Region Storm By-Law

<b>MCR</b>	<b>MCR ENGINEERS LTD.</b>	<b>GROUNDWATER</b>
	<b>GEO-ENVIRONMENTAL CONSULTANTS</b>	

**Project:** Proposed Residential Development  
**Location:** 3085 - 3105 Hurontario Street, Mississauga, ON  
**Date:** August-23  
**Project #:** G5822

**TABLE 3  
GROUNDWATER MONITORING DATA**

<b>Borehole Number</b>	<b>Surface Elevation</b>	<b>Water Level Depth</b>	<b>Water Level Elevation</b>	<b>Monitoring Date</b> (mm/dd/yyyy)	<b>NOTES</b>
	(masl)	(mbgs)	(masl)		
BH 101	116.95	1.83	115.12	4/1/2023	
BH 102	116.47	3.71	112.76	4/1/2023	
BH 2	116.15	3.10	113.05	4/17/2020	by Soil-Mat
BH 101	116.23	4.50	111.73	4/17/2020	by Soil-Mat
BH 19-3	115.51	2.51	113.00	8/9/2019	by WSP
BH 19-4	118.26	3.13	115.13	8/9/2019	by WSP
<b>Average</b>	116.60	3.13	113.47		
<b>Max</b>			115.13		



<b>MCR</b>	<b>MCR ENGINEERS LTD.</b>	<b>GROUNDWATER</b>
	<b>GEO-ENVIRONMENTAL CONSULTANTS</b>	

Project: Proposed Residential Development  
 Location: 3085 - 3105 Hurontario Street, Mississauga, ON  
 Date: August-23  
 Project #: G5822

**TABLE 4**  
**DISCHARGE ESTIMATION OF CONSTRUCTION DEWATERING**

<b>Site Parameters</b>	<b>P4</b>	<b>Units</b>
Initial Water Level before Dewatering	113.47	(m)
Lowest Water Level during Construction Dewatering	99.45	(m)
Length of Site X	100.00	(m)
Width of Site W	130.00	(m)
Equivalent Radius $r_e$	64.33	(m)
Hydraulic Conductivity of Aquifer (k)	0.20	(m/day)
Aquifer Bottom Elevation	98.45	(m)
Applied Radius of Influence (Ro)	63.97	(m)
Height btw Initial Water Level and Aquifer Bottom (H)	15.02	(m)
Height btw Lowest Water Level and Aquifer Bottom ( $h_w$ )	1.00	(m)
Radius of Influence (R)	128.30	(m)
Factor of Safety (FS)	1.50	

$$Q = \frac{\pi k (H^2 - h_w^2)}{\ln(R/r)}$$

<b>Estimated steady-state discharge of dewatering</b>	<b>306</b> (m <sup>3</sup> /day)
	<b>56</b> (USG/min)

<b>MCR</b>	<b>MCR ENGINEERS LTD.</b>	<b>GROUNDWATER</b>
	<b>GEO-ENVIRONMENTAL CONSULTANTS</b>	

Project: Proposed Residential Development  
 Location: 3085 - 3105 Hurontario Street, Mississauga, ON  
 Date: August-23  
 Project #: G5822

**TABLE 5**  
**DISCHARGE ESTIMATION OF PERMANENT DRAINAGE SYSTEM**

<b>Site Parameters</b>	<b>P4</b>	<b>Units</b>
Initial Water Level before Dewatering	113.47	(m)
Lowest Water Level under PDS conditions	100.45	(m)
Length of Site X	100.00	(m)
Width of Site W	130.00	(m)
Equivalent Radius $r_e$	64.33	(m)
Hydraulic Conductivity of Aquifer (k)	0.20	(m/day)
Aquifer Bottom Elevation	99.45	(m)
Applied Radius of Influence (Ro)	59.41	(m)
Height btw Initial Water Level and Aquifer Bottom (H)	14.02	(m)
Height btw Lowest Water Level and Aquifer Bottom ( $h_w$ )	1.00	(m)
Radius of Influence (R)	123.73	(m)
Factor of Safety (FS)	1.50	

$$Q = \frac{\pi k (H^2 - h_w^2)}{\ln(R/r)}$$

<b>Estimated steady-state discharge of dewatering</b>	<b>282</b> (m <sup>3</sup> /day)
	<b>52</b> (USG/min)

# **APPENDIX A**



**PLAN OF SURVEY OF  
LOT 15, CONCESSION 1  
NORTH OF DUNDAS STREET,  
PART OF BLOCKS A AND B,  
REGISTERED PLAN 645 AND  
PART OF VILLAGE LOT 9,  
SAVIGNEY'S PLAN OF COOKSVILLE  
(PLAN TOR-12)  
CITY OF MISSISSAUGA  
REGIONAL MUNICIPALITY OF PEEL**

**SURVEYOR'S CERTIFICATE**

I CERTIFY THAT:  
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.  
2. THE SURVEY WAS COMPLETED ON THE 08<sup>th</sup> DAY OF FEBRUARY, 2021.  
DATE, FEBRUARY 24<sup>th</sup>, 2021

*S. Goonewardena*  
S. GOONERWARDENA  
ONTARIO LAND SURVEYOR

SCALE 1:300  
0m 5m 10m 20m 30 metres

R-PE SURVEYING LTD., O.L.S.

METRIC  
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

**NOTES**

- DENOTES MONUMENT SET
- SSIB DENOTES SHORT STANDARD IRON BAR
- SIB DENOTES STANDARD IRON BAR
- B DENOTES IRON BAR
- RSIB DENOTES ROUND STANDARD IRON BAR
- CC DENOTES CUT CROSS
- PL1 DENOTES PLAN 43R-1718B
- PL2 DENOTES PLAN 43R-3318B
- PL3 DENOTES EXPROPRIATION PLAN PR3525321
- PL6 DENOTES UNREGISTERED PEEL STANDARD CONDOMINIUM PLAN BY CHAMBERS & ASSOCIATES SURVEYING LTD., O.L.S. DATED AUGUST 23, 2018 (FILE No. 10-12)
- (1225) DENOTES DAVID B. SEARLES SURVEYING LTD., O.L.S.
- (1654) DENOTES CHAMBERS & ASSOCIATES SURVEYING LTD., O.L.S.
- (N) DENOTES NOT IDENTIFIED
- (WT) DENOTES WITNESS
- P.I.N. DENOTES PROPERTY IDENTIFIER NUMBER
- RW DENOTES RETAINING WALL
- SCP DENOTES SPECIFIED CONTROL POINT
- CLF DENOTES CHAIN LINK FENCE

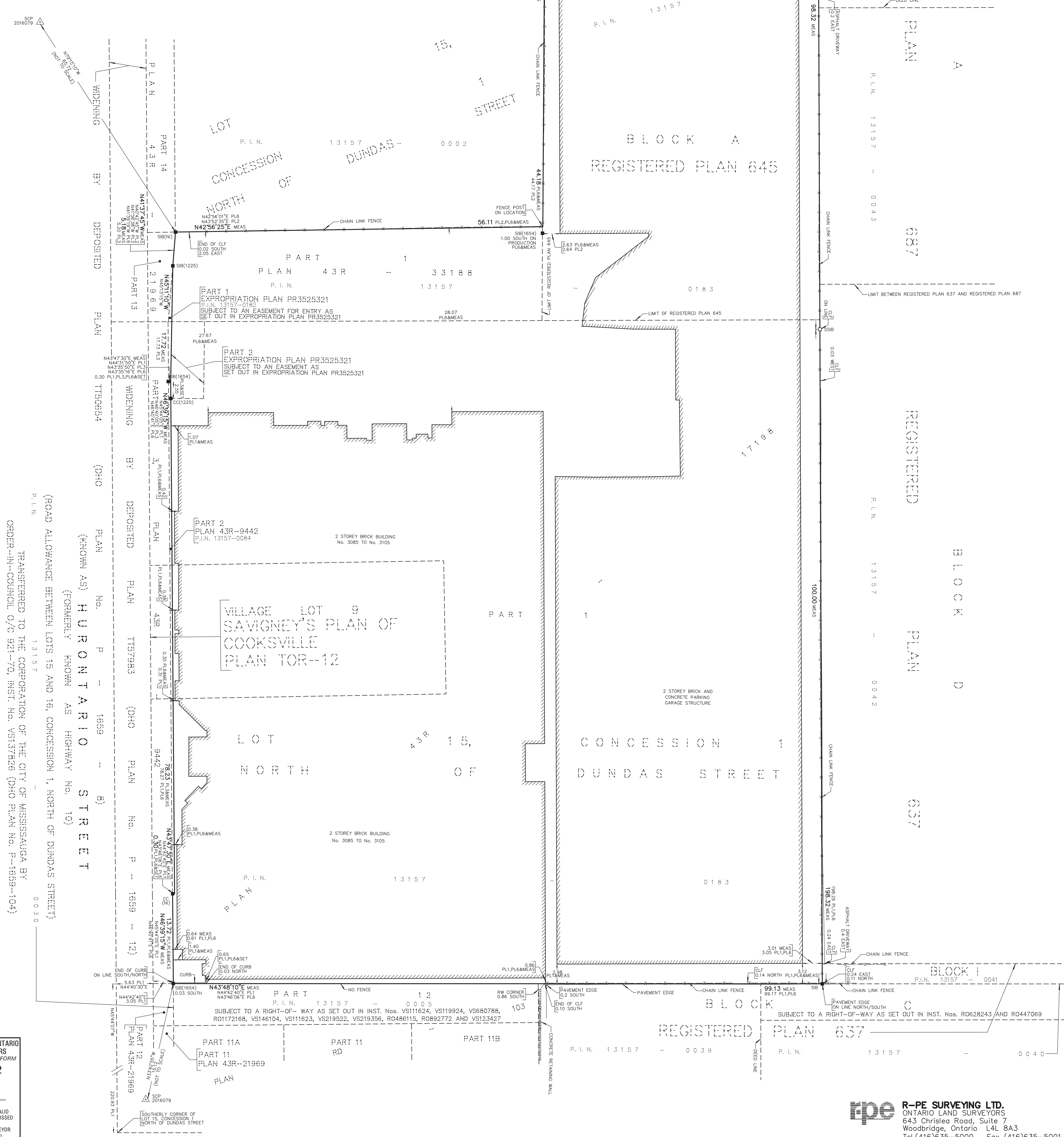
**INTEGRATION NOTE**

BEARINGS ARE UTM GRID, DERIVED FROM SPECIFIED CONTROL POINTS 2016079 AND 2016080, UTM ZONE 17, NAD-1983; CSRS:CBNV6-2010.0.

COORDINATES ARE UTM ZONE 17, NAD-1983; CSRS:CBNV6-2010.0, TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

POINT ID	NORTHINGS	EASTINGS
SCP 2016079	4826446.77	611405.54
SCP 2016080	4826342.28	611561.12

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999739.



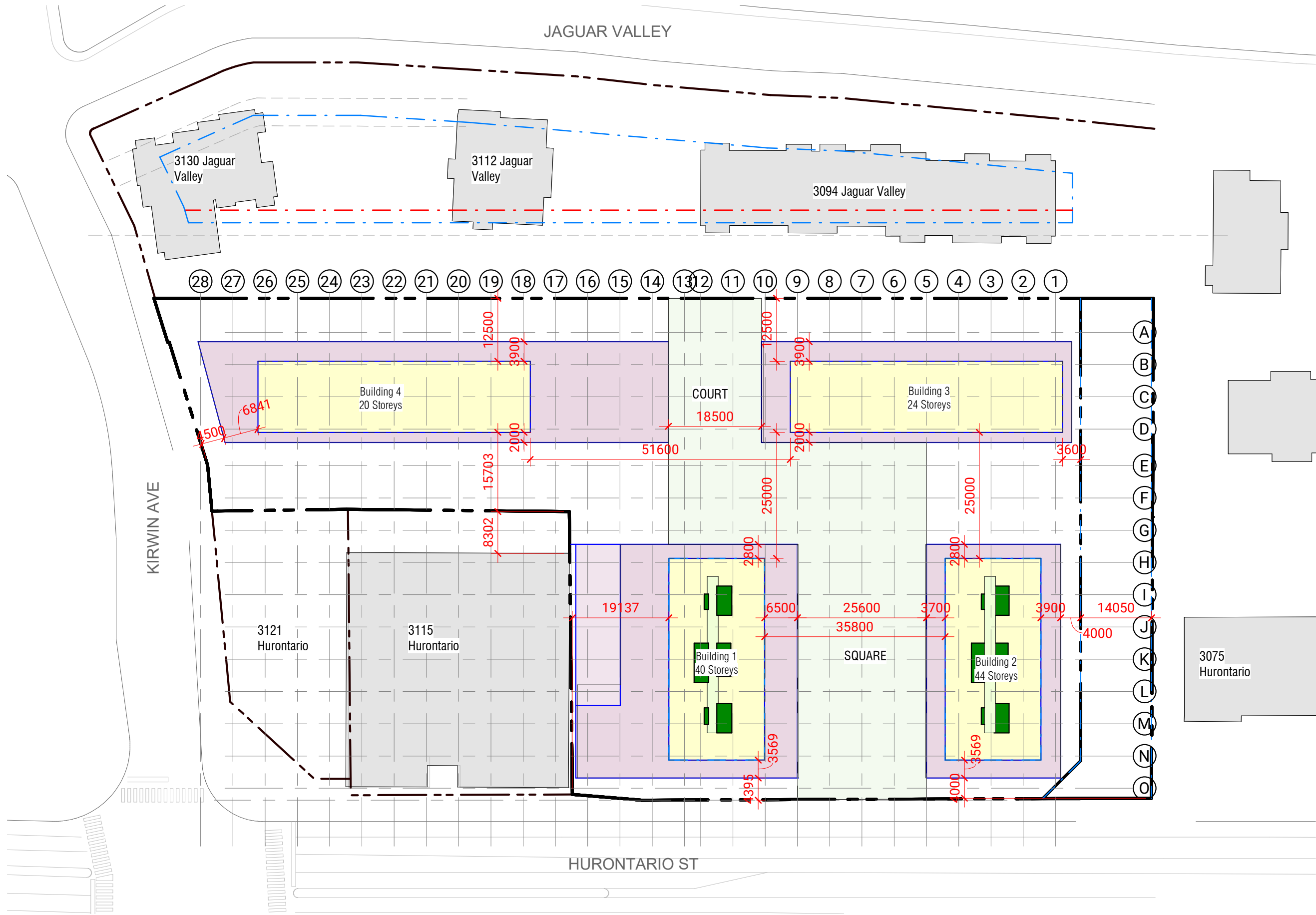
**ASSOCIATION OF ONTARIO  
LAND SURVEYORS  
PLAN SUBMISSION FORM  
2153932**

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR IN accordance with Regulation 1026, Section 2(93).

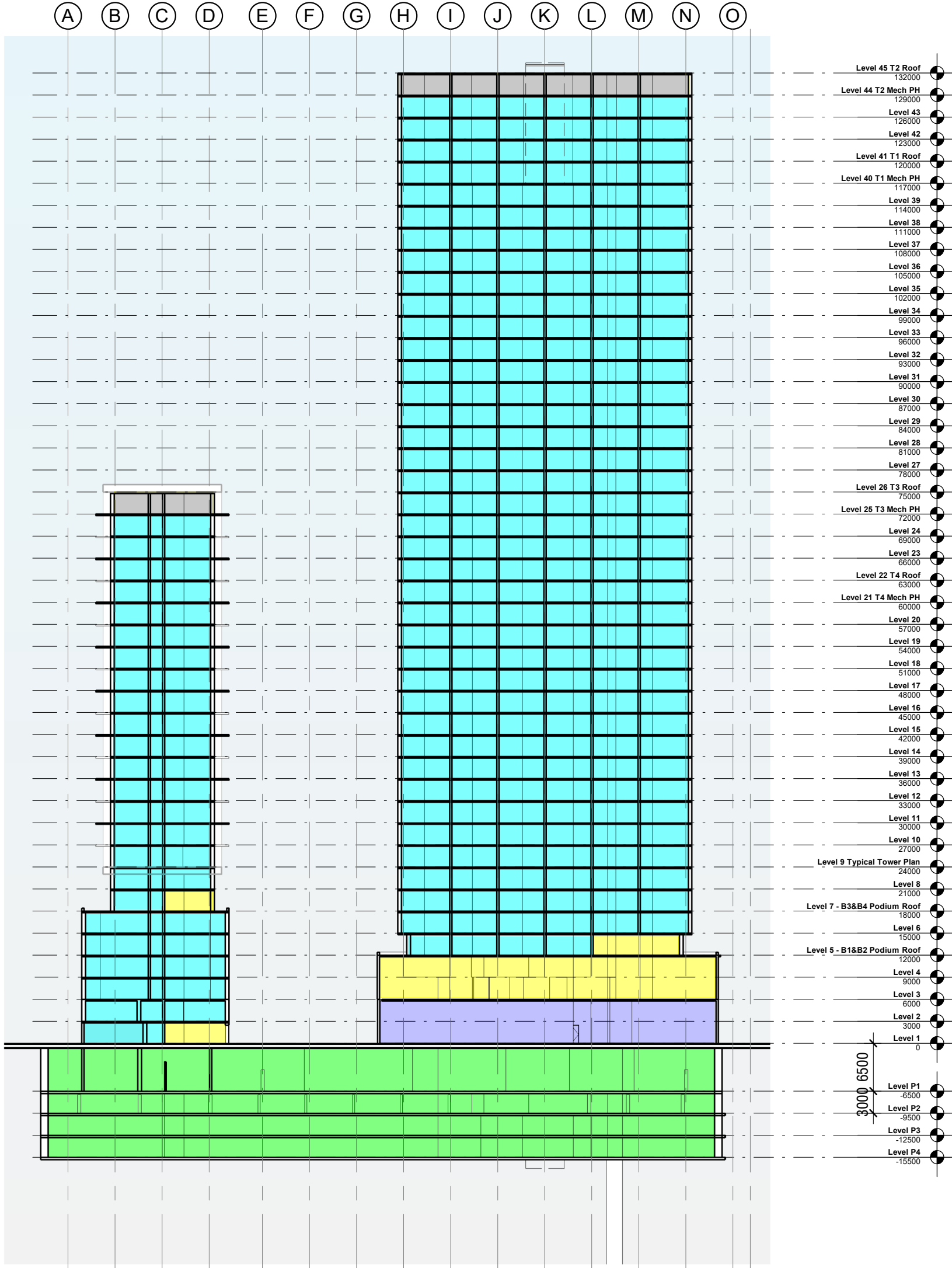
**R-PE SURVEYING LTD.**  
ONTARIO LAND SURVEYORS  
643 Christie Road, Suite 7  
Woodbridge, Ontario L4L 8A3  
Tel. (416) 635-5000 Fax (416) 635-5001  
Tel. (905) 264-0881 Fax (905) 264-2099  
Website: www.r-pe.ca  
DRAWN: A.Q. CHECKED: S.G.  
JOB No. 20-257 CAD FILE No. 20257PS01

# **APPENDIX C**

JAGUAR VALLEY







Mech

Residential

Amenity

Commercial

Parking

## **APPENDIX B**

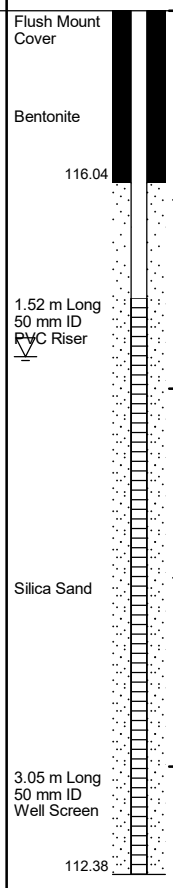
# RECORD OF BOREHOLE 101

PROJECT : GE5822  
 LOCATION : 3085-3105 Hurontario Street, Mississauga, Ontario  
 STARTED : March 16, 2023  
 COMPLETED : March 16, 2023

**MC CLYMONT & RAK  
 ENGINEERS, INC.**

SHEET 1 OF 1  
 DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE			SAMPLES		ORGANIC VAPOUR READINGS (ppm)				SHEAR STRENGTH: Cu, KPa				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	⊗				nat V - ● rem V - ⊙						
								% LEL - (hexane) □				WATER CONTENT, PERCENT						
							100	200	300	400	20	40	60	80	wp  -----  wl 10 20 30 40			
		GROUND SURFACE		116.95														
		150mm ASPHALT		116.80														
		250mm GRANULAR FILL		116.15														
		SAND: fine, brown, moist, compact.		116.55	1	SS	19											
					2	SS	18											
					3	SS	24											
2	POWER BORING HOLLOW STEM AUGER	SILTY SAND TILL: trace of shale fragments and gravel, brown, wet, very dense.		114.66	4	SS	93											
			SILTY SAND TILL/WEATHERED SHALE COMPLEX: trace of gravel, brown, wet, very dense.		113.90	5	SS	>100										
4			WEATHERED SHALE: grey, moist.		112.38	6	SS	>100										
		End of Borehole		111.92														
6		Note: 1) Water level was not measured on completion of drilling. 2) Water level was measured at 1.83 mbgs on Apr. 11, 2023.		5.03														



### GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION  
 WATER LEVEL: 1.83 m bgs

▼ DEEP/DUAL INSTALLATION  
 WATER LEVEL:

LOGGED : RS  
 CHECKED : CM

# RECORD OF BOREHOLE 102

PROJECT : GE5822  
 LOCATION : 3085-3105 Hurontario Street, Mississauga, Ontario  
 STARTED : March 15, 2023  
 COMPLETED : March 16, 2023

**MC CLYMONT & RAK  
 ENGINEERS, INC.**

SHEET 1 OF 1  
 DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE		SAMPLES		ORGANIC VAPOUR READINGS (ppm)				SHEAR STRENGTH: Cu, KPa				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	%				WATER CONTENT, PERCENT					
								% LEL - (hexane)				wp  -----  w					
		GROUND SURFACE		116.47													
		200mm CONCRETE		116.27											Flush Mount Cover		
		150mm GRANULAR FILL		116.20	1	SS	12								2.29 m Long 50 mm ID PVC Riser		
		SAND: fine, dark brown to brown, moist to wet, compact to dense. - trace of gravel until 0.61 m.		116.12													
				0.35	2	SS	18										
					3	SS	9										
2	POWER BORING HOLLOW STEM AUGER	CLAYEY SILT TILL: trace of sand and gravel, brown to grey, moist, very stiff.		114.03											3.05 m Long 50 mm ID Well Screen		
				2.44	5	SS	22										
					6	SS	26										
					7	SS	19										
4			WEATHERED SHALE		112.20	8	SS	>100									
		4.27			9	SS											
6			End of Borehole		111.14										111.14		
		Note: 1) Water level was not measured on completion of drilling. 2) Water level was measured at 3.71 mbgs on Apr. 11, 2023.		5.33													

### GROUNDWATER ELEVATIONS

SHALLOW/SINGLE INSTALLATION  
 WATER LEVEL: 3.71 m bgs

DEEP/DUAL INSTALLATION  
 WATER LEVEL:

LOGGED : RS  
 CHECKED : CM

# **APPENDIX C**



# Log of Borehole No. 1

**Project No:** SM 190138-G

**Project Manager:** Kyle Richardson

**Project:** Proposed Condominium Building

**Borehole Location:** See Drawing No. 1

**Location:** 3085 Hurontario Street, Mississauga

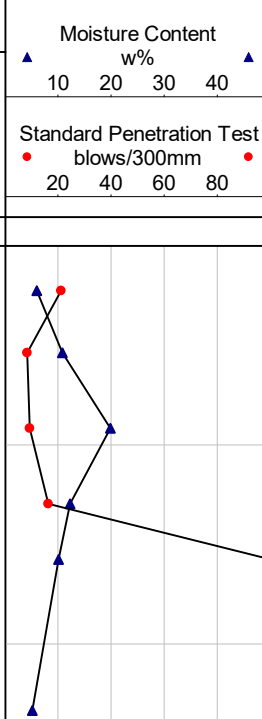
**UTM Coordinates - N:** 4826460

**Client:** Oakhill Environmental Inc.

**E:** 611511



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲	▲
0	116.39		Ground Surface										
0	116.09		<b>Pavement Structure</b> Approximately 100 millimetres of asphaltic concrete over 200 millimetres of compact granular base.										
1			<b>Sand</b> Brown, medium in gradation, trace gravel, occasional organics in upper level, loose.										
2	114.20		<b>Clayey Silt</b> Grey, trace gravel, very stiff.										
3	113.10		<b>Dundas Shale</b> Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.										
4													
5													
6													
7													
8	108.50		End of Borehole										
9			NOTES: 1. Borehole was advanced using hollow stem auger equipment on April 8, 2019 to auger refusal at a depth of 5.2 metres, then the bedrock cored to a depth of approximately 7.9 metres using Nq diamond barrel equipment. 2. Borehole was backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										



**Drill Method:** Hollow Stem Augers

**Drill Date:** April 8, 2019

**Hole Size:** 200 millimetres

**Drilling Contractor:** Geo-Environmental

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Benchmark

**Field Logged by:** ZRV

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 2

**Project No:** SM 190138-G

**Project Manager:** Kyle Richardson

**Project:** Proposed Condominium Building

**Borehole Location:** See Drawing No. 1

**Location:** 3085 Hurontario Street, Mississauga

**UTM Coordinates - N:** 4826436

**Client:** Oakhill Environmental Inc.

**E:** 611503



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲
0	116.15		Ground Surface									
0	115.85		<b>Pavement Structure</b> Approximately 150 millimetres of asphaltic concrete over 150 millimetres of compact granular base.									
1			<b>Sand</b> Brown, medium in gradation, trace gravel, occasional organics in upper level, compact.									
1	114.40			SS	1	12,12,11,9	23					
2				SS	2	3,5,12,19	17					
2	113.70			SS	3	12,22,11,13	33					
3			<b>Clayey Silt</b> Grey, trace gravel, hard.	SS	4	11,50/4"	100					
3			<b>Dundas Shale</b> Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.	SS	5	50/5"	100					
4												
5	111.50		End of Borehole		6	50/3"	100					
5			NOTES: 1. Borehole was advanced using hollow stem auger equipment on April 8, 2019 to auger refusal on assumed bedrock at a depth of approximately 4.6 metres. 2. Borehole was 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: April 24, 2019 - 3.1 metres May 7, 2019 - 3.0 metres April 17, 2020 - 3.1 metres									

**Drill Method:** Hollow Stem Augers

**Drill Date:** April 8, 2019

**Hole Size:** 200 millimetres

**Drilling Contractor:** Geo-Environmental

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** ZRV

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 101

**Project No:** SM 190138-G

**Project:** Proposed Condominium Building

**Location:** 3085 Hurontario Street, Mississauga

**Client:** Oakhill Environmental Inc.

**Project Manager:** Kyle Richardson

**Borehole Location:** See Drawing No. 1

**UTM Coordinates - N:** 4826448

**E:** 611500



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲	
0	116.23		Ground Surface										
0	115.93	▀▀▀	<b>Pavement Structure</b> Approximately 100 millimetres of asphaltic concrete over 200 millimetres of compact granular base.										
1		.....	<b>Sand</b> Brown, medium in gradation, trace gravel, loose to compact.										
2	114.10	.....											
3	113.40	.....	<b>Clayey Silt</b> Grey, trace gravel, very stiff.										
3		.....	<b>Dundas Shale</b> Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.										
4				SS	1	12,11,10,9	21						
5				SS	2	5,4,2,2	6						
6				SS	3	4,5,7,9	12						
7				SS	4	6,10,22,50/3"	32			>4.5			
8				SS	5	50/3"	100						
9				NQ	7	RQD 0%							
10				NQ	8	RQD 64.2%							
11				NQ	9	RQD 78.8%							
12				NQ	10	RQD 62.9%						13.8 MPa	
13				NQ	11	RQD 44.2%						13.5 MPa	
14				NQ	12	RQD 23.6%						11.8 MPa	
15												14.2 MPa	
16												69.3 MPa	

**Drill Method:** Hollow Stem Augers

**Drill Date:** March 12, 2020

**Hole Size:** 200 millimetres

**Drilling Contractor:** Davis Drilling

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** SW

**Checked by:** KR

**Sheet:** 1 of 2







# MONITORING WELL DRILLING RECORD : BH19-4

Project Number: 191-02120-01

3085 Hurontario Street, Mississauga, Ontario  
Phase Two Environmental Site Assessment  
Equity Builders

<b>DRILLING DETAILS</b> Date (Start): 7/3/2019 Date (End): 7/3/2019 Drilling Company: Strata Drilling Group Drilling Equipment: CME 420M Drilling Method: Solid Stem Auger Borehole Diameter: 38.1 mm Drilling Fluid: NA	<b>SURVEY DETAILS</b> Easting: 611464.98 m Northing: 4826526.176 m Surface Elevation: 118.26 masl Top of Well Elevation: 118.18 masl	<b>ODOUR</b> L - Light M - Medium S - Strong  <b>VISUAL</b> D - Dispersed with Product S - Saturated with Product	<b>SAMPLE TYPE</b> DC - Diamond Corer SS - Split Spoon MA - Manual Auger TR - Trowel ST - Shelby Tube DT - Dual Tube MC - Macro Core NR - No Recovery	<b>CHEMICAL ANALYSIS</b> Metals: Sb As Ba Be B Cd Cr Co Cu Pb Mo N Se Ag Ti U V Zn Inorg: Inorganic Compounds PHC: Petroleum Hydrocarbons (F1-F4) BTEX: Benzene, Toluene, Ethylbenzene, Xylene VOC: Volatile Organic Compounds PAH: Polycyclic Aromatic Hydrocarbons PCB: Polychlorinated Biphenyl D/F: Dioxins & Furans Phenol: Phenolic Compounds GSA: Grain-size Analysis
---	--	--	---	--

(m) DEPTH ELEVATION (masl)	STRATIGRAPHY	LITHOLOGY / GEOLOGY  DESCRIPTION	OBSERVATIONS			SAMPLES				MONITORING WELL		REMARKS	
			PID CGD (ppm)	ODOUR	VISUAL	SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM		DESCRIPTION
118.26 118.16		<b>TOPSOIL</b> : approximately 101.6 mm											
0.5		<b>SAND</b> : light brown, moist, loose	125.4			DT1A	83%						
1.0		<i>some silt, light brown, moist</i>	2.1			DT2A	75%						
1.5		<i>very moist</i>	0.3			DT2B	75%						
2.0		<b>CLAYEY SILT</b> : grey, very moist to wet,	0.3			DT3A	63%		pH GSA Gr % Sa % Si % Cl %				
2.5			0.1			DT3B	42%						
3.0		<i>trace boulders, coarse sand seam @ 3.05m, wet</i>	15.7			DT4A	100%		PHC VOC				
3.5			0.1			DT4B	100%						
4.0			0.1			DT5A	44%						
4.27 113.99 4.42		<b>SHALE</b> : moist, grey <i>Bedrock refusal at 4.48 m. MW Install at 3.57m.</i>											

Project : DATABASE\_MASTER.GPJ Report : WSP\_EN\_WELL-ENVIRONMENTAL 8/13/2019

WATER MARKER  
Depth : 3.13 m  
Elev. : 115.13 m  
Date : 8/9/2019

SCREEN  
Length: 1.52 m  
Diam.: 38.1 mm  
Slot: #10

CONCRETE  
(FLUSH MOUNT)

BENTONITE

# **APPENDIX D**



## CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

<p><b>Work Order</b> : <b>WT2309350</b></p> <p><b>Client</b> : <b>McClymont &amp; Rak Engineers Inc.</b></p> <p><b>Contact</b> : Richard Sukhu</p> <p><b>Address</b> : 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9</p> <p><b>Telephone</b> : 416 675 0160</p> <p><b>Project</b> : 5822</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : 17-620765</p> <p><b>Sampler</b> : BR</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2022 Price List</p> <p><b>No. of samples received</b> : 1</p> <p><b>No. of samples analysed</b> : 1</p>	<p><b>Page</b> : 1 of 7</p> <p><b>Laboratory</b> : Waterloo - Environmental</p> <p><b>Account Manager</b> : Emily Smith</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 13-Apr-2023 17:30</p> <p><b>Date Analysis Commenced</b> : 14-Apr-2023</p> <p><b>Issue Date</b> : 25-Apr-2023 18:00</p>
---	---

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, Waterloo, Ontario



## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
µg/L	micrograms per litre
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

>: greater than.

<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).

For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

## Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	<i>Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.</i>
DLHC	<i>Detection Limit Raised: Dilution required due to high concentration of test analyte(s).</i>
HTD	<i>Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.</i>
PEHR	<i>Parameter exceeded recommended holding time on receipt: Proceeded with analysis as requested.</i>



## Analytical Results

Analyte	Method	LOR	Unit	Client sample ID								
				BH 102	Sub-Matrix: Water	Sampling date/time	MISSUB STM	RMPSUB SAN	RMPSUB STM			
				WT2309350-001	13-Apr-2023 09:00							
<b>Physical Tests</b>												
pH	E108	0.10	pH units	8.05		6 - 9 pH units	5.5 - 10 pH units	6 - 9 pH units	--	--	--	
Solids, total suspended [TSS]	E160	3.0	mg/L	7.0		15 mg/L	350 mg/L	15 mg/L	--	--	--	
<b>Anions and Nutrients</b>												
Fluoride	E235.F	0.020	mg/L	0.199	DLDS	--	10 mg/L	--	--	--	--	
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	0.398		1 mg/L	100 mg/L	1 mg/L	--	--	--	
Phosphorus, total	E372-U	0.0020	mg/L	0.0930		0.4 mg/L	10 mg/L	0.4 mg/L	--	--	--	
Sulfate (as SO4)	E235.SO4	0.30	mg/L	35.5	DLDS	--	1500 mg/L	--	--	--	--	
<b>Cyanides</b>												
Cyanide, strong acid dissociable (Total)	E333	0.0020	mg/L	<0.0020		0.02 mg/L	2 mg/L	0.02 mg/L	--	--	--	
<b>Inorganics</b>												
Chlorine, total	E326	0.050	mg/L	<0.050	PEHR	1 mg/L	--	--	--	--	--	
<b>Microbiological Tests</b>												
Coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	Not Detected		200 CFU/100mL	--	200 CFU/100mL	--	--	--	
<b>Total Metals</b>												
Aluminum, total	E420	0.0030	mg/L	0.357	DLHC	1 mg/L	50 mg/L	--	--	--	--	
Antimony, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--	
Arsenic, total	E420	0.00010	mg/L	<0.00100	DLHC	0.02 mg/L	1 mg/L	0.02 mg/L	--	--	--	
Cadmium, total	E420	0.0000050	mg/L	<0.0000500	DLHC	0.008 mg/L	0.7 mg/L	0.008 mg/L	--	--	--	
Chromium, total	E420	0.00050	mg/L	<0.00500	DLHC	0.08 mg/L	5 mg/L	0.08 mg/L	--	--	--	
Cobalt, total	E420	0.00010	mg/L	0.00102	DLHC	--	5 mg/L	--	--	--	--	
Copper, total	E420	0.00050	mg/L	<0.00500	DLHC	0.04 mg/L	3 mg/L	0.05 mg/L	--	--	--	
Lead, total	E420	0.000050	mg/L	0.00119	DLHC	0.12 mg/L	3 mg/L	0.12 mg/L	--	--	--	
Manganese, total	E420	0.00010	mg/L	0.136	DLHC	0.05 mg/L	5 mg/L	0.05 mg/L	--	--	--	
Mercury, total	E508	0.0000050	mg/L	<0.0000050		0.0004 mg/L	0.01 mg/L	0.0004 mg/L	--	--	--	
Molybdenum, total	E420	0.000050	mg/L	0.0278	DLHC	--	5 mg/L	--	--	--	--	
Nickel, total	E420	0.00050	mg/L	<0.00500	DLHC	0.08 mg/L	3 mg/L	0.08 mg/L	--	--	--	
Selenium, total	E420	0.000050	mg/L	0.000566	DLHC	0.02 mg/L	1 mg/L	0.02 mg/L	--	--	--	
Silver, total	E420	0.000010	mg/L	<0.000100	DLHC	0.12 mg/L	5 mg/L	0.12 mg/L	--	--	--	
Tin, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--	



Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
<b>Total Metals - Continued</b>										
Titanium, total	E420	0.00030	mg/L	0.00844	DLHC	--	5 mg/L	--	--	--
Zinc, total	E420	0.0030	mg/L	<0.0300	DLHC	<b>0.04 mg/L</b>	<b>3 mg/L</b>	<b>0.04 mg/L</b>	--	--
<b>Speciated Metals</b>										
Chromium, hexavalent [Cr VI], total	E532	0.00050	mg/L	<0.00050		--	--	--	--	--
<b>Aggregate Organics</b>										
Biochemical oxygen demand [BOD]	E550	2.0	mg/L	686	HTD	15 mg/L	300 mg/L	--	--	--
Carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	587	HTD	--	300 mg/L	15 mg/L	--	--
Oil & grease (gravimetric)	E567	5.0	mg/L	<5.0		--	--	--	--	--
Oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0		--	150 mg/L	--	--	--
Oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0		--	15 mg/L	--	--	--
Phenols, total (4AAP)	E562	0.0010	mg/L	0.0013		<b>0.008 mg/L</b>	<b>1 mg/L</b>	<b>0.008 mg/L</b>	--	--
<b>Volatile Organic Compounds</b>										
Benzene	E611D	0.50	µg/L	<0.50		2 µg/L	10 µg/L	2 µg/L	--	--
Chloroform	E611D	0.50	µg/L	<0.50		--	40 µg/L	2 µg/L	--	--
Dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50		--	50 µg/L	5.6 µg/L	--	--
Dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50		--	80 µg/L	6.8 µg/L	--	--
Dichloroethylene, cis-1,2-	E611D	0.50	µg/L	<0.50		--	4000 µg/L	5.6 µg/L	--	--
Dichloromethane	E611D	1.0	µg/L	<1.0		--	2000 µg/L	5.2 µg/L	--	--
Dichloropropylene, trans-1,3-	E611D	0.30	µg/L	<0.30		--	140 µg/L	5.6 µg/L	--	--
Ethylbenzene	E611D	0.50	µg/L	<0.50		2 µg/L	160 µg/L	2 µg/L	--	--
Methyl ethyl ketone [MEK]	E611D	20	µg/L	<20		--	8000 µg/L	--	--	--
Styrene	E611D	0.50	µg/L	<0.50		--	200 µg/L	--	--	--
Tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50		--	1400 µg/L	17 µg/L	--	--
Tetrachloroethylene	E611D	0.50	µg/L	<0.50		--	1000 µg/L	4.4 µg/L	--	--
Toluene	E611D	0.50	µg/L	<0.50		2 µg/L	270 µg/L	2 µg/L	--	--
Trichloroethylene	E611D	0.50	µg/L	<0.50		--	400 µg/L	8 µg/L	--	--
Xylene, m+p-	E611D	0.40	µg/L	<0.40		--	--	--	--	--
Xylene, o-	E611D	0.30	µg/L	<0.30		--	--	--	--	--
Xylenes, total	E611D	0.50	µg/L	<0.50		4.4 µg/L	1400 µg/L	4.4 µg/L	--	--
<b>Volatile Organic Compounds Surrogates</b>										
Bromofluorobenzene, 4-	E611D	1.0	%	105		--	--	--	--	--
Difluorobenzene, 1,4-	E611D	1.0	%	99.5		--	--	--	--	--



Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
<b>Polycyclic Aromatic Hydrocarbons</b>										
Acenaphthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Acenaphthylene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Anthracene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(a)anthracene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(a)pyrene	E641A	0.0050	µg/L	<0.0050	--	--	--	--	--	--
Benzo(b+j)fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(g,h,i)perylene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(k)fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Chrysene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Dibenz(a,h)anthracene	E641A	0.0050	µg/L	<0.0050	--	--	--	--	--	--
Fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Fluorene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Methylnaphthalene, 1-	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Methylnaphthalene, 2-	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Naphthalene	E641A	0.050	µg/L	<0.050	--	--	--	--	--	--
Phenanthrene	E641A	0.020	µg/L	<0.020	--	--	--	--	--	--
Pyrene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
PAHs, total (CCME sewer 18)	E641A	0.070	µg/L	<0.070	2 µg/L	--	--	--	--	--
Chrysene-d12	E641A	0.1	%	82.4	--	--	--	--	--	--
Naphthalene-d8	E641A	0.1	%	97.4	--	--	--	--	--	--
Phenanthrene-d10	E641A	0.1	%	99.7	--	--	--	--	--	--
<b>Phthalate Esters</b>										
bis(2-Ethylhexyl) phthalate [DEHP]	E655F	2.0	µg/L	<2.0	--	12 µg/L	8.8 µg/L	--	--	--
Di-n-butyl phthalate	E655F	1.0	µg/L	<1.0	--	80 µg/L	15 µg/L	--	--	--
<b>Semi-Volatile Organics Surrogates</b>										
Fluorobiphenyl, 2-	E655F	1.0	%	85.1	--	--	--	--	--	--
Terphenyl-d14, p-	E655F	1.0	%	92.8	--	--	--	--	--	--
<b>Phenolics Surrogates</b>										
Tribromophenol, 2,4,6-	E655F	0.20	%	106	--	--	--	--	--	--
<b>Nonylphenols</b>										
Nonylphenol diethoxylates [NP2EO]	E749B	0.10	µg/L	<0.10	--	--	--	--	--	--
Nonylphenol ethoxylates, total	E749B	2.0	µg/L	<2.0	--	200 µg/L	--	--	--	--



Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
<b>Nonylphenols - Continued</b>										
Nonylphenol monoethoxylates [NP1EO]	E749B	2.0	µg/L	<2.0	--	--	--	--	--	--
Nonylphenols [NP]	E749A	1.0	µg/L	<1.0	--	20 µg/L	--	--	--	--
<b>Polychlorinated Biphenyls</b>										
Aroclor 1016	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1221	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1232	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1242	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1248	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1254	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1260	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1262	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1268	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060	--	1 µg/L	0.4 µg/L	--	--	--
Decachlorobiphenyl	E687	0.1	%	116	--	--	--	--	--	--
Tetrachloro-m-xylene	E687	0.1	%	98.2	--	--	--	--	--	--

Please refer to the General Comments section for an explanation of any qualifiers detected.

### Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH 102	Water	Manganese, total		MISSUB	STM	0.136 mg/L	0.05 mg/L
	Water	Biochemical oxygen demand [BOD]		MISSUB	STM	686 mg/L	15 mg/L
	Water	Biochemical oxygen demand [BOD]		RMPSUB	SAN	686 mg/L	300 mg/L
	Water	Carbonaceous biochemical oxygen demand [CBOD]		RMPSUB	SAN	587 mg/L	300 mg/L
	Water	Manganese, total		RMPSUB	STM	0.136 mg/L	0.05 mg/L
	Water	Carbonaceous biochemical oxygen demand [CBOD]		RMPSUB	STM	587 mg/L	15 mg/L



**Key:**

MISSUB	Ontario Mississauga Storm Sewer Use By-Law (0046-2022) (March 2022)
STM	Mississauga Storm Sewer (0046-2022)
RMPSUB	Ontario Reg.Mun. of Peel Sewer Bylaw #53-2010 (APR, 2019)
SAN	Peel Sanitary Sewer (53-2010)
STM	Peel Storm Sewer (53-2010)




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## QUALITY CONTROL INTERPRETIVE REPORT

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<p><b>Work Order</b> : <b>WT2309350</b></p> <p><b>Client</b> : <b>McClymont &amp; Rak Engineers Inc.</b></p> <p><b>Contact</b> : Richard Sukhu</p> <p><b>Address</b> : 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9</p> <p><b>Telephone</b> : 416 675 0160</p> <p><b>Project</b> : 5822</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : 17-620765</p> <p><b>Sampler</b> : BR</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2022 Price List</p> <p><b>No. of samples received</b> : 1</p> <p><b>No. of samples analysed</b> : 1</p>	<p><b>Page</b> : 1 of 13</p> <p><b>Laboratory</b> : Waterloo - Environmental</p> <p><b>Account Manager</b> : Emily Smith</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 13-Apr-2023 17:30</p> <p><b>Issue Date</b> : 25-Apr-2023 18:00</p>
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This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

**Key**

- Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
  - CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
  - DQO: Data Quality Objective.
  - LOR: Limit of Reporting (detection limit).
  - RPD: Relative Percent Difference.
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### ***Workorder Comments***

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Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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### ***Summary of Outliers***

#### ***Outliers : Quality Control Samples***

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

#### ***Outliers: Reference Material (RM) Samples***

- No Reference Material (RM) Sample outliers occur.

***Outliers : Analysis Holding Time Compliance (Breaches)***

- Analysis Holding Time Outliers exist - please see following pages for full details.

***Outliers : Frequency of Quality Control Samples***

- No Quality Control Sample Frequency Outliers occur.





**Outliers : Quality Control Samples**

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Laboratory Control Sample (LCS) Recoveries</b>								
Volatile Organic Compounds	QC-MRG2-9017180 02	----	Methyl ethyl ketone [MEK]	78-93-3	E611D	148 % <sup>LCS-H</sup>	70.0-130%	Recovery greater than upper control limit

**Result Qualifiers**

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Aggregate Organics : Biochemical Oxygen Demand - 5 day</b>										
HDPE [BOD HT-4d] BH 102	E550	13-Apr-2023	----	----	----		20-Apr-2023	4 days	7 days	* EHT
<b>Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day</b>										
HDPE [BOD HT-4d] BH 102	E555	13-Apr-2023	----	----	----		20-Apr-2023	4 days	7 days	* EHT
<b>Aggregate Organics : Mineral Oil &amp; Grease by Gravimetry</b>										
Amber glass (hydrochloric acid) BH 102	E567SG	13-Apr-2023	21-Apr-2023	28 days	8 days	✓	21-Apr-2023	40 days	0 days	✓
<b>Aggregate Organics : Oil &amp; Grease by Gravimetry</b>										
Amber glass (hydrochloric acid) BH 102	E567	13-Apr-2023	21-Apr-2023	28 days	8 days	✓	21-Apr-2023	40 days	0 days	✓
<b>Aggregate Organics : Phenols (4AAP) in Water by Colorimetry</b>										
Amber glass total (sulfuric acid) [ON MECP] BH 102	E562	13-Apr-2023	22-Apr-2023	----	----		22-Apr-2023	28 days	9 days	✓
<b>Anions and Nutrients : Fluoride in Water by IC</b>										
HDPE [ON MECP] BH 102	E235.F	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	28 days	5 days	✓
<b>Anions and Nutrients : Sulfate in Water by IC</b>										
HDPE [ON MECP] BH 102	E235.SO4	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	28 days	5 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)</b>											
<b>Amber glass total (sulfuric acid) [ON MECP]</b> BH 102	E318	13-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	28 days	6 days	✓	
<b>Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)</b>											
<b>Amber glass total (sulfuric acid) [ON MECP]</b> BH 102	E372-U	13-Apr-2023	19-Apr-2023	----	----		20-Apr-2023	28 days	7 days	✓	
<b>Cyanides : Total Cyanide</b>											
<b>HDPE - total (sodium hydroxide)</b> BH 102	E333	13-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	14 days	6 days	✓	
<b>Inorganics : Total Chlorine (Residual) by DPD Colourimetry</b>											
<b>HDPE [ON MECP]</b> BH 102	E326	13-Apr-2023	----	----	----		18-Apr-2023	0.25 hrs	120 hrs	* EHTR-FM	
<b>Microbiological Tests : E. coli (MF-mFC-BCIG)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> BH 102	E012A.EC	13-Apr-2023	----	----	----		14-Apr-2023	48 hrs	28 hrs	✓	
<b>Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode</b>											
<b>Amber glass/Teflon lined cap - LCMS</b> BH 102	E749B	13-Apr-2023	14-Apr-2023	7 days	1 days	✓	14-Apr-2023	7 days	0 days	✓	
<b>Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode</b>											
<b>Amber glass/Teflon lined cap - LCMS</b> BH 102	E749A	13-Apr-2023	14-Apr-2023	7 days	1 days	✓	14-Apr-2023	7 days	0 days	✓	
<b>Phthalate Esters : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS</b>											
<b>Amber glass/Teflon lined cap [ON MECP]</b> BH 102	E655F	13-Apr-2023	18-Apr-2023	14 days	5 days	✓	19-Apr-2023	40 days	1 days	✓	
<b>Physical Tests : pH by Meter</b>											
<b>HDPE [ON MECP]</b> BH 102	E108	13-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	14 days	6 days	✓	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : TSS by Gravimetry</b>											
<b>HDPE [ON MECP]</b> BH 102	E160	13-Apr-2023	----	----	----		18-Apr-2023	7 days	5 days	✓	
<b>Polychlorinated Biphenyls : PCB Aroclors by GC-MS</b>											
<b>Amber glass/Teflon lined cap [ON MECP]</b> BH 102	E687	13-Apr-2023	18-Apr-2023	14 days	5 days	✓	19-Apr-2023	40 days	1 days	✓	
<b>Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS</b>											
<b>Amber glass/Teflon lined cap (sodium bisulfate) [ON MECP]</b> BH 102	E641A	13-Apr-2023	18-Apr-2023	7 days	5 days	✓	18-Apr-2023	40 days	1 days	✓	
<b>Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC</b>											
<b>HDPE - total (sodium hydroxide)</b> BH 102	E532	13-Apr-2023	----	----	----		14-Apr-2023	28 days	1 days	✓	
<b>Total Metals : Total Mercury in Water by CVAAS</b>											
<b>Glass vial total (hydrochloric acid) [ON MECP]</b> BH 102	E508	13-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	28 days	1 days	✓	
<b>Total Metals : Total metals in Water by CRC ICPMS</b>											
<b>HDPE total (nitric acid)</b> BH 102	E420	13-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	180 days	2 days	✓	
<b>Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS</b>											
<b>Glass vial (sodium bisulfate)</b> BH 102	E611D	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	14 days	5 days	✓	

**Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended  
 EHT: Exceeded ALS recommended hold time prior to analysis.  
 Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	897728	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
pH by Meter	E108	901441	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
<b>Laboratory Control Samples (LCS)</b>							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	900969	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	905683	1	16	6.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	905682	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900959	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	900975	1	19	5.2	4.7	✓
pH by Meter	E108	901441	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓



Matrix: **Water**

Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Control Samples (LCS) - Continued</b>							
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
<b>Method Blanks (MB)</b>							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	900969	1	2	50.0	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	897728	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	905683	1	16	6.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	905682	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900959	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	900975	1	19	5.2	4.7	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
<b>Matrix Spikes (MS)</b>							
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
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Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓



Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
<b>Matrix Spikes (MS) - Continued</b>							
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✔
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✔



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC  Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
pH by Meter	E108  Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160  Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Fluoride in Water by IC	E235.F  Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4  Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Chlorine (Residual) by DPD Colourimetry	E326  Waterloo - Environmental	Water	APHA 4500-Cl G (mod)	Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for this test is 15 minutes and field testing is recommended when determining Chlorine concentrations at the time of sampling.  Chlorine if present in a sample container after sampling can be rapidly consumed by any inorganic or organic matter in the sample and dissipates rapidly into headspace.  Laboratory results may be requested when chlorine concentrations that may be present at the time of laboratory analysis are required for the interpretation of other laboratory analysis where the presence of Chlorine may affect results. e.g. laboratory toxicity testing





Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis.  Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Total Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection.  Results are based on an un-filtered, field-preserved sample.
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter.  Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method.  Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K <sub>3</sub> Fe(CN) <sub>6</sub> ) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Mineral Oil & Grease by Gravimetry	E567SG Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F Waterloo - Environmental	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS.
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Waterloo - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Oil & Grease Extraction for Gravimetry	EP567  Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581  Waterloo - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601  Waterloo - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
BNA Extraction	EP655  Waterloo - Environmental	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660  Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749  Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.

## QUALITY CONTROL REPORT

**Work Order** : **WT2309350**

**Client** : McClymont & Rak Engineers Inc.

**Contact** : Richard Sukhu

**Address** : 111 Zenway Blvd. Unit 4  
Vaughan ON Canada L4H 3H9

**Telephone** :

**Project** : 5822

**PO** : ----

**C-O-C number** : 17-620765

**Sampler** : BR 416 675 0160

**Site** : ----

**Quote number** : 2022 Price List

**No. of samples received** : 1

**No. of samples analysed** : 1

**Page** : 1 of 15

**Laboratory** : Waterloo - Environmental

**Account Manager** : Emily Smith

**Address** : 60 Northland Road, Unit 1  
Waterloo, Ontario Canada N2V 2B8

**Telephone** : +1 519 886 6910

**Date Samples Received** : 13-Apr-2023 17:30

**Date Analysis Commenced** : 14-Apr-2023

**Issue Date** : 25-Apr-2023 18:00

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
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Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	Waterloo LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario

Page : 2 of 15  
Work Order : WT2309350  
Client : McClymont & Rak Engineers Inc.  
Project : 5822



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## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

### Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

# = Indicates a QC result that did not meet the ALS DQO.

## Workorder Comments

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Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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### Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Physical Tests (QC Lot: 901162)</b>											
WT2309547-001	Anonymous	Solids, total suspended [TSS]	----	E160	30.0	mg/L	2330	2390	2.37%	20%	----
<b>Physical Tests (QC Lot: 901441)</b>											
WT2309388-001	Anonymous	pH	----	E108	0.10	pH units	7.64	7.75	1.43%	4%	----
<b>Anions and Nutrients (QC Lot: 901447)</b>											
WT2309367-001	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 901448)</b>											
WT2309367-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	70.7	70.2	0.644%	20%	----
<b>Anions and Nutrients (QC Lot: 901840)</b>											
WT2309288-014	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0067	0.0055	0.0012	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 901841)</b>											
HA2300138-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.137	0.144	0.007	Diff <2x LOR	----
<b>Cyanides (QC Lot: 903588)</b>											
EO2302909-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0050	mg/L	0.0074	0.0074	0.00002	Diff <2x LOR	----
<b>Inorganics (QC Lot: 901104)</b>											
WT2309350-001	BH 102	Chlorine, total	7782-50-5	E326	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
<b>Microbiological Tests (QC Lot: 897728)</b>											
WT2309350-001	BH 102	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 897737)</b>											
BF2300013-008	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 898147)</b>											
WT2309350-001	BH 102	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.357	0.392	9.20%	20%	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00102	0.00108	0.00006	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00119	0.00121	0.000020	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.136	0.141	2.96%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Total Metals (QC Lot: 898147) - continued</b>											
WT2309350-001	BH 102	Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0278	0.0292	5.08%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	0.000566	0.000556	0.000011	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	0.00844	0.00832	0.00012	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
<b>Speciated Metals (QC Lot: 897519)</b>											
WT2309024-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
<b>Aggregate Organics (QC Lot: 897340)</b>											
WT2309319-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
<b>Aggregate Organics (QC Lot: 897569)</b>											
WT2309340-002	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
<b>Aggregate Organics (QC Lot: 906864)</b>											
WP2304935-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0026	0.0024	0.0002	Diff <2x LOR	----
<b>Volatile Organic Compounds (QC Lot: 901718)</b>											
WT2309668-001	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	0.75	0.76	0.01	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	3.32	3.42	2.97%	30%	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	5.9	6.0	0.04	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	119	120	1.58%	30%	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	103	113	10	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	0.51	0.58	0.07	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	1.22	1.27	0.05	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	231	236	2.06%	30%	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	4.31	4.37	1.38%	30%	----
<b>Nonylphenols (QC Lot: 897632)</b>											



Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Nonylphenols (QC Lot: 897632) - continued</b>											
WT2309182-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
<b>Nonylphenols (QC Lot: 897633)</b>											
WT2309182-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	10.0	µg/L	<10.0	<10.0	0	Diff <2x LOR	----





## Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Physical Tests (QCLot: 901162)</b>						
Solids, total suspended [TSS]	---	E160	3	mg/L	<3.0	---
<b>Anions and Nutrients (QCLot: 901447)</b>						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 901448)</b>						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
<b>Anions and Nutrients (QCLot: 901840)</b>						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	---
<b>Anions and Nutrients (QCLot: 901841)</b>						
Kjeldahl nitrogen, total [TKN]	---	E318	0.05	mg/L	<0.050	---
<b>Cyanides (QCLot: 903588)</b>						
Cyanide, strong acid dissociable (Total)	---	E333	0.002	mg/L	<0.0020	---
<b>Inorganics (QCLot: 901104)</b>						
Chlorine, total	7782-50-5	E326	0.05	mg/L	<0.050	---
<b>Microbiological Tests (QCLot: 897728)</b>						
Coliforms, Escherichia coli [E. coli]	---	E012A.EC	1	CFU/100mL	<1	---
<b>Total Metals (QCLot: 897737)</b>						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	---
<b>Total Metals (QCLot: 898147)</b>						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	---
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 898147) - continued</b>						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	---
<b>Speciated Metals (QCLot: 897519)</b>						
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	<0.00050	---
<b>Aggregate Organics (QCLot: 897340)</b>						
Biochemical oxygen demand [BOD]	---	E550	2	mg/L	<2.0	---
<b>Aggregate Organics (QCLot: 897569)</b>						
Carbonaceous biochemical oxygen demand [CBOD]	---	E555	2	mg/L	<2.0	---
<b>Aggregate Organics (QCLot: 905682)</b>						
Oil & grease (gravimetric)	---	E567	5	mg/L	<5.0	---
<b>Aggregate Organics (QCLot: 905683)</b>						
Oil & grease, mineral (gravimetric)	---	E567SG	5	mg/L	<5.0	---
<b>Aggregate Organics (QCLot: 906864)</b>						
Phenols, total (4AAP)	---	E562	0.001	mg/L	<0.0010	---
<b>Volatile Organic Compounds (QCLot: 901718)</b>						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	---
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	---
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	---
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	---
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	---
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	---
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	---
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	---
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	---
Styrene	100-42-5	E611D	0.5	µg/L	<0.50	---
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	---
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	---
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	---
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	---
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	---
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	---
<b>Polycyclic Aromatic Hydrocarbons (QCLot: 900959)</b>						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	---
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	---
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Polycyclic Aromatic Hydrocarbons (QCLot: 900959) - continued</b>						
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
<b>Phthalate Esters (QCLot: 900969)</b>						
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	<2.0	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	<1.0	----
<b>Nonylphenols (QCLot: 897632)</b>						
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
<b>Nonylphenols (QCLot: 897633)</b>						
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----
<b>Polychlorinated Biphenyls (QCLot: 900975)</b>						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

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Work Order : WT2309350  
Client : McClymont & Rak Engineers Inc.  
Project : 5822

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## Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 901162)</b>									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.0	85.0	115	----
<b>Physical Tests (QCLot: 901441)</b>									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
<b>Anions and Nutrients (QCLot: 901447)</b>									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
<b>Anions and Nutrients (QCLot: 901448)</b>									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.0	90.0	110	----
<b>Anions and Nutrients (QCLot: 901840)</b>									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.845 mg/L	99.2	80.0	120	----
<b>Anions and Nutrients (QCLot: 901841)</b>									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.6	75.0	125	----
<b>Cyanides (QCLot: 903588)</b>									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	95.6	80.0	120	----
<b>Inorganics (QCLot: 901104)</b>									
Chlorine, total	7782-50-5	E326	0.05	mg/L	0.28861 mg/L	100	75.0	125	----
<b>Total Metals (QCLot: 897737)</b>									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.1	80.0	120	----
<b>Total Metals (QCLot: 898147)</b>									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	94.9	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	98.0	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	103	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	98.4	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	107	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	93.5	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	99.0	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 898147) - continued</b>									
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	101	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	98.4	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	98.4	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	95.1	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	98.8	80.0	120	----
<b>Speciated Metals (QCLot: 897519)</b>									
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	0.025 mg/L	98.8	80.0	120	----
<b>Aggregate Organics (QCLot: 897340)</b>									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	99.2	85.0	115	----
<b>Aggregate Organics (QCLot: 897569)</b>									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	104	85.0	115	----
<b>Aggregate Organics (QCLot: 905682)</b>									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	98.4	70.0	130	----
<b>Aggregate Organics (QCLot: 905683)</b>									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	94.8	70.0	130	----
<b>Aggregate Organics (QCLot: 906864)</b>									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	95.7	85.0	115	----
<b>Volatile Organic Compounds (QCLot: 901718)</b>									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	98.4	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	99.8	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	94.4	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	81.0	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	100	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	108	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	93.7	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	# 148	70.0	130	LCS-H
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
Tetrachloroethane, 1,1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	115	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	89.4	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	88.5	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	98.2	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	89.0	70.0	130	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Volatile Organic Compounds (QCLot: 901718) - continued</b>									
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	96.4	70.0	130	----
<b>Polycyclic Aromatic Hydrocarbons (QCLot: 900959)</b>									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5263 µg/L	107	50.0	140	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5263 µg/L	96.3	50.0	140	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5263 µg/L	95.5	50.0	140	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5263 µg/L	108	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5263 µg/L	98.2	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5263 µg/L	109	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5263 µg/L	102	50.0	140	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5263 µg/L	110	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5263 µg/L	104	50.0	140	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5263 µg/L	111	50.0	140	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5263 µg/L	86.3	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5263 µg/L	114	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5263 µg/L	91.8	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5263 µg/L	94.5	50.0	140	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5263 µg/L	92.9	50.0	140	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5263 µg/L	107	50.0	140	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5263 µg/L	111	50.0	140	----
<b>Phthalate Esters (QCLot: 900969)</b>									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	6.4 µg/L	110	50.0	140	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	6.4 µg/L	102	50.0	140	----
<b>Nonylphenols (QCLot: 897632)</b>									
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	105	75.0	125	----
<b>Nonylphenols (QCLot: 897633)</b>									
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	95.4	75.0	125	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	112	75.0	125	----
<b>Polychlorinated Biphenyls (QCLot: 900975)</b>									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Polychlorinated Biphenyls (QCLot: 900975) - continued</b>									
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	97.2	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	102	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----

### Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.





## Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Anions and Nutrients (QCLot: 901447)</b>										
WT2309367-001	Anonymous	Fluoride	16984-48-8	E235.F	9.67 mg/L	10 mg/L	96.7	75.0	125	----
<b>Anions and Nutrients (QCLot: 901448)</b>										
WT2309367-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	912 mg/L	1000 mg/L	91.2	75.0	125	----
<b>Anions and Nutrients (QCLot: 901840)</b>										
WT2309288-014	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.102 mg/L	0.1 mg/L	102	70.0	130	----
<b>Anions and Nutrients (QCLot: 901841)</b>										
HA2300138-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.73 mg/L	2.5 mg/L	109	70.0	130	----
<b>Cyanides (QCLot: 903588)</b>										
EO2302909-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.229 mg/L	0.25 mg/L	91.7	75.0	125	----
<b>Inorganics (QCLot: 901104)</b>										
WT2309350-001	BH 102	Chlorine, total	7782-50-5	E326	0.250 mg/L	0.28861 mg/L	86.6	70.0	130	----
<b>Total Metals (QCLot: 897737)</b>										
BF2300013-009	Anonymous	Mercury, total	7439-97-6	E508	0.0000975 mg/L	0.0001 mg/L	97.5	70.0	130	----
<b>Total Metals (QCLot: 898147)</b>										
WT2309355-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0998 mg/L	0.1 mg/L	99.8	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0534 mg/L	0.05 mg/L	107	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00510 mg/L	0.005 mg/L	102	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0129 mg/L	0.0125 mg/L	104	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Copper, total	7440-50-8	E420	0.0122 mg/L	0.0125 mg/L	97.9	70.0	130	----
		Lead, total	7439-92-1	E420	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0126 mg/L	0.0125 mg/L	101	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0248 mg/L	0.025 mg/L	99.3	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		Silver, total	7440-22-4	E420	0.00474 mg/L	0.005 mg/L	94.8	70.0	130	----
		Tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0132 mg/L	0.0125 mg/L	106	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Total Metals (QCLot: 898147) - continued</b>										
WT2309355-001	Anonymous	Zinc, total	7440-66-6	E420	0.0237 mg/L	0.025 mg/L	94.8	70.0	130	----
<b>Speciated Metals (QCLot: 897519)</b>										
WT2309024-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
<b>Aggregate Organics (QCLot: 906864)</b>										
WP2304935-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0199 mg/L	0.02 mg/L	99.5	75.0	125	----
<b>Volatile Organic Compounds (QCLot: 901718)</b>										
WT2309668-001	Anonymous	Benzene	71-43-2	E611D	99.9 µg/L	100 µg/L	99.9	60.0	140	----
		Chloroform	67-66-3	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	96.0 µg/L	100 µg/L	96.0	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	83.9 µg/L	100 µg/L	83.9	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Dichloromethane	75-09-2	E611D	106 µg/L	100 µg/L	106	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	104 µg/L	100 µg/L	104	60.0	140	----
		Ethylbenzene	100-41-4	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Styrene	100-42-5	E611D	98.2 µg/L	100 µg/L	98.2	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	116 µg/L	100 µg/L	116	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	91.9 µg/L	100 µg/L	91.9	60.0	140	----
		Toluene	108-88-3	E611D	92.8 µg/L	100 µg/L	92.8	60.0	140	----
		Trichloroethylene	79-01-6	E611D	99.2 µg/L	100 µg/L	99.2	60.0	140	----
Xylene, m+p-	179601-23-1	E611D	ND µg/L	200 µg/L	ND	60.0	140	----		
Xylene, o-	95-47-6	E611D	101 µg/L	100 µg/L	101	60.0	140	----		
<b>Nonylphenols (QCLot: 897632)</b>										
WT2309182-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	12.6 µg/L	10 µg/L	126	60.0	140	----
<b>Nonylphenols (QCLot: 897633)</b>										
WT2309182-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.92 µg/L	1 µg/L	91.5	60.0	140	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	15.2 µg/L	20 µg/L	76.0	60.0	140	----





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Company: Richard Suter Quality Control (QC) Report with Report:  YES  NO

Contact: Richard Suter  Compare Results to Criteria on Report - provide details below if box checked

Phone: Company address below will appear on the final report Select Distribution:  EMAIL  MAIL  FAX

Street: 111 Zenway Blvd Email 1 or Fax: rsuter@macnab.com

City/Province: Vancouver Email 2:

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Company:  Email 1 or Fax:

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Project Information: Oil and Gas Required Fields (client use)

ALS Account # / Quote #:  AFE/Coast Center:  PO#:

Job #: 5822 Major/Minor Code:  Routing Code:

PO/A/E:  Requisitioner:  Location:

LSD:  Location:

ALS Lab Work Order # (lab use only): WT2309350 ALS Contact:

ALS Sample # (lab use only): BH 102 Date: 4/13/23 Time: 9:00 AM Sample Type: GW

Sample Identification and/or Coordinates (This description will appear on the report): Peel Region / Mississauga Storm Sanitary Sewer Bylaw

Drinking Water (DW) Samples (client use) Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

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Waterloo  
Work Order Reference  
WT2309350



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Sample is hazardous (please print)  
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**G5822**

**AUGUST 2023**

**GEOTECHNICAL REPORT  
PROPOSED DEVELOPMENT  
3085 – 3105 HURONTARIO STREET  
MISSISSAUGA, ONTARIO**

**DISTRIBUTION:**

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## 1.0 INTRODUCTION

MCR was retained by Mattamy Homes Canada (the Client), to carry out a geotechnical investigation for the proposed residential and commercial development located at the 3081 – 3095 Hurontario Street, in the City of Mississauga, Ontario (hereafter referred to as ‘the Site’).

The objective of the report was to determine design data required for foundations, dewatering, shoring/excavation, backfill, slab on grade and pavement. The above design and construction issues are addressed in the following report.

## 2.0 SITE CONDITIONS

The site is located on the east side of Hurontario Street, between Kirwin Avenue and Dundas Street East, in the City of Mississauga.

The Site is presently occupied by two [2] storey commercial building, in the southwestern portion and a two [2] storey above grade parking structure on the eastern portion of the Site. The Site is bounded by Kirwin Avenue to the north, residential building to the east, commercial buildings to the south and Hurontario Street to the west.

## 3.0 PROPOSED DEVELOPMENT

The Site is proposed for a residential and commercial development consisting of a forty [40] storey building with four [4] storey podium (Building 1), a forty-four [44] storey building with four [4] storey podium (Building 2), a twenty-eight [28] storey building with six [6] storey podium (Building 3) and a twenty-four [24] storey building with six [6] storey podium (Building 4) over four [4] levels of combined underground parking (Appendix B).

It is understood that the ground floor finished elevation (FFE) ranges from 117.96 to 116.00 m and P4 FFE will be at 100.95 m.



#### **4.0 SITE INVESTIGATION**

Three [3] boreholes, BH 1, BH 2 and BH 101, were drilled at the subject site by Soil-Mat on April 8, 2019, and March 12, 2020 to depths of 7.90, 4.65 and 13.85 m.

Two [2] boreholes, BH 19-3 and BH 19-4, were drilled at the subject site by WSP on July 3, 2019, to depths of 4.40 m.

Two [2] supplementary boreholes, BH 101 and BH 102, were drilled at the subject site by MCR on March 15 and 16, 2023, to depths of 5.05 and 5.35 m.

Monitoring wells were installed in all the boreholes, except BH 1, for long term groundwater monitoring and sampling.

The borehole locations are shown on Drawing No. 1 and borehole logs by MCR and others are enclosed in Appendices B and C.

Soil samples were taken using the Standard Penetration Test (SPT) method and were placed in clean, sealed plastic bags in the field and transported back to our laboratory where they were further examined for soil characterization.

Selected samples were transported to Bureau Veritas to be tested for common corrosion parameters, including pH, resistivity, oxygen reduction potential (redox), chlorides and sulphate content. The laboratory test results are presented in Appendix D.

The elevation of the borehole by Soil-Mat was determined relative to a geodetic benchmark, described as the door sill located on the north face of the existing building located at 3085 Hurontario Street West, with the reported geodetic elevation of 116.40 metres, all as per the Site Servicing and Grading Plan drawing by McConnell Maughan Limited Plan 313E-2., dated July 1986.

MCR borehole elevations referred to in this report are geodetic and metric and are interpolated from the survey plans by R-PE Surveying Ltd., dated February 24, 2021.

## 5.0 SOIL AND GROUNDWATER CONDITIONS

Subsurface conditions encountered at the borehole locations are shown on Borehole Log Sheets, attached in Appendices Band C, and summarized on a Soil Profile/Drawing No. 2&3, as follows:

**Pavement:** A layer of asphalt, 100 to 200 mm in thickness, was present at the surface of BH 1, BH 2, and BH 101 (by Soil-Mat) and BH 101 (by MCR) and was followed by 150 to 250 mm of granular fill. A layer of concrete, 165 to 200 mm in thickness, was present at the surface of BH 19-3 (by WSP) and BH 102 (by MCR) and was followed by 150 to mm of granular fill in BH 102.

Possible topsoil with approximate 100 mm thickness was observed at the surface of BH 19-4 (by WSP).

**For the purpose of offsite disposal, the type/quality and extent of the existing fill should be explored by further test pit/borehole investigation prior to contract award.**

**Sand/Silty Sand Till:** Loose to very dense layer sand/silty sand till was detected below the pavement/possible topsoil in all boreholes and extended to depths of 1.75 to 3.65 m. The brown/light brown/dark brown sand/silty sand till deposit was in moist to wet condition and contained trace gravel and boulder, some silt and occasional organics in upper level.

**Clayey Silt (Till):** Very stiff to hard clayey silt (till) was encountered below the sand/silty sand (till) in BH 1, BH 2 and BH 101 (by Soil-Mat), BH 19-3 and BH19-4 (by WSP) and BH 102 (by MCR) and extended to the underlying weathered shale at depths of 2.45 to 4.30 m. The grey clayey silt (till) deposit was in a moist to wet condition and contained trace of sand and gravel.

**Silty Sand Till/Weathered Shale Complex:** Very dense silty sand till/weathered shale complex was found below the silty sand till in BH 101 (by MCR) and extended to the underlying weathered shale at a depth of 4.60 m. The brown silty sand till/weathered shale complex was in a wet condition and contained trace gravel.

It should be noted that the till/sand soil is an unsorted sediment; therefore, boulders and cobbles are anticipated.

**Shale Bedrock:** Weathered shale bedrock was spotted below the clayey silt (till)/silty sand till/weathered shale complex in all boreholes at about depth of 2.45 to 4.60 m, i.e., at about Elevations of 114.00 to 111.25 m, and extended to the maximum depth of the borehole.

The surface of the shale bedrock will vary across the site; therefore, it should be confirmed by further borehole investigation and during foundation installations.

**Groundwater:** Upon completion of drilling, BH 101 (by Soil-Mat) remained dry. Groundwater level was not measured in BH 101 and BH 102 (by MCR) upon completion of drilling. The results of groundwater level monitoring are summarized in Table 1.

Table 1 – Groundwater Level Monitoring Results

Monitoring Well Id	Ground Surface Elevation (masl)	Water Level (mbgs)	Groundwater Elevation (masl)	Date of Measurement (mm/dd/yyyy)	Depth of Well (mbgs)	Depth of Bentonite (mbgs)	Length of Screen (m)	Inside Diameter of Pipe (mm)	Top of Monitoring Well
<b>Boreholes by Soil-Mat</b>									
BH 2	116.15	3.10	113.05	04/24/2019	4.40	2.80	1.52	50	Flush Mount
		3.00	113.15	05/07/2019					
		3.10	113.05	04/17/2020					
BH 101	116.23	4.60	111.63	03/27/2020	13.63	4.30	9.20	50	Flush Mount
		4.50	111.73	04/17/2020					
<b>Boreholes by WSP</b>									
BH 19-3	115.51	2.51	113.00	8/9/2019	3.55	1.85	3.05	50	Flush Mount
BH 19-4	118.26	3.13	115.13	8/9/2019	3.55	1.85	3.05	50	Flush Mount
<b>Boreholes by MCR</b>									
BH 101	116.95	1.83	115.12	04/11/2023	4.57	0.91	3.05	50	Flush Mount
BH 102	116.47	3.71	112.76	04/11/2023	5.33	1.68	3.05	50	Flush Mount
<b>Min</b>	115.51	1.83	111.63	-	3.55	-	-	-	-
<b>Max</b>	118.26	4.60	115.13	-	13.63	-	-	-	-
<b>Average</b>	116.60	3.28	113.18	-	5.84	-	-	-	-

Please note that the groundwater levels are subject to seasonal fluctuations. Consequently, definitive information on the long-term groundwater levels could not be obtained at the present time.

The sedimentary bedrock may contain waterbearing bedding planes. When these bedding planes are intercepted in rock excavation, caissons or elevator pistons etc., a substantial amount of water, often under a hydrostatic head may be encountered.

A Geohydrology assessment study is completed by MCR and the results are presented in a separate report.

## 6.0 FOUNDATION

The Site is proposed for a residential and commercial development consisting of a forty [40] storey building with four [4] storey podium (Building 1), a forty-four [44] storey building with four [4] storey podium (Building 2), a twenty-eight [28] storey building with six [6] storey podium (Building 3) and a twenty-four [24] storey building with six [6] storey podium (Building 4) over four [4] levels of combined underground parking (Appendix B).

It is understood that the ground floor finished elevation (FFE) ranges from 117.96 to 116.00 m and P4 FFE will be at 100.95 m.

Based on the encountered soil/rock foundation conditions, the proposed development, with four U/G parking levels, can be supported on a spread/strip footings founded in sound shale bedrock.

The recommendations are based on the current information and design. Should changes are made during the design phase or construction, this office must be informed and retained to modify recommendations accordingly or propose additional field work.

## 6.1 SPREAD/STRIP FOOTINGS

The proposed footings could be proportioned using the following bearing resistance:

Factored Bearing Resistance at ULS = 7000 kPa

Bearing Resistance at SLS = 5000 kPa

When founded in sound shale bedrock at or below Elevations of 100.45 m, and at least 1.50 m below the surface of the shale bedrock, subject to design grades and the depth of shale bedrock across the site.

Coefficient of Subgrade Reaction  $k$  (for sound shale) = 100 MN/m<sup>3</sup> is considered applicable.

## 6.2 GENERAL FOUNDATION NOTES

It is recommended that your excavation and construction contract provisions include unit prices for excavation into wet soils which may contain cobbles, boulders and erratic rock to minimize potential unexpected extra costs during excavation and foundation installations.

Adjacent footings, founded at different elevations, preferably are to be stepped at 10 horizontal to 7 vertical, subject to rock condition during excavations.

For frost protection requirements, the exterior footings and footings in unheated areas in unheated P4 areas must have a minimum shale bedrock cover of 0.5 m.

Any water or loose materials must be removed from the footing bases prior to placing concrete.

The recommended resistance at SLS allows for up to 25 mm of total settlement. Potential differential settlements are to be evaluated after completion of the foundation drawings.

Furthermore, the recommended bearing resistance and foundation elevations

have been calculated from the limited borehole information and are intended for design purposes only.

More specific information with respect to rock/foundation conditions will be available when the proposed shoring/foundation construction is underway. Therefore, the encountered rock/foundation conditions must be verified in the field, and footings must be inspected and approved by our office prior to placement of concrete.

## 7.0 EARTHQUAKE CONSIDERATION

The building must be designed to resist a minimum earthquake force. The National Building Code specifies that the building be designed to withstand a minimum lateral seismic force,  $V$ , which is assumed to act non-currently in any direction on the building as per the following expression:

$$V = S(T_a) M_v I_E W / R_d R_o$$

It should be noted that  $V$  shall not be less than:

$$S(2.0) M_v I_E W / R_d R_o$$

In addition, the SFRS (Seismic Force Resisting System (s)) with  $R_d$  equal to or greater than 1.5,  $V$  should not be greater than:

$$2/3 S(0.2) I_E W / R_d R_o$$

Where  $S(T_a)$  shall be calculated by  $S_a(T_a)F_a$  or  $S_a(T_a)F_v$ , depending on fundamental lateral period  $T_a$ . The terms, which are relevant to the geotechnical conditions at the site, are acceleration-based site coefficient  $F_a$  and velocity-based site coefficient  $F_v$ .

For the subject site, classified as Class B based on the borehole information, the applicable values of  $F_a$  and  $F_v$  are 0.8. and 0.6, respectively. A structural consultant should review all factors.

## 8.0 BASEMENT WALLS

Underground parking walls should be designed to resist a pressure "p", at any depth, "h" below the surface, as given by the expression:

$$p = K[\gamma h + q]$$

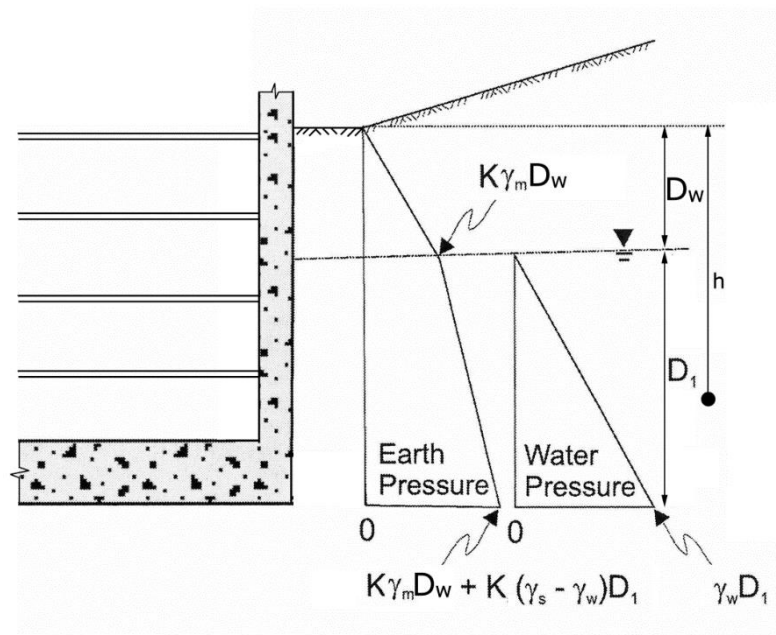
Where:  $K = 0.40$  is the earth pressure coefficient considered applicable  
 $K = 0.25$  is the shale pressure coefficient considered applicable  
 $\gamma = 21.7 \text{ kN/m}^3$  is the unit weight of backfill  
 $q$  = an allowance for surcharge.

The above equation assumes that perimeter drains will be provided and that the backfill against subsurface walls, where applicable, would be a free draining granular material.

However, subject to further groundwater monitoring results, we suggest that perimeter walls below the groundwater level be designed for hydrostatic pressure to resist a pressure "p", at any depth "h" below the surface, as given by the expression:

$$p = \begin{cases} Kq + K\gamma_m h & h \leq D_w \\ Kq + K\gamma_w D_w + K(\gamma_s - \gamma_w)(h - D_w) + \gamma_w(h - D_w) & h > D_w \end{cases}$$

Where:  $K = 0.50$  is the earth pressure coefficient considered applicable  
 $K = 0.25$  is the shale pressure coefficient considered applicable  
 $\gamma_m = 20 \text{ kN/m}^3$  is moist or wet soil unit weight  
 $\gamma_s = 21.7 \text{ kN/m}^3$  is saturated soil unit weight  
 $\gamma_w = 9.80 \text{ kN/m}^3$  is the unit weight of water  
 $q$  = an allowance for surcharge



## 9.0 DEWATERING

The excavation for the proposed underground parking will extend below the groundwater table.

For soldier pile/lagging, to protect the sides of the excavation from being disturbed by excess groundwater pressure, i.e. to prevent quick sand/dilating silt conditions, the **water table must initially be lowered to at least 1.0 m below the top of bedrock.**

The selected dewatering system, eductors/well points/deep inclined rock embedded wells, designed by a speciality contractor, will be most effective if it is installed and activated at the earliest opportunity during general excavation.

To control potential localized groundwater influx, bedrock could be trenched, and temporary sump pumps installed.

The dewatering contract must be performance driven and the contractor must provide a performance bond. In addition, upon completion of system's installation, contractor must produce a written statement that "The system installed is robust enough to lower and maintain groundwater at least 1.0 m below the lowest footing/shaft elevation, without impacting the integrity of shoring or foundation soils.



Where caisson wall shoring is required, any breaches in caisson wall shoring might result in localized piping. Creation of piping channels might increase the volume of both temporary dewatering and permanent drainage. It is critical that during general excavation **potential formation of localized piping be carefully evaluated and appropriate corrective measures implemented.**

In addition, a pre-construction survey of adjacent structures/roads should be carried out prior to the dewatering/shoring construction stage. Potential adverse effects on adjacent structures, due to the dewatering must be assessed/quantified and suitable preventive/remedial measures implemented.

## 10.0 EXCAVATION AND BACKFILL

Excess soils shall be managed in accordance to O. Reg. 406/19. As of January 1, 2022, the Project Leader may be required to file a notice in the registry as prescribed under Section 8 of the regulation. The notice shall contain the information set out in Schedule 1 of the regulation. Before the notice is filed the Project Leader shall ensure that a Qualified Person (Qualified Person within the meaning of Section 5 or 6 of O. Reg. 153/04) prepares the documents, as required, under Sections 11, 12, 13 of the regulation.

The Project Leader shall, if required to file a notice and before removing excess soil from the project area, develop and apply a tracking system in accordance with the Soil Rules, to track each load of excess soil during its transportation and deposit.

No major problems will be encountered for the anticipated depth of general excavations, carried out within a shoring wall enclosure.

The excavation in weathered shale bedrock can be carried out with a heavy-duty backhoe. However, the shoring/foundation contractor must be aware that the harder and thick limestone/dolostone slabs are interbedded with the shale bedrock.

For excavation above the water table, the anticipated water seepage, if any, into the excavations from the more permeable seams/lenses or surface run-off can be handled by conventional pumping methods.

A dewatering system such as eductors/well points/deep inclined wells embedded in bedrock will be required for excavation at/below the groundwater level, above bedrock, subject to long term groundwater monitoring results.

In service trenches (outside the building), the fill should be suitable for compaction, i.e. free of limestone fragments of a size greater than 150 mm, and with natural moisture content, which is within 2 percent of the optimum moisture content.

The backfill material should be compacted to at least 98 percent of the Standard Proctor Maximum Dry Density (SPMDD).

The backfill under floor slab against subsurface walls, where applicable, should be free draining granular fill, preferably conforming to the Ontario Provincial Standard Specification for granular base course, Granular B.

## **11.0 SHORING**

A shoring system should be designed to protect adjacent structures and services. The fourth edition of the Foundation Manual should be referred to for the design of the shoring system.

It should be noted that groundwater and cobbles/boulders might be encountered during soldier pile/caisson construction, and the contractor must be prepared to deal with boulders and water seepage into the caisson shafts without undue delays.

Specifically, the shoring contractor may experience difficulties during the drilling the much harder/thick limestone slabs.

Subject to groundwater conditions/monitoring results; it might be difficult to prevent groundwater from penetrating into the excavation through gaps in timber lagging.

The geotechnical parameters, which are considered to be applicable for the design, are as follows:

Active earth pressure coefficient  $K_a = 0.45$  for walls in areas where structures or sensitive services are being supported.

Active earth pressure coefficient  $K_a = 0.28$  for remaining areas.

Natural unit weight of soil =  $21.7 \text{ kN/m}^3$

Passive pressure coefficient in shale bedrock  $K_p = 5$

Any surcharge loads must be included in the lateral pressure calculations.

Lateral movements of the shoring wall, designed using  $K_a = 0.28$ , are expected to be in order of 15 mm. They are expected to be less if  $K_a$  value of 0.45 is used. The expected movements are based on a properly constructed system.

The horizontal and vertical movements should be monitored during construction to ensure satisfactory performance of the shoring system.

The soil and rock anchors should be designed for 20 and 600 kPa respectively subject to confirmation by on-site load tests. It is re-iterated that subsurface conditions **may vary beyond the site's confines**. As a result, the design values must be confirmed by at least two load tests, carried out to twice the design load.

It is imperative that a stability analysis of the entire support system is undertaken prior to commencement of construction. The final shoring design should be reviewed by our office.

Space and groundwater influx permitting, lowest parking level could be excavated "neat" into the rock face. A sufficient rock bench/rock bolts will be required to secure the integrity of the shoring system.

The exposed rock face could be shotcreted (if required) and covered as shown on Drawing No. 4, subject to site condition/field inspection during excavation.

The shoring system and surrounding structures must be monitored for horizontal and vertical movements, prior to, during and after the excavation.

In addition, a pre-construction survey of adjacent structures/roads should be carried out prior to the shoring/design/construction stage. Any potential adverse effect on adjacent structures should be assessed and suitable preventive/remedial measures implemented.

## **12.0 SLAB ON GRADE AND PERMANENT DRAINAGE**

The lowest garage floor slabs can be constructed as slab on grade (SOG), supported by shale bedrock.

Upon completion of foundation work, the SOG should rest on a well compacted bed of size 19 mm clear stone at least 200 mm thick. The stone bed would act as a barrier and prevent capillary rise of moisture from the subgrade to the floor slab.

A permanent Private Water Drainage System (PWDS), as shown on Drawings No. 4 and 5, where shoring is constructed, should be considered. Please note that MCR does not prepare working/shop drawings for the PWDS.

To minimize siltation, all drainage pipe connections must be solid slotted PVC, with elbows and Ts, no “butt” end connections should be permitted. The pipes should slope to a sump at a minimum 1% slope.

Perimeter drainage pipes, with a positive gravity outlet, should be solid and slotted PVC with a minimum of 0.5% slope. In addition, silt traps must be provided at convenient/accessible locations.

We request that PWDS drawings indicate design elevations for both perimeter and underfloor installation. MCR will provide calculations for sizing of permanent pumps, when required.

Upon completion of general excavation, scope and adequacy of the PWDS is to be re-evaluated. The installation of PWDS must be inspected by our office, prior to placement of filter stone.

Any design changes must be approved by the architect and reflected on mandatory

as built drawings\*.

\* A copy of this section “Slab on grade and Permanent Water Drainage System” page should be posted at a site office as a permanent display.

In addition, the elevator pit should be fully waterproofed as shown on Drawing No. 6.

### **13.0 PAVEMENT**

The critical section of pavement will be at the transition from the infinitely rigid substructure onto soil/backfill subgrade.

As a result, we suggest that an approach type slab be considered to protect underground utilities (on the City’s property) at the entrance/exit points, as shown on Drawing No. 7.

The approach slab will alleviate detrimental effects of dynamic loading/settlement/pavement depression in the backfill to the rigid substructure.

Subject to the anticipated road traffic volumes/AADT/axle loads, the pavement structural design matrix as per City of Mississauga Standards presented in Table 2 and attached in Appendix E, must be followed.

In pavement areas, any organic soil/topsoil/loose fill should be removed (subject to field inspection) and the base should be thoroughly proof-rolled. Any soft spots revealed during proof rolling should be sub-excavated and backfilled with suitable materials, compacted to 98 % SPMDD.

The natural soil is of a low permeability and frost susceptible. The design of pavement is therefore mainly influenced by the need to minimize the effects of freezing and thawing. Consequently, the ground must not be unnecessarily disturbed and drainage must be provided.

The subgrade should be sloped at least 2% to facilitate drainage towards catch basins and the final subgrade should be compacted before the pavement is constructed.

**Table 2 – Pavement Structural Design Matrix as Per City of Mississauga**

Class of Road	Structural Road Component	Minimum Structural Road Depth (mm)				
		1	3	5	7	
Arterial / Industrial & Residential / Collector Local Industrial	Top Course Asphalt	40	40	40	40	
	Base Course Asphalt	60	85	100	100	
	Granular Base	200	200	200	200	
	Granular Sub-Base	65	325	400	400	
	<b>Total Depth</b>	<b>365</b>	<b>650</b>	<b>740</b>	<b>740</b>	
Minor Local Industrial / Minor Residential / Collector	Top Course Asphalt	40	40	40	40	
	Base Course Asphalt	50	85	100	100	
	Granular Base	200	200	200	200	
	Granular Sub-Base	0	225	325	360	
	<b>Total Depth</b>	<b>290</b>	<b>580</b>	<b>665</b>	<b>700</b>	
Residential (Minor Local/Local)	Top Course Asphalt	40	40	40	40	
	Base Course Asphalt	50	85	85	100	
	Granular Base	200	200	200	200	
	Granular Sub-Base	0	175	235	250	
	<b>Total Depth</b>	<b>290</b>	<b>500</b>	<b>560</b>	<b>590</b>	
Frost Susceptibility Factor	1 (80% Sand)	3 (30% MAX. Silt; 30% MIN. Sand)	5	7	11 (55% MAX. Silt)	15 (+55% Silt)

A typical pavement structure above garage roof slab, please see Drawings No. 8 and 9.

It should be noted that the subgrade should be dry, not spongy, during the compaction and construction of the [sub] base.

Soft or spongy subgrade areas should also be sub-excavated and properly replaced with suitable approved backfill, compacted to 98 % SPMDD.

The subgrade will suffer strength regression if water is allowed to infiltrate into the mantle. Therefore, sub-drains should be installed (subject to field inspection) to prevent surface water from infiltrating into the road subgrade.

For construction of concrete curbs, it is recommended that the concrete curbs be constructed on a granular base of at least 300 mm thick of granular A material, subject to pavement design.

In addition, in soft and/or wet areas Geotextile filter fabric/Geogrid may have to be used.

All granular materials used in the pavement construction should be compacted to 100 % of the Standard Proctor Maximum Dry Density.

Should the proposed roads be constructed during wet seasons, the moisture content in the subgrade will probably be above the optimum, and this will render its shear strength inadequate to support paving equipment traffic. In the above case, the granular sub/base should be replaced by an equal thickness of compacted size 50 mm Crusher-Run Limestone.

## **14.0 CHEMICAL PROPERTIES OF THE SOIL**

One (1) sample from BH 101 (by MCR) was submitted to Bureau Veritas to be tested for common corrosion parameters, including pH, resistivity, oxygen reduction potential (redox), chlorides, sulfides and sulphate content. The laboratory test results are presented in Appendix D.

### **14.1 CORROSIVITY**

The results regarding corrosivity of the subsurface soil and the corresponding points based on American Water Works Association (AWWA) document, “Polyethylene Encasement for Ductile-Iron Pipe Systems” ANSI/AWWA C105/A21.5-18, dated December 1, 2018, are presented in Table 3.

**Table 3 – Results of Soil Corrosivity Potential**

Sample ID	Depth (m)	Parameter	Measured Value	ANSI/AWWA Point Rating	Total ANSI/AWWA Points
BH101 SS5	2.44	Sulphide (%)	0.00015	2	13
		pH	7.83	0	
		Resistivity (ohm.cm)	1100	10	
		Redox Potential (mV)	260	0	
		Moisture (%)	14	1	

According to AWWA ten points indicates that soil is corrosive to ductile-iron pipe; protection is needed. It should be noted that the analytical results only provide an indication of the potential for corrosion.

## 14.2 SULPHATE ATTACK

The concentration of water-soluble sulphate content of the tested sample was 0.004% which is below the CSA Standard of 0.1% water-soluble sulphate (Table 3 - Additional Requirements for Concrete Subjected to Sulphate Attack from Canadian Standard CSA A23.1). Therefore, no particular protection measure, such as special concrete mix, against sulphate attack needs to be implemented.



## **15.0 GENERAL COMMENTS**

The comments given in this report are intended only as guidance for design engineers and are subject to field verification during construction. As more specific subsurface information, with respect to conditions between boreholes becomes available during excavations on the subject site, this report should be updated.

Contractors bidding on or undertaking the work should decide on their own investigations, as well as their own interpretations of the factual borehole results. This concern specifically applies to the classification of the subsurface soil and the potential reuse of these soils on/off site.

The contractors must draw their own conclusions as to how the near surface and subsurface conditions may affect them.

We trust this report contains information requested at this time. However, if any clarification is required or if we can be of further assistance, please call us.

Respectfully,  
MCR ENGINEERS LTD.

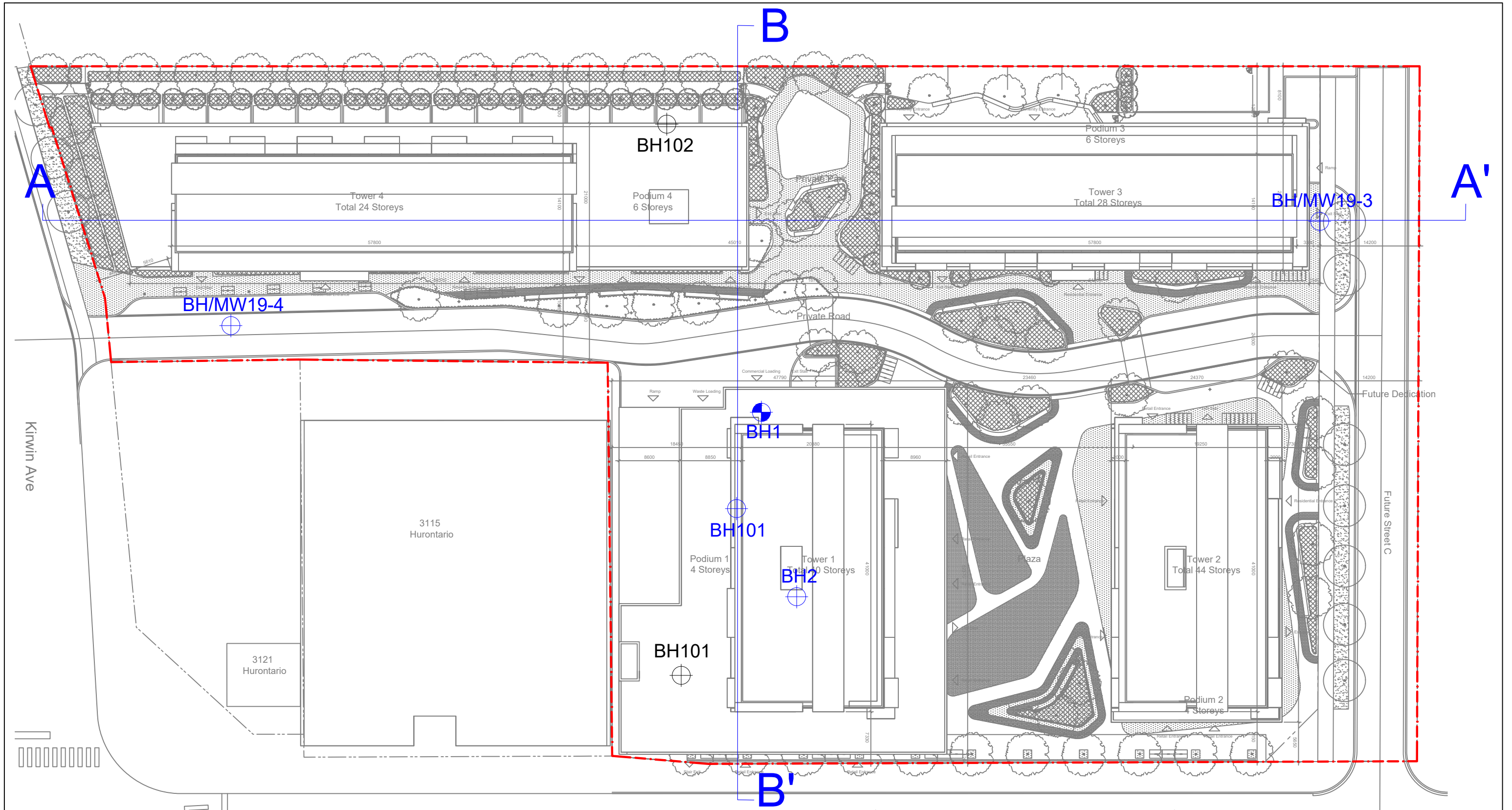


S. Tavassoli, M.Sc., E.I.T.



L.J. Rak, M.Eng., P.Eng.

# FIGURES



**LEGEND:**

- PROPERTY BOUNDARY
- ⊕ MONITORING WELL INSTALLED BY MCR, 2023
- ⊕⊕ BORHOLE/MONITORING WELL BY OTHERS, 2019

Drawing Notes: Image drafted from property survey, Toronto Maps, Google Maps, and site inspections. Not for construction purposes.

PROJECT NORTH

TRUE NORTH

0 5 10 20

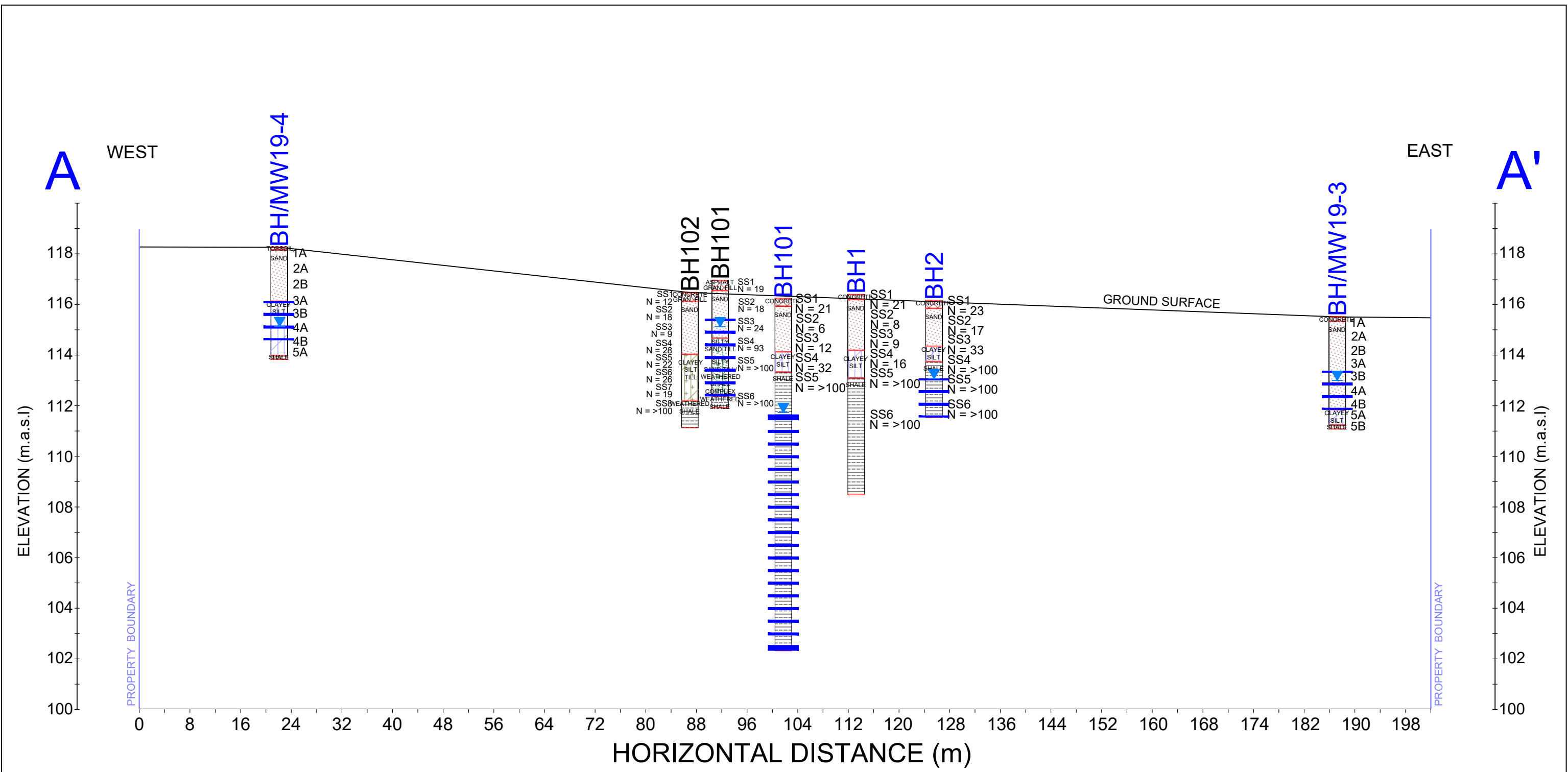
SCALE (m)

**MOR** | MCR ENGINEERS LTD  
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

BOREHOLE LOCATION PLAN

Project No. GE5822	Date AUGUST 2023	Drawn by: CM	Checked by: ST	Drawing No. 1
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**LEGEND:**

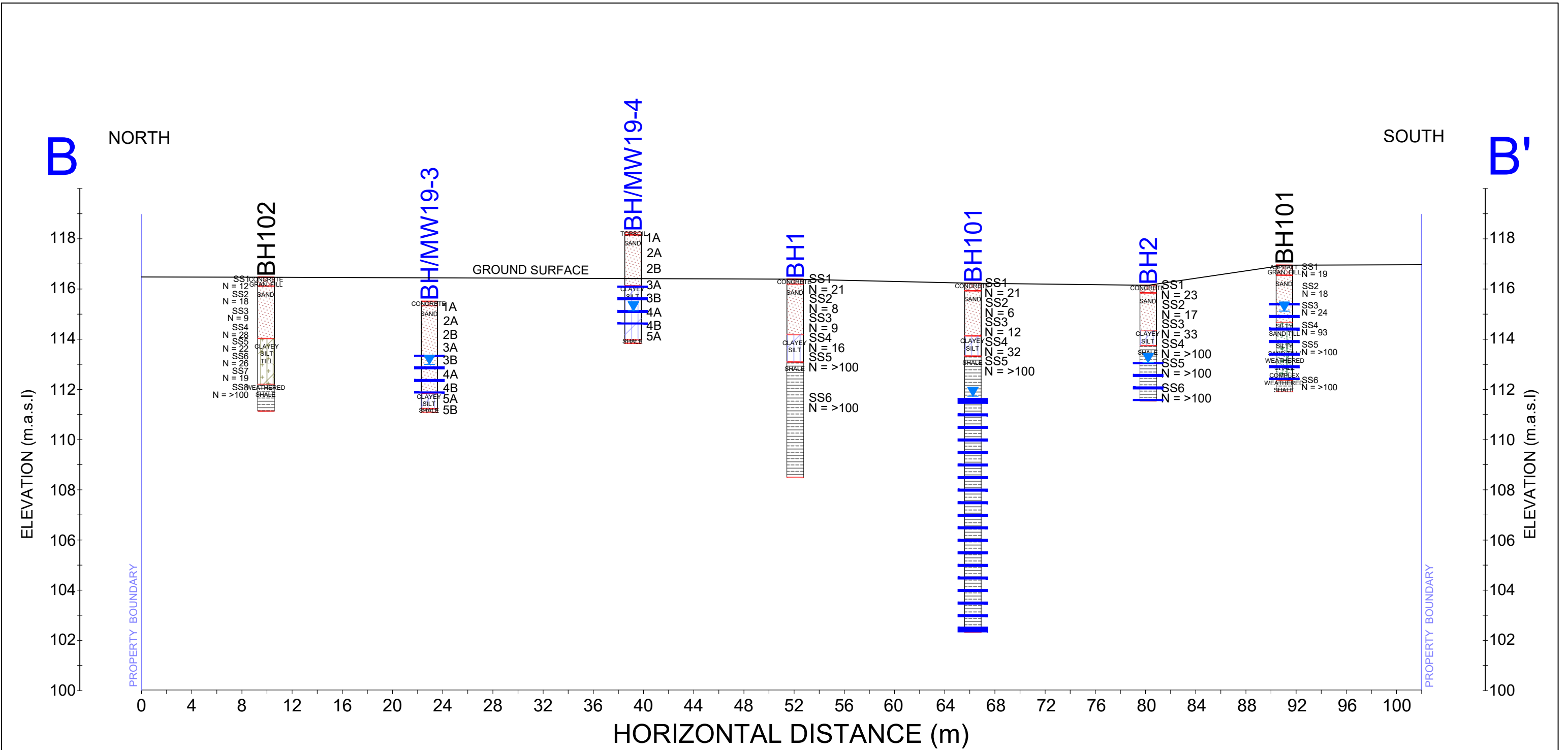
	SCREENED INTERVALS		FILL		SHALE		SANDY SILT
	ELEVATION MARK (masl)		SAND		SILT		SILTY SAND
	APPROXIMATE WATER LEVEL		CLAYEY SILT				

**MOR** | MCR ENGINEERS LTD  
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

**CROSS-SECTION A-A'**

Project No. GE5822	Date AUGUST 2023	Drawn by: CM	Checked by: ST	Drawing No. 2
-----------------------	---------------------	-----------------	-------------------	------------------



**LEGEND:**

	SCREENED INTERVALS		FILL		SHALE		SANDY SILT
	ELEVATION MARK (masl)		SAND		SILT		SILTY SAND
	APPROXIMATE WATER LEVEL		CLAYEY SILT				

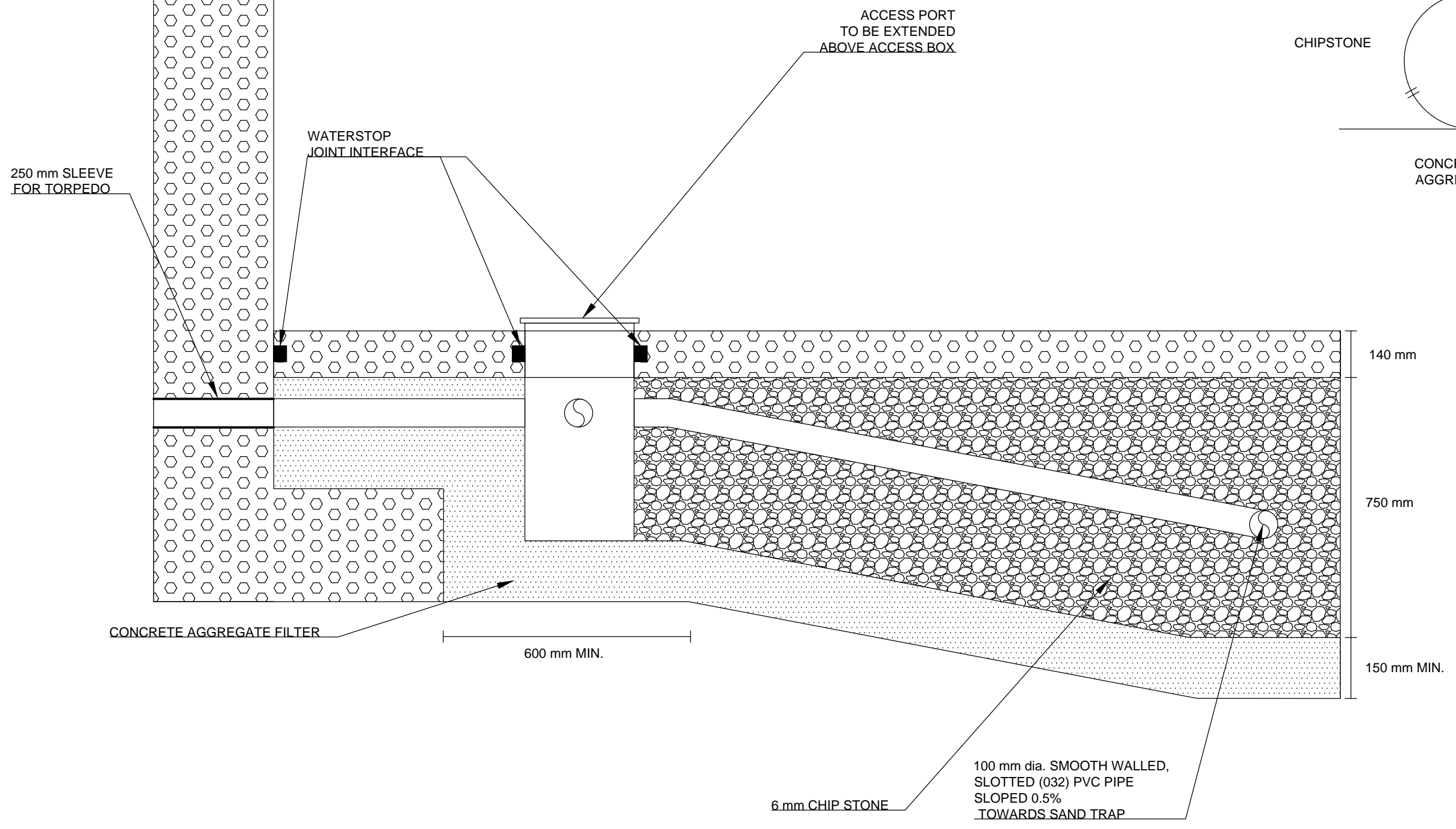
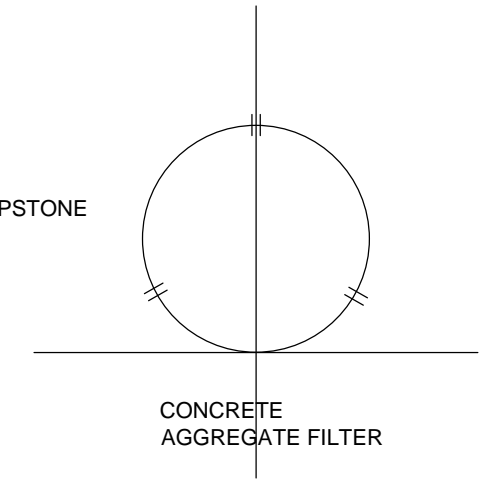
**MOR** | MCR ENGINEERS LTD  
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

**CROSS-SECTION B-B'**

Project No. GE5822	Date AUGUST 2023	Drawn by: CM	Checked by: ST	Drawing No. 3
-----------------------	---------------------	-----------------	-------------------	------------------

CROSS SECTION:  
100 mm dia.  
SMOOTH PVC PIPE



PRIVATE WATER  
DRAINAGE SYSTEM

# **TABLES**



**McCLYMONT AND RAK ENGINEERS INC.**  
**GEO-ENVIRONMENTAL CONSULTANTS**

**TABLE 1**  
**CONSTRUCTION DETAILS AND ELEVATION OF MONITORING WELLS**

MONITORING WELL ID	GROUND SURFACE ELEVATION (masl)	WATER LEVEL (mbgs)	GROUNDWATER ELEVATION (masl)	DATE OF MEASUREMENT (mm/dd/yyyy)	DEPTH OF WELL (mbgs)	DEPTH OF BENTONITE (mbgs)	LENGTH OF SCREEN (m)	INSIDE DIAMETER OF PIPE (mm)	TOP OF MONITORING WELL
<b>Boreholes by Soil-Mat</b>									
BH 2	116.15	3.10	113.05	04/24/2019	4.40	2.80	1.52	50	FLUSH MOUNT
		3.00	113.15	05/07/2019					
		3.10	113.05	04/17/2020					
BH 101	116.23	4.60	111.63	03/27/2020	13.63	4.30	9.20	50	FLUSH MOUNT
		4.50	111.73	04/17/2020					
<b>Boreholes by WSP</b>									
BH 19-3	115.51	2.51	113.00	8/9/2019	3.55	1.85	3.05	50	FLUSH MOUNT
BH 19-4	118.26	3.13	115.13	8/9/2019	3.55	1.85	3.05	50	FLUSH MOUNT
<b>Boreholes by MCR</b>									
BH 101	116.95	1.83	115.12	04/11/2023	4.57	0.91	3.05	50	FLUSH MOUNT
BH 102	116.47	3.71	112.76	04/11/2023	5.33	1.68	3.05	50	FLUSH MOUNT
<b>Min</b>	115.51	1.83	111.63	-	3.55	-	-	-	-
<b>Max</b>	118.26	4.60	115.13	-	13.63	-	-	-	-
<b>Average</b>	116.60	3.28	113.18	-	5.84	-	-	-	-

**NOTE:**

*mbgs - meters below ground surface*

*masl - meters above sea level*

*N/A - Not Applicable*

*NF - Not Found*



**McCLYMONT AND RAK ENGINEERS INC.**  
**GEO-ENVIRONMENTAL CONSULTANTS**

**TABLE 2**  
**GROUNDWATER ANALYTICAL RESULTS - PEEL REGION SEWERS BY-LAW DISCHARGE CRITERIA**  
**MCR JOB#: G5822**  
**SITE ADDRESS: 3085 - 3105 Hurontario Street, Mississauga, ON**

PARAMETER	UNITS	LIMITS FOR STORM SEWER DISCHARGE	LIMITS FOR SANITARY & COMBINED SEWERS DISCHARGE	BH 102
				13-Apr-23
pH	pH Units	6.0 - 9.0	5.5 - 10.0	8.05
Total Suspended Solids	mg/L	15	350	7
Fluoride (F-)	mg/L	-	10	0.199
Total Kjeldahl Nitrogen (TKN)	mg/L	1	100	0.398
Total Phosphorus (P)	mg/L	0.4	10	0.093
Sulfate (SO4)	mg/L	-	1500	35.5
Total Cyanide (CN)	mg/L	0.02	2	<0.0020
Escherichia Coli	CFU/100mL	200	-	<1
Total Aluminum (Al)	mg/L	-	50	0.357
Total Antimony (Sb)	mg/L	-	5	<0.00100
Total Arsenic (As)	mg/L	0.02	1	<0.00100
Total Cadmium (Cd)	mg/L	0.008	0.7	<0.0000500
Total Chromium (Cr)	mg/L	0.08	5	<0.00500
Total Cobalt (Co)	mg/L	-	5	0.00102
Total Copper (Cu)	mg/L	0.05	3	<0.00500
Total Lead (Pb)	mg/L	0.12	3	0.00119
Total Manganese (Mn)	mg/L	0.05	5	<b>0.136</b>
Total Mercury (Hg)	mg/L	0.0004	0.01	<0.0000050
Total Molybdenum (Mo)	mg/L	-	5	0.0278
Total Nickel (Ni)	mg/L	0.08	3	<0.00500
Total Selenium (Se)	mg/L	0.02	1	0.000566
Total Silver (Ag)	mg/L	0.12	5	<0.000100
Total Tin (Sn)	mg/L	-	5	<0.00100
Total Titanium (Ti)	mg/L	-	5	0.00844
Total Zinc (Zn)	mg/L	0.04	3	<0.0300
Biological Oxygen Demand	mg/L	15	300	<b>686</b>
Total Oil & Grease (Animal/Vegetable)	mg/L	-	150	<5.0
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	<5.0
Phenols-4AAP	mg/L	0.008	1	0.0013
Benzene	µg/L	2	10	<0.50
Chloroform	µg/L	2	40	<0.50
1,2-Dichlorobenzene	µg/L	5.6	50	<0.50
1,4-Dichlorobenzene	µg/L	6.8	80	<0.50
cis-1,2-Dichloroethylene	µg/L	5.6	4000	<0.50
Dichloromethane (Methylene Chloride)	µg/L	5.2	2000	<1.0
trans-1,3-Dichloropropene	µg/L	5.6	140	<0.30
Ethylbenzene	µg/L	2	160	<0.50
Methyl Ethyl Ketone	µg/L	-	8000	<20
Styrene	µg/L	-	200	<0.50
1,1,1,2-Tetrachloroethane	µg/L	17	1400	<0.50
Tetrachloroethylene	µg/L	4.4	1000	<0.50
Toluene	µg/L	2	270	<0.50
Trichloroethylene	µg/L	8	400	<0.50
Xylene (Total)	µg/L	4.4	1400	<0.50
Bis(2-ethylhexyl)phthalate	µg/L	8.8	12	<2.0
Di-n-butylphthalate	µg/L	15	80	<1.0
Total PCBs	µg/L	0.4	1	<0.060
Nonylphenol	µg/L	-	20	<1.0
Total Nonylphenol Ethoxylates	µg/L	-	200	<2.0

**Note:**

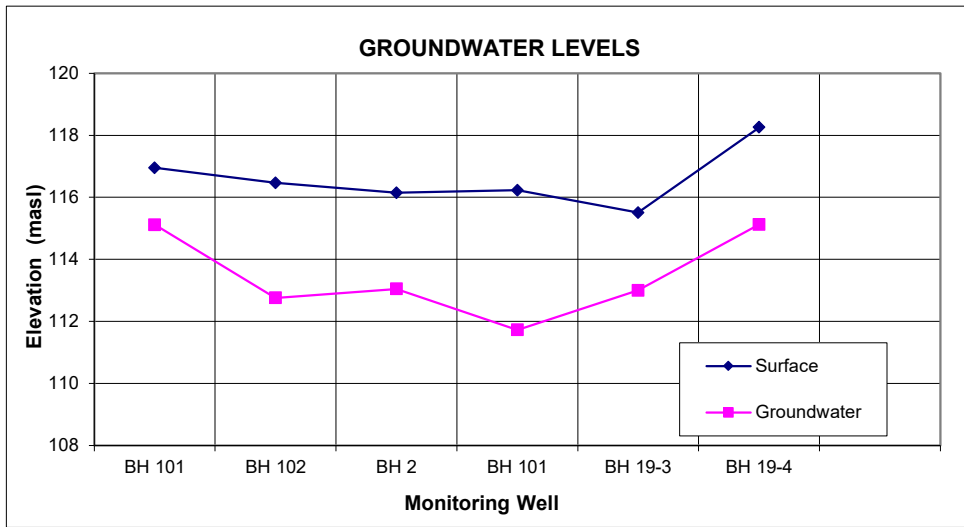
- BOLD** Exceeds Criteria - Peel Region Sanitary By-Law
- BOLD** Non-Detect Exceeds Criteria - Peel Region Sanitary By-Law
- BOLD** Exceeds Criteria - Peel Region Storm By-Law
- BOLD** Non-Detect Exceeds Criteria - Peel Region Storm By-Law

<b>MCR</b>	<b>MCR ENGINEERS LTD.</b>	<b>GROUNDWATER</b>
	<b>GEO-ENVIRONMENTAL CONSULTANTS</b>	

**Project:** Proposed Residential Development  
**Location:** 3085 - 3105 Hurontario Street, Mississauga, ON  
**Date:** August-23  
**Project #:** G5822

**TABLE 3  
GROUNDWATER MONITORING DATA**

<b>Borehole Number</b>	<b>Surface Elevation</b>	<b>Water Level Depth</b>	<b>Water Level Elevation</b>	<b>Monitoring Date</b>	<b>NOTES</b>
	(masl)	(mbgs)	(masl)	(mm/dd/yyyy)	
BH 101	116.95	1.83	115.12	4/1/2023	
BH 102	116.47	3.71	112.76	4/1/2023	
BH 2	116.15	3.10	113.05	4/17/2020	by Soil-Mat
BH 101	116.23	4.50	111.73	4/17/2020	by Soil-Mat
BH 19-3	115.51	2.51	113.00	8/9/2019	by WSP
BH 19-4	118.26	3.13	115.13	8/9/2019	by WSP
<b>Average</b>	116.60	3.13	113.47		
<b>Max</b>			115.13		



<b>MCR</b>	<b>MCR ENGINEERS LTD.</b>	<b>GROUNDWATER</b>
	<b>GEO-ENVIRONMENTAL CONSULTANTS</b>	

Project: Proposed Residential Development  
 Location: 3085 - 3105 Hurontario Street, Mississauga, ON  
 Date: August-23  
 Project #: G5822

**TABLE 4**  
**DISCHARGE ESTIMATION OF CONSTRUCTION DEWATERING**

<b>Site Parameters</b>	<b>P4</b>	<b>Units</b>
Initial Water Level before Dewatering	113.47	(m)
Lowest Water Level during Construction Dewatering	99.45	(m)
Length of Site X	100.00	(m)
Width of Site W	130.00	(m)
Equivalent Radius $r_e$	64.33	(m)
Hydraulic Conductivity of Aquifer (k)	0.20	(m/day)
Aquifer Bottom Elevation	98.45	(m)
Applied Radius of Influence (Ro)	63.97	(m)
Height btw Initial Water Level and Aquifer Bottom (H)	15.02	(m)
Height btw Lowest Water Level and Aquifer Bottom ( $h_w$ )	1.00	(m)
Radius of Influence (R)	128.30	(m)
Factor of Safety (FS)	1.50	

$$Q = \frac{\pi k (H^2 - h_w^2)}{\ln(R/r)}$$

<b>Estimated steady-state discharge of dewatering</b>	<b>306</b> (m <sup>3</sup> /day)
	<b>56</b> (USG/min)

<b>MCR</b>	<b>MCR ENGINEERS LTD.</b>	<b>GROUNDWATER</b>
	<b>GEO-ENVIRONMENTAL CONSULTANTS</b>	

Project: Proposed Residential Development  
 Location: 3085 - 3105 Hurontario Street, Mississauga, ON  
 Date: August-23  
 Project #: G5822

**TABLE 5**  
**DISCHARGE ESTIMATION OF PERMANENT DRAINAGE SYSTEM**

<b>Site Parameters</b>	<b>P4</b>	<b>Units</b>
Initial Water Level before Dewatering	113.47	(m)
Lowest Water Level under PDS conditions	100.45	(m)
Length of Site X	100.00	(m)
Width of Site W	130.00	(m)
Equivalent Radius $r_e$	64.33	(m)
Hydraulic Conductivity of Aquifer (k)	0.20	(m/day)
Aquifer Bottom Elevation	99.45	(m)
Applied Radius of Influence (Ro)	59.41	(m)
Height btw Initial Water Level and Aquifer Bottom (H)	14.02	(m)
Height btw Lowest Water Level and Aquifer Bottom ( $h_w$ )	1.00	(m)
Radius of Influence (R)	123.73	(m)
Factor of Safety (FS)	1.50	

$$Q = \frac{\pi k (H^2 - h_w^2)}{\ln(R/r)}$$

<b>Estimated steady-state discharge of dewatering</b>	<b>282</b> (m <sup>3</sup> /day)
	<b>52</b> (USG/min)

# **APPENDIX A**



**PLAN OF SURVEY OF  
LOT 15, CONCESSION 1  
NORTH OF DUNDAS STREET,  
PART OF BLOCKS A AND B,  
REGISTERED PLAN 645 AND  
PART OF VILLAGE LOT 9,  
SAVIGNEY'S PLAN OF COOKSVILLE  
(PLAN TOR-12)  
CITY OF MISSISSAUGA  
REGIONAL MUNICIPALITY OF PEEL**

**SURVEYOR'S CERTIFICATE**

I CERTIFY THAT:  
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.  
2. THE SURVEY WAS COMPLETED ON THE 08<sup>th</sup> DAY OF FEBRUARY, 2021.  
DATE, FEBRUARY 24<sup>th</sup>, 2021

*S. Goonewardena*  
S. GOONERWARDENA  
ONTARIO LAND SURVEYOR

SCALE 1:300  
0m 5m 10m 20m 30 metres

R-PE SURVEYING LTD., O.L.S.

METRIC  
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

**NOTES**

- DENOTES MONUMENT SET
- SSIB DENOTES SHORT STANDARD IRON BAR
- SIB DENOTES STANDARD IRON BAR
- B DENOTES IRON BAR
- RSIB DENOTES ROUND STANDARD IRON BAR
- CC DENOTES CUT CROSS
- PL1 DENOTES PLAN 43R-1718B
- PL2 DENOTES PLAN 43R-3318B
- PL3 DENOTES EXPROPRIATION PLAN PR3525321
- PL6 DENOTES UNREGISTERED PEEL STANDARD CONDOMINIUM PLAN BY CHAMBERS & ASSOCIATES SURVEYING LTD., O.L.S. DATED AUGUST 23, 2018 (FILE No. 10-12)
- (1225) DENOTES DAVID B. SEARLES SURVEYING LTD., O.L.S.
- (1654) DENOTES CHAMBERS & ASSOCIATES SURVEYING LTD., O.L.S.
- (N) DENOTES NOT IDENTIFIED
- (WT) DENOTES WITNESS
- P.I.N. DENOTES PROPERTY IDENTIFIER NUMBER
- RW DENOTES RETAINING WALL
- SCP DENOTES SPECIFIED CONTROL POINT
- CLF DENOTES CHAIN LINK FENCE

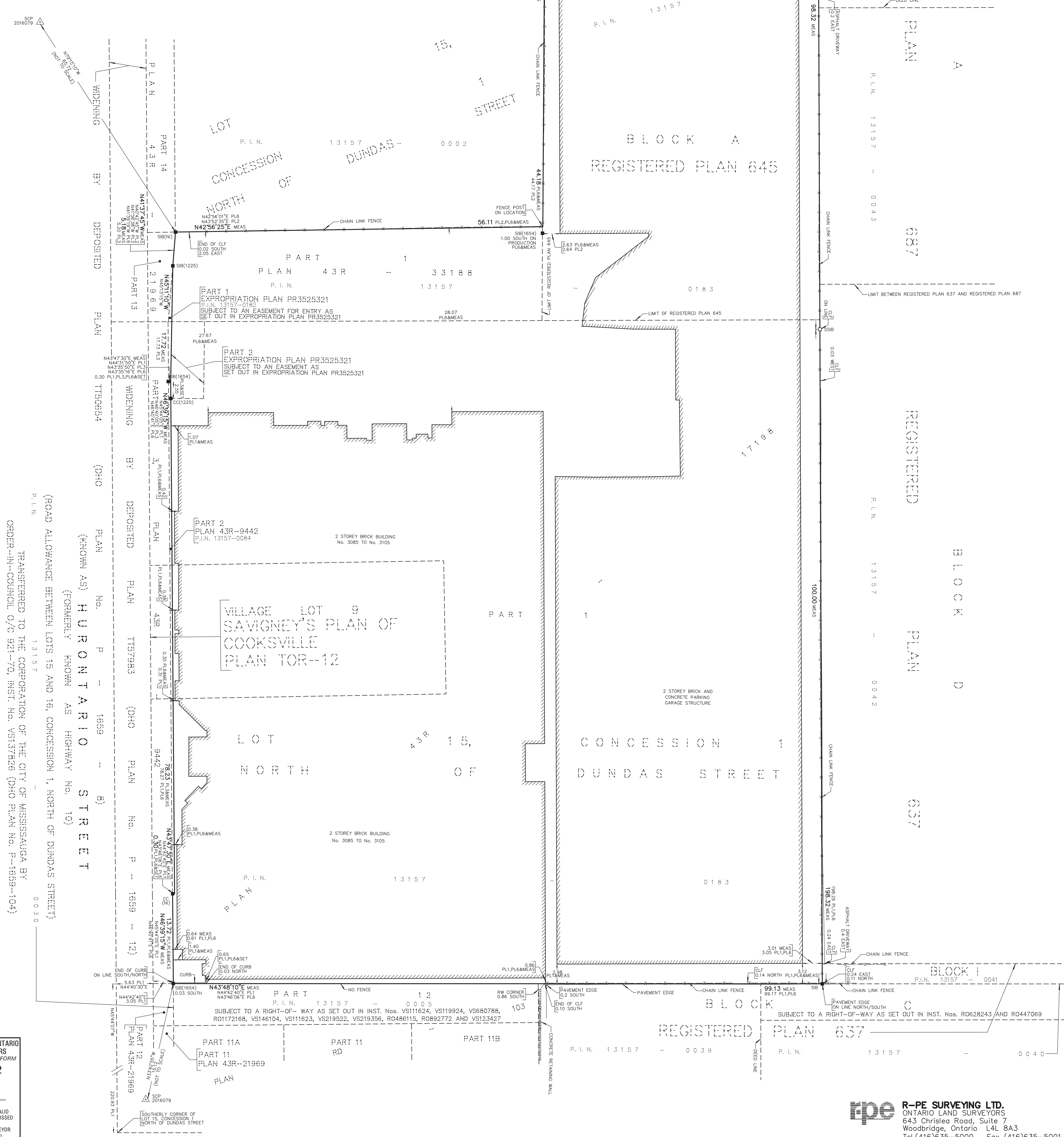
**INTEGRATION NOTE**

BEARINGS ARE UTM GRID, DERIVED FROM SPECIFIED CONTROL POINTS 2016079 AND 2016080, UTM ZONE 17, NAD-1983; CSRS:CBNV6-2010.0.

COORDINATES ARE UTM ZONE 17, NAD-1983; CSRS:CBNV6-2010.0, TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

POINT ID	NORTHINGS	EASTINGS
SCP 2016079	4826446.77	611405.54
SCP 2016080	4826342.28	611561.12

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999739.



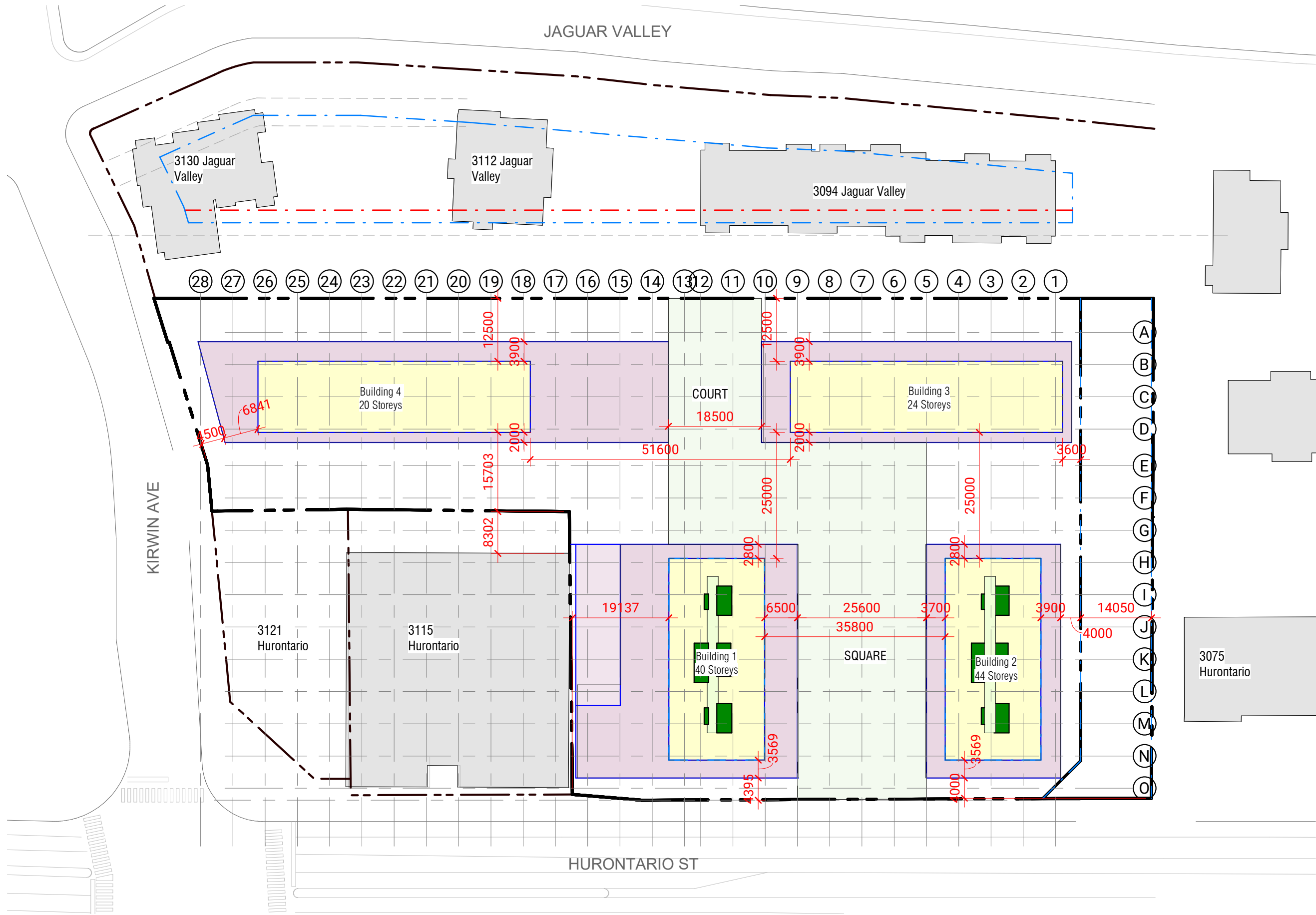
**ASSOCIATION OF ONTARIO  
LAND SURVEYORS  
PLAN SUBMISSION FORM  
2153932**

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR IN accordance with Regulation 1026, Section 2(93).

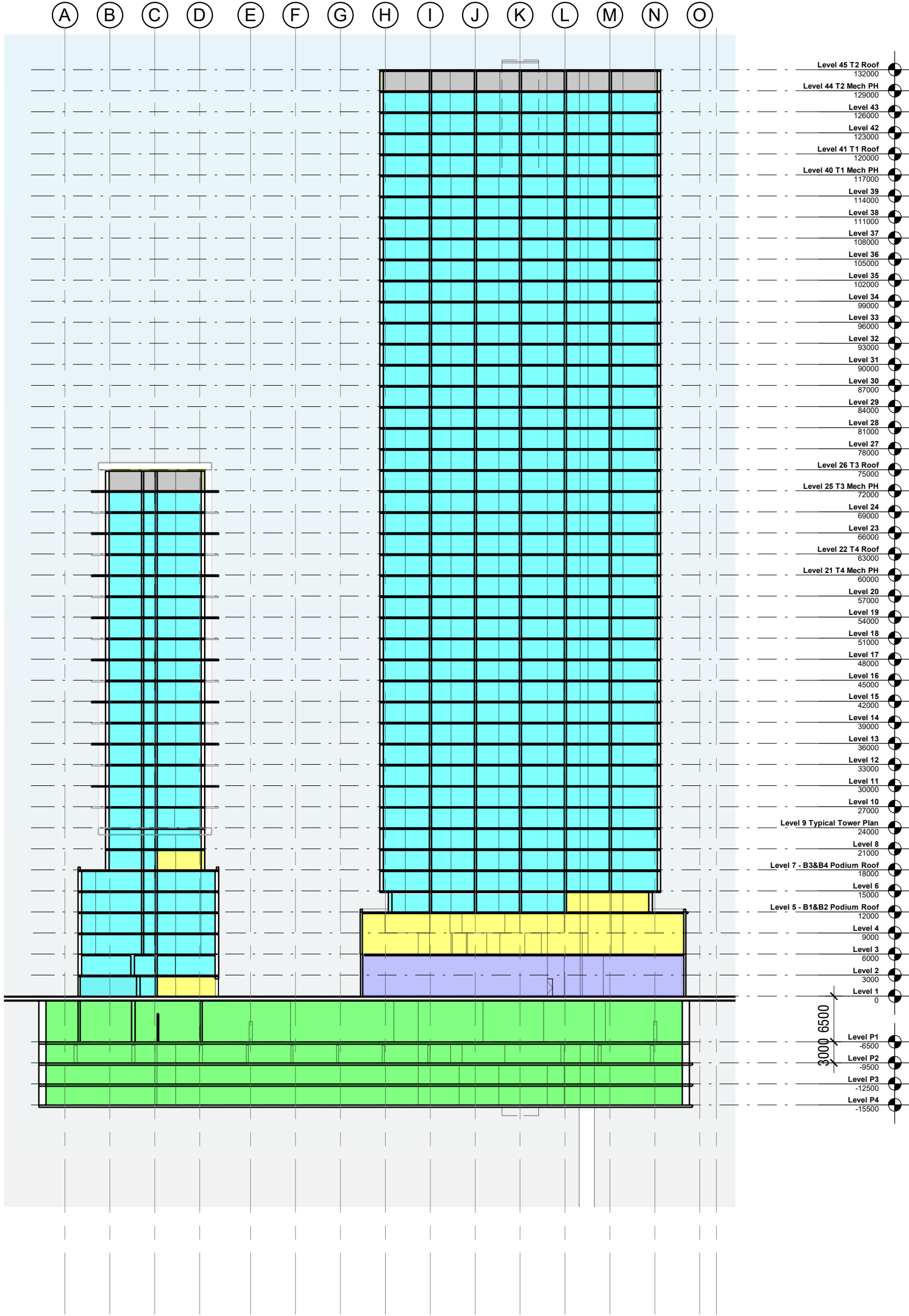
**R-PE SURVEYING LTD.**  
ONTARIO LAND SURVEYORS  
643 Christie Road, Suite 7  
Woodbridge, Ontario L4L 8A3  
Tel. (416) 635-5000 Fax (416) 635-5001  
Tel. (905) 264-0881 Fax (905) 264-2099  
Website: www.r-pe.ca  
DRAWN: A.Q. CHECKED: S.G.  
JOB No. 20-257 CAD FILE No. 20257PS01

# **APPENDIX C**

JAGUAR VALLEY







# **APPENDIX B**

# RECORD OF BOREHOLE 101

PROJECT : GE5822  
 LOCATION : 3085-3105 Hurontario Street, Mississauga, Ontario  
 STARTED : March 16, 2023  
 COMPLETED : March 16, 2023

**MC CLYMONT & RAK  
 ENGINEERS, INC.**

SHEET 1 OF 1  
 DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE			SAMPLES		ORGANIC VAPOUR READINGS (ppm)				SHEAR STRENGTH: Cu, KPa				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	⊗				●					
								% LEL - (hexane) □				WATER CONTENT, PERCENT					
		GROUND SURFACE		116.95													
		150mm ASPHALT		116.80												Flush Mount Cover	
		250mm GRANULAR FILL		116.15													
		SAND: fine, brown, moist, compact.		116.55	1	SS	19									Bentonite	
				116.40												116.04	
					2	SS	18										
																1.52 m Long 50 mm ID PVC Riser	
2	POWER BORING HOLLOW STEM AUGER	SILTY SAND TILL: trace of shale fragments and gravel, brown, wet, very dense.		114.66													
					2.29	4	SS	93									
			SILTY SAND TILL/WEATHERED SHALE COMPLEX: trace of gravel, brown, wet, very dense.		113.90												Silica Sand
					3.05	5	SS	>100									3.05 m Long 50 mm ID Well Screen
4			WEATHERED SHALE: grey, moist.		112.38												112.38
					4.57	6	SS	>100									
		End of Borehole		111.92													
		Note: 1) Water level was not measured on completion of drilling. 2) Water level was measured at 1.83 mbgs on Apr. 11, 2023.		5.03													
6																	

### GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION  
 WATER LEVEL: 1.83 m bgs

▼ DEEP/DUAL INSTALLATION  
 WATER LEVEL:

LOGGED : RS  
 CHECKED : CM

# RECORD OF BOREHOLE 102

PROJECT : GE5822  
 LOCATION : 3085-3105 Hurontario Street, Mississauga, Ontario  
 STARTED : March 15, 2023  
 COMPLETED : March 16, 2023

**MC CLYMONT & RAK  
 ENGINEERS, INC.**

SHEET 1 OF 1  
 DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE		SAMPLES		ORGANIC VAPOUR READINGS (ppm)				SHEAR STRENGTH: Cu, KPa				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	%				WATER CONTENT, PERCENT					
								% LEL - (hexane)				wp  -----  w					
		GROUND SURFACE		116.47													
		200mm CONCRETE		116.27											Flush Mount Cover		
		150mm GRANULAR FILL		116.20	1	SS	12								2.29 m Long 50 mm ID PVC Riser		
		SAND: fine, dark brown to brown, moist to wet, compact to dense. - trace of gravel until 0.61 m.		116.12													
				0.35	2	SS	18										
					3	SS	9										
2	POWER BORING HOLLOW STEM AUGER	CLAYEY SILT TILL: trace of sand and gravel, brown to grey, moist, very stiff.		114.03											3.05 m Long 50 mm ID Well Screen		
				2.44	5	SS	22										
					6	SS	26										
					7	SS	19										
4			WEATHERED SHALE		112.20	8	SS	>100									
		4.27			9	SS											
6			End of Borehole		111.14											111.14	
		Note: 1) Water level was not measured on completion of drilling. 2) Water level was measured at 3.71 mbgs on Apr. 11, 2023.		5.33													

### GROUNDWATER ELEVATIONS

SHALLOW/SINGLE INSTALLATION  
 WATER LEVEL: 3.71 m bgs

DEEP/DUAL INSTALLATION  
 WATER LEVEL:

LOGGED : RS  
 CHECKED : CM

# **APPENDIX C**

# Log of Borehole No. 1

**Project No:** SM 190138-G

**Project Manager:** Kyle Richardson

**Project:** Proposed Condominium Building

**Borehole Location:** See Drawing No. 1

**Location:** 3085 Hurontario Street, Mississauga

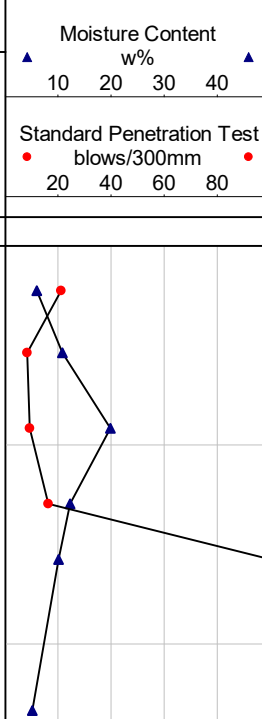
**UTM Coordinates - N:** 4826460

**Client:** Oakhill Environmental Inc.

**E:** 611511



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲	▲
0	116.39		Ground Surface										
0	116.09		<b>Pavement Structure</b> Approximately 100 millimetres of asphaltic concrete over 200 millimetres of compact granular base.										
1			<b>Sand</b> Brown, medium in gradation, trace gravel, occasional organics in upper level, loose.										
2	114.20		<b>Clayey Silt</b> Grey, trace gravel, very stiff.										
3	113.10		<b>Dundas Shale</b> Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.										
4													
5													
6													
7													
8	108.50		End of Borehole										
9			NOTES: 1. Borehole was advanced using hollow stem auger equipment on April 8, 2019 to auger refusal at a depth of 5.2 metres, then the bedrock cored to a depth of approximately 7.9 metres using Nq diamond barrel equipment. 2. Borehole was backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										



**Drill Method:** Hollow Stem Augers

**Drill Date:** April 8, 2019

**Hole Size:** 200 millimetres

**Drilling Contractor:** Geo-Environmental

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Benchmark

**Field Logged by:** ZRV

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 2

**Project No:** SM 190138-G

**Project Manager:** Kyle Richardson

**Project:** Proposed Condominium Building

**Borehole Location:** See Drawing No. 1

**Location:** 3085 Hurontario Street, Mississauga

**UTM Coordinates - N:** 4826436

**Client:** Oakhill Environmental Inc.

**E:** 611503



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲
0	116.15		Ground Surface									
0	115.85		<b>Pavement Structure</b> Approximately 150 millimetres of asphaltic concrete over 150 millimetres of compact granular base.									
1			<b>Sand</b> Brown, medium in gradation, trace gravel, occasional organics in upper level, compact.									
1	114.40			SS	1	12,12,11,9	23					
2				SS	2	3,5,12,19	17					
2	113.70		<b>Clayey Silt</b> Grey, trace gravel, hard.									
2				SS	3	12,22,11,13	33					
3			<b>Dundas Shale</b> Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.									
3				SS	4	11,50/4"	100					
3				SS	5	50/5"	100					
4												
4	111.50		End of Borehole		6	50/3"	100					
5			NOTES: 1. Borehole was advanced using hollow stem auger equipment on April 8, 2019 to auger refusal on assumed bedrock at a depth of approximately 4.6 metres. 2. Borehole was 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: April 24, 2019 - 3.1 metres May 7, 2019 - 3.0 metres April 17, 2020 - 3.1 metres									

**Drill Method:** Hollow Stem Augers

**Drill Date:** April 8, 2019

**Hole Size:** 200 millimetres

**Drilling Contractor:** Geo-Environmental

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** ZRV

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 101

**Project No:** SM 190138-G

**Project Manager:** Kyle Richardson

**Project:** Proposed Condominium Building

**Borehole Location:** See Drawing No. 1

**Location:** 3085 Hurontario Street, Mississauga

**UTM Coordinates - N:** 4826448

**Client:** Oakhill Environmental Inc.

**E:** 611500



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲ 10	▲ 40
0	116.23		Ground Surface										
0	115.93		<b>Pavement Structure</b> Approximately 100 millimetres of asphaltic concrete over 200 millimetres of compact granular base.										
1			<b>Sand</b> Brown, medium in gradation, trace gravel, loose to compact.										
2	114.10												
3	113.40		<b>Clayey Silt</b> Grey, trace gravel, very stiff.										
3			<b>Dundas Shale</b> Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.										
4													
5													
6													
7													
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38													
39													

**Drill Method:** Hollow Stem Augers

**Drill Date:** March 12, 2020

**Hole Size:** 200 millimetres

**Drilling Contractor:** Davis Drilling

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** SW

**Checked by:** KR

**Sheet:** 1 of 2









# MONITORING WELL DRILLING RECORD : BH19-4

Project Number: **191-02120-01**

3085 Hurontario Street, Mississauga, Ontario  
Phase Two Environmental Site Assessment  
Equity Builders

<b>DRILLING DETAILS</b> Date (Start): 7/3/2019 Date (End): 7/3/2019 Drilling Company: Strata Drilling Group Drilling Equipment: CME 420M Drilling Method: Solid Stem Auger Borehole Diameter: 38.1 mm Drilling Fluid: NA	<b>SURVEY DETAILS</b> Easting: 611464.98 m Northing: 4826526.176 m Surface Elevation: 118.26 masl Top of Well Elevation: 118.18 masl	<b>ODOUR</b> L - Light M - Medium S - Strong  <b>VISUAL</b> D - Dispersed with Product S - Saturated with Product	<b>SAMPLE TYPE</b> DC - Diamond Corer SS - Split Spoon MA - Manual Auger TR - Trowel ST - Shelby Tube DT - Dual Tube MC - Macro Core NR - No Recovery	<b>CHEMICAL ANALYSIS</b> Metals: Sb As Ba Be B Cd Cr Co Cu Pb Mo N Se Ag Ti U V Zn Inorg: Inorganic Compounds PHC: Petroleum Hydrocarbons (F1-F4) BTEX: Benzene, Toluene, Ethylbenzene, Xylene VOC: Volatile Organic Compounds PAH: Polycyclic Aromatic Hydrocarbons PCB: Polychlorinated Biphenyl D/F: Dioxins & Furans Phenol: Phenolic Compounds GSA: Grain-size Analysis
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(m) DEPTH ELEVATION (masl)	STRATIGRAPHY	LITHOLOGY / GEOLOGY  DESCRIPTION	OBSERVATIONS			SAMPLES				MONITORING WELL		REMARKS	
			PID CGD (ppm)	ODOUR	VISUAL	SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM		DESCRIPTION
118.26 118.16		<b>TOPSOIL</b> : approximately 101.6 mm											
0.5		<b>SAND</b> : light brown, moist, loose	125.4			DT1A	83%						0.5
1.0		← some silt, light brown, moist	2.1			DT2A	75%						1.0
1.5		← very moist	0.3			DT2B	75%						1.5
2.0		<b>CLAYEY SILT</b> : grey, very moist to wet,	0.3			DT3A	63%		pH GSA Gr % Sa % Si % Cl %				2.0
2.5			0.1			DT3B	42%						2.5
3.0		← trace boulders, coarse sand seam @ 3.05m, wet	15.7			DT4A	100%		PHC VOC				3.0
3.5			0.1			DT4B	100%						3.5
4.0			0.1			DT5A	44%						4.0
4.27 113.99 4.42		<b>SHALE</b> : moist, grey ← Bedrock refusal at 4.48 m. MW Install at 3.57m.											4.5

Project : DATABASE\_MASTER.GPJ Report : WSP\_EN\_WELL-ENVIRONMENTAL 8/13/2019

# **APPENDIX D**



## CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

<p><b>Work Order</b> : <b>WT2309350</b></p> <p><b>Client</b> : <b>McClymont &amp; Rak Engineers Inc.</b></p> <p><b>Contact</b> : Richard Sukhu</p> <p><b>Address</b> : 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9</p> <p><b>Telephone</b> : 416 675 0160</p> <p><b>Project</b> : 5822</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : 17-620765</p> <p><b>Sampler</b> : BR</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2022 Price List</p> <p><b>No. of samples received</b> : 1</p> <p><b>No. of samples analysed</b> : 1</p>	<p><b>Page</b> : 1 of 7</p> <p><b>Laboratory</b> : Waterloo - Environmental</p> <p><b>Account Manager</b> : Emily Smith</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 13-Apr-2023 17:30</p> <p><b>Date Analysis Commenced</b> : 14-Apr-2023</p> <p><b>Issue Date</b> : 25-Apr-2023 18:00</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, Waterloo, Ontario

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
µg/L	micrograms per litre
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

>: greater than.

<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).

For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

## Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	<i>Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.</i>
DLHC	<i>Detection Limit Raised: Dilution required due to high concentration of test analyte(s).</i>
HTD	<i>Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.</i>
PEHR	<i>Parameter exceeded recommended holding time on receipt: Proceeded with analysis as requested.</i>



## Analytical Results

Analyte	Method	LOR	Unit	Client sample ID									
				BH 102	Sub-Matrix: Water	Sampling date/time	MISSUB STM	RMPSUB SAN	RMPSUB STM				
				WT2309350-001	13-Apr-2023 09:00								
<b>Physical Tests</b>													
pH	E108	0.10	pH units	8.05		6 - 9 pH units	5.5 - 10 pH units	6 - 9 pH units	--	--	--		
Solids, total suspended [TSS]	E160	3.0	mg/L	7.0		15 mg/L	350 mg/L	15 mg/L	--	--	--		
<b>Anions and Nutrients</b>													
Fluoride	E235.F	0.020	mg/L	0.199	DLDS	--	10 mg/L	--	--	--	--		
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	0.398		1 mg/L	100 mg/L	1 mg/L	--	--	--		
Phosphorus, total	E372-U	0.0020	mg/L	0.0930		0.4 mg/L	10 mg/L	0.4 mg/L	--	--	--		
Sulfate (as SO4)	E235.SO4	0.30	mg/L	35.5	DLDS	--	1500 mg/L	--	--	--	--		
<b>Cyanides</b>													
Cyanide, strong acid dissociable (Total)	E333	0.0020	mg/L	<0.0020		0.02 mg/L	2 mg/L	0.02 mg/L	--	--	--		
<b>Inorganics</b>													
Chlorine, total	E326	0.050	mg/L	<0.050	PEHR	1 mg/L	--	--	--	--	--		
<b>Microbiological Tests</b>													
Coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	Not Detected		200 CFU/100mL	--	200 CFU/100mL	--	--	--		
<b>Total Metals</b>													
Aluminum, total	E420	0.0030	mg/L	0.357	DLHC	1 mg/L	50 mg/L	--	--	--	--		
Antimony, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--		
Arsenic, total	E420	0.00010	mg/L	<0.00100	DLHC	0.02 mg/L	1 mg/L	0.02 mg/L	--	--	--		
Cadmium, total	E420	0.0000050	mg/L	<0.0000500	DLHC	0.008 mg/L	0.7 mg/L	0.008 mg/L	--	--	--		
Chromium, total	E420	0.00050	mg/L	<0.00500	DLHC	0.08 mg/L	5 mg/L	0.08 mg/L	--	--	--		
Cobalt, total	E420	0.00010	mg/L	0.00102	DLHC	--	5 mg/L	--	--	--	--		
Copper, total	E420	0.00050	mg/L	<0.00500	DLHC	0.04 mg/L	3 mg/L	0.05 mg/L	--	--	--		
Lead, total	E420	0.000050	mg/L	0.00119	DLHC	0.12 mg/L	3 mg/L	0.12 mg/L	--	--	--		
Manganese, total	E420	0.00010	mg/L	0.136	DLHC	0.05 mg/L	5 mg/L	0.05 mg/L	--	--	--		
Mercury, total	E508	0.0000050	mg/L	<0.0000050		0.0004 mg/L	0.01 mg/L	0.0004 mg/L	--	--	--		
Molybdenum, total	E420	0.000050	mg/L	0.0278	DLHC	--	5 mg/L	--	--	--	--		
Nickel, total	E420	0.00050	mg/L	<0.00500	DLHC	0.08 mg/L	3 mg/L	0.08 mg/L	--	--	--		
Selenium, total	E420	0.000050	mg/L	0.000566	DLHC	0.02 mg/L	1 mg/L	0.02 mg/L	--	--	--		
Silver, total	E420	0.000010	mg/L	<0.000100	DLHC	0.12 mg/L	5 mg/L	0.12 mg/L	--	--	--		
Tin, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--		



Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
<b>Total Metals - Continued</b>										
Titanium, total	E420	0.00030	mg/L	0.00844	DLHC	--	5 mg/L	--	--	--
Zinc, total	E420	0.0030	mg/L	<0.0300	DLHC	<b>0.04 mg/L</b>	<b>3 mg/L</b>	<b>0.04 mg/L</b>	--	--
<b>Speciated Metals</b>										
Chromium, hexavalent [Cr VI], total	E532	0.00050	mg/L	<0.00050		--	--	--	--	--
<b>Aggregate Organics</b>										
Biochemical oxygen demand [BOD]	E550	2.0	mg/L	686	HTD	15 mg/L	300 mg/L	--	--	--
Carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	587	HTD	--	300 mg/L	15 mg/L	--	--
Oil & grease (gravimetric)	E567	5.0	mg/L	<5.0		--	--	--	--	--
Oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0		--	150 mg/L	--	--	--
Oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0		--	15 mg/L	--	--	--
Phenols, total (4AAP)	E562	0.0010	mg/L	0.0013		<b>0.008 mg/L</b>	<b>1 mg/L</b>	<b>0.008 mg/L</b>	--	--
<b>Volatile Organic Compounds</b>										
Benzene	E611D	0.50	µg/L	<0.50		<b>2 µg/L</b>	<b>10 µg/L</b>	<b>2 µg/L</b>	--	--
Chloroform	E611D	0.50	µg/L	<0.50		--	<b>40 µg/L</b>	<b>2 µg/L</b>	--	--
Dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50		--	<b>50 µg/L</b>	<b>5.6 µg/L</b>	--	--
Dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50		--	<b>80 µg/L</b>	<b>6.8 µg/L</b>	--	--
Dichloroethylene, cis-1,2-	E611D	0.50	µg/L	<0.50		--	<b>4000 µg/L</b>	<b>5.6 µg/L</b>	--	--
Dichloromethane	E611D	1.0	µg/L	<1.0		--	<b>2000 µg/L</b>	<b>5.2 µg/L</b>	--	--
Dichloropropylene, trans-1,3-	E611D	0.30	µg/L	<0.30		--	<b>140 µg/L</b>	<b>5.6 µg/L</b>	--	--
Ethylbenzene	E611D	0.50	µg/L	<0.50		<b>2 µg/L</b>	<b>160 µg/L</b>	<b>2 µg/L</b>	--	--
Methyl ethyl ketone [MEK]	E611D	20	µg/L	<20		--	8000 µg/L	--	--	--
Styrene	E611D	0.50	µg/L	<0.50		--	200 µg/L	--	--	--
Tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50		--	<b>1400 µg/L</b>	<b>17 µg/L</b>	--	--
Tetrachloroethylene	E611D	0.50	µg/L	<0.50		--	<b>1000 µg/L</b>	<b>4.4 µg/L</b>	--	--
Toluene	E611D	0.50	µg/L	<0.50		<b>2 µg/L</b>	<b>270 µg/L</b>	<b>2 µg/L</b>	--	--
Trichloroethylene	E611D	0.50	µg/L	<0.50		--	<b>400 µg/L</b>	<b>8 µg/L</b>	--	--
Xylene, m+p-	E611D	0.40	µg/L	<0.40		--	--	--	--	--
Xylene, o-	E611D	0.30	µg/L	<0.30		--	--	--	--	--
Xylenes, total	E611D	0.50	µg/L	<0.50		<b>4.4 µg/L</b>	<b>1400 µg/L</b>	<b>4.4 µg/L</b>	--	--
<b>Volatile Organic Compounds Surrogates</b>										
Bromofluorobenzene, 4-	E611D	1.0	%	105		--	--	--	--	--
Difluorobenzene, 1,4-	E611D	1.0	%	99.5		--	--	--	--	--





Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
<b>Polycyclic Aromatic Hydrocarbons</b>										
Acenaphthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Acenaphthylene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Anthracene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(a)anthracene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(a)pyrene	E641A	0.0050	µg/L	<0.0050	--	--	--	--	--	--
Benzo(b+j)fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(g,h,i)perylene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(k)fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Chrysene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Dibenz(a,h)anthracene	E641A	0.0050	µg/L	<0.0050	--	--	--	--	--	--
Fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Fluorene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Methylnaphthalene, 1-	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Methylnaphthalene, 2-	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Naphthalene	E641A	0.050	µg/L	<0.050	--	--	--	--	--	--
Phenanthrene	E641A	0.020	µg/L	<0.020	--	--	--	--	--	--
Pyrene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
PAHs, total (CCME sewer 18)	E641A	0.070	µg/L	<0.070	2 µg/L	--	--	--	--	--
Chrysene-d12	E641A	0.1	%	82.4	--	--	--	--	--	--
Naphthalene-d8	E641A	0.1	%	97.4	--	--	--	--	--	--
Phenanthrene-d10	E641A	0.1	%	99.7	--	--	--	--	--	--
<b>Phthalate Esters</b>										
bis(2-Ethylhexyl) phthalate [DEHP]	E655F	2.0	µg/L	<2.0	--	12 µg/L	8.8 µg/L	--	--	--
Di-n-butyl phthalate	E655F	1.0	µg/L	<1.0	--	80 µg/L	15 µg/L	--	--	--
<b>Semi-Volatile Organics Surrogates</b>										
Fluorobiphenyl, 2-	E655F	1.0	%	85.1	--	--	--	--	--	--
Terphenyl-d14, p-	E655F	1.0	%	92.8	--	--	--	--	--	--
<b>Phenolics Surrogates</b>										
Tribromophenol, 2,4,6-	E655F	0.20	%	106	--	--	--	--	--	--
<b>Nonylphenols</b>										
Nonylphenol diethoxylates [NP2EO]	E749B	0.10	µg/L	<0.10	--	--	--	--	--	--
Nonylphenol ethoxylates, total	E749B	2.0	µg/L	<2.0	--	200 µg/L	--	--	--	--



Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
<b>Nonylphenols - Continued</b>										
Nonylphenol monoethoxylates [NP1EO]	E749B	2.0	µg/L	<2.0	--	--	--	--	--	--
Nonylphenols [NP]	E749A	1.0	µg/L	<1.0	--	20 µg/L	--	--	--	--
<b>Polychlorinated Biphenyls</b>										
Aroclor 1016	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1221	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1232	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1242	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1248	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1254	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1260	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1262	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1268	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060	--	1 µg/L	0.4 µg/L	--	--	--
Decachlorobiphenyl	E687	0.1	%	116	--	--	--	--	--	--
Tetrachloro-m-xylene	E687	0.1	%	98.2	--	--	--	--	--	--

Please refer to the General Comments section for an explanation of any qualifiers detected.

### Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH 102	Water	Manganese, total		MISSUB	STM	0.136 mg/L	0.05 mg/L
	Water	Biochemical oxygen demand [BOD]		MISSUB	STM	686 mg/L	15 mg/L
	Water	Biochemical oxygen demand [BOD]		RMPSUB	SAN	686 mg/L	300 mg/L
	Water	Carbonaceous biochemical oxygen demand [CBOD]		RMPSUB	SAN	587 mg/L	300 mg/L
	Water	Manganese, total		RMPSUB	STM	0.136 mg/L	0.05 mg/L
	Water	Carbonaceous biochemical oxygen demand [CBOD]		RMPSUB	STM	587 mg/L	15 mg/L



**Key:**

MISSUB	Ontario Mississauga Storm Sewer Use By-Law (0046-2022) (March 2022)
STM	Mississauga Storm Sewer (0046-2022)
RMPSUB	Ontario Reg.Mun. of Peel Sewer Bylaw #53-2010 (APR, 2019)
SAN	Peel Sanitary Sewer (53-2010)
STM	Peel Storm Sewer (53-2010)




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## QUALITY CONTROL INTERPRETIVE REPORT

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<p><b>Work Order</b> : <b>WT2309350</b></p> <p><b>Client</b> : <b>McClymont &amp; Rak Engineers Inc.</b></p> <p><b>Contact</b> : Richard Sukhu</p> <p><b>Address</b> : 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9</p> <p><b>Telephone</b> : 416 675 0160</p> <p><b>Project</b> : 5822</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : 17-620765</p> <p><b>Sampler</b> : BR</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2022 Price List</p> <p><b>No. of samples received</b> : 1</p> <p><b>No. of samples analysed</b> : 1</p>	<p><b>Page</b> : 1 of 13</p> <p><b>Laboratory</b> : Waterloo - Environmental</p> <p><b>Account Manager</b> : Emily Smith</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 13-Apr-2023 17:30</p> <p><b>Issue Date</b> : 25-Apr-2023 18:00</p>
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This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

**Key**

- Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
- DQO: Data Quality Objective.
- LOR: Limit of Reporting (detection limit).
- RPD: Relative Percent Difference.

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### ***Workorder Comments***

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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### ***Summary of Outliers***

#### ***Outliers : Quality Control Samples***

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

#### ***Outliers: Reference Material (RM) Samples***

- No Reference Material (RM) Sample outliers occur.

***Outliers : Analysis Holding Time Compliance (Breaches)***

- Analysis Holding Time Outliers exist - please see following pages for full details.

***Outliers : Frequency of Quality Control Samples***

- No Quality Control Sample Frequency Outliers occur.



**Outliers : Quality Control Samples**

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Laboratory Control Sample (LCS) Recoveries</b>								
Volatile Organic Compounds	QC-MRG2-9017180 02	----	Methyl ethyl ketone [MEK]	78-93-3	E611D	148 % <sup>LCS-H</sup>	70.0-130%	Recovery greater than upper control limit

**Result Qualifiers**

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Aggregate Organics : Biochemical Oxygen Demand - 5 day</b>										
HDPE [BOD HT-4d] BH 102	E550	13-Apr-2023	----	----	----		20-Apr-2023	4 days	7 days	* EHT
<b>Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day</b>										
HDPE [BOD HT-4d] BH 102	E555	13-Apr-2023	----	----	----		20-Apr-2023	4 days	7 days	* EHT
<b>Aggregate Organics : Mineral Oil &amp; Grease by Gravimetry</b>										
Amber glass (hydrochloric acid) BH 102	E567SG	13-Apr-2023	21-Apr-2023	28 days	8 days	✓	21-Apr-2023	40 days	0 days	✓
<b>Aggregate Organics : Oil &amp; Grease by Gravimetry</b>										
Amber glass (hydrochloric acid) BH 102	E567	13-Apr-2023	21-Apr-2023	28 days	8 days	✓	21-Apr-2023	40 days	0 days	✓
<b>Aggregate Organics : Phenols (4AAP) in Water by Colorimetry</b>										
Amber glass total (sulfuric acid) [ON MECP] BH 102	E562	13-Apr-2023	22-Apr-2023	----	----		22-Apr-2023	28 days	9 days	✓
<b>Anions and Nutrients : Fluoride in Water by IC</b>										
HDPE [ON MECP] BH 102	E235.F	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	28 days	5 days	✓
<b>Anions and Nutrients : Sulfate in Water by IC</b>										
HDPE [ON MECP] BH 102	E235.SO4	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	28 days	5 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)</b>											
<b>Amber glass total (sulfuric acid) [ON MECP]</b> BH 102	E318	13-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	28 days	6 days	✓	
<b>Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)</b>											
<b>Amber glass total (sulfuric acid) [ON MECP]</b> BH 102	E372-U	13-Apr-2023	19-Apr-2023	----	----		20-Apr-2023	28 days	7 days	✓	
<b>Cyanides : Total Cyanide</b>											
<b>HDPE - total (sodium hydroxide)</b> BH 102	E333	13-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	14 days	6 days	✓	
<b>Inorganics : Total Chlorine (Residual) by DPD Colourimetry</b>											
<b>HDPE [ON MECP]</b> BH 102	E326	13-Apr-2023	----	----	----		18-Apr-2023	0.25 hrs	120 hrs	* EHTR-FM	
<b>Microbiological Tests : E. coli (MF-mFC-BCIG)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> BH 102	E012A.EC	13-Apr-2023	----	----	----		14-Apr-2023	48 hrs	28 hrs	✓	
<b>Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode</b>											
<b>Amber glass/Teflon lined cap - LCMS</b> BH 102	E749B	13-Apr-2023	14-Apr-2023	7 days	1 days	✓	14-Apr-2023	7 days	0 days	✓	
<b>Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode</b>											
<b>Amber glass/Teflon lined cap - LCMS</b> BH 102	E749A	13-Apr-2023	14-Apr-2023	7 days	1 days	✓	14-Apr-2023	7 days	0 days	✓	
<b>Phthalate Esters : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS</b>											
<b>Amber glass/Teflon lined cap [ON MECP]</b> BH 102	E655F	13-Apr-2023	18-Apr-2023	14 days	5 days	✓	19-Apr-2023	40 days	1 days	✓	
<b>Physical Tests : pH by Meter</b>											
<b>HDPE [ON MECP]</b> BH 102	E108	13-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	14 days	6 days	✓	





Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : TSS by Gravimetry</b>											
<b>HDPE [ON MECP]</b> BH 102	E160	13-Apr-2023	----	----	----		18-Apr-2023	7 days	5 days	✓	
<b>Polychlorinated Biphenyls : PCB Aroclors by GC-MS</b>											
<b>Amber glass/Teflon lined cap [ON MECP]</b> BH 102	E687	13-Apr-2023	18-Apr-2023	14 days	5 days	✓	19-Apr-2023	40 days	1 days	✓	
<b>Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS</b>											
<b>Amber glass/Teflon lined cap (sodium bisulfate) [ON MECP]</b> BH 102	E641A	13-Apr-2023	18-Apr-2023	7 days	5 days	✓	18-Apr-2023	40 days	1 days	✓	
<b>Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC</b>											
<b>HDPE - total (sodium hydroxide)</b> BH 102	E532	13-Apr-2023	----	----	----		14-Apr-2023	28 days	1 days	✓	
<b>Total Metals : Total Mercury in Water by CVAAS</b>											
<b>Glass vial total (hydrochloric acid) [ON MECP]</b> BH 102	E508	13-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	28 days	1 days	✓	
<b>Total Metals : Total metals in Water by CRC ICPMS</b>											
<b>HDPE total (nitric acid)</b> BH 102	E420	13-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	180 days	2 days	✓	
<b>Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS</b>											
<b>Glass vial (sodium bisulfate)</b> BH 102	E611D	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	14 days	5 days	✓	

**Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended  
 EHT: Exceeded ALS recommended hold time prior to analysis.  
 Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	897728	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
pH by Meter	E108	901441	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
<b>Laboratory Control Samples (LCS)</b>							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	900969	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	905683	1	16	6.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	905682	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900959	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	900975	1	19	5.2	4.7	✓
pH by Meter	E108	901441	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓



Matrix: **Water**

Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Control Samples (LCS) - Continued</b>							
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
<b>Method Blanks (MB)</b>							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	900969	1	2	50.0	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	897728	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	905683	1	16	6.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	905682	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900959	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	900975	1	19	5.2	4.7	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
<b>Matrix Spikes (MS)</b>							
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓



Matrix: **Water** Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
<b>Matrix Spikes (MS) - Continued</b>							
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC  Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
pH by Meter	E108  Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160  Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Fluoride in Water by IC	E235.F  Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4  Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Chlorine (Residual) by DPD Colourimetry	E326  Waterloo - Environmental	Water	APHA 4500-Cl G (mod)	Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for this test is 15 minutes and field testing is recommended when determining Chlorine concentrations at the time of sampling.  Chlorine if present in a sample container after sampling can be rapidly consumed by any inorganic or organic matter in the sample and dissipates rapidly into headspace.  Laboratory results may be requested when chlorine concentrations that may be present at the time of laboratory analysis are required for the interpretation of other laboratory analysis where the presence of Chlorine may affect results. e.g. laboratory toxicity testing



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis.  Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Total Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection.  Results are based on an un-filtered, field-preserved sample.
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter.  Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method.  Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K <sub>3</sub> Fe(CN) <sub>6</sub> ) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Mineral Oil & Grease by Gravimetry	E567SG Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F Waterloo - Environmental	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS.
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Waterloo - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Oil & Grease Extraction for Gravimetry	EP567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581 Waterloo - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Waterloo - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
BNA Extraction	EP655 Waterloo - Environmental	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749 Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.



## QUALITY CONTROL REPORT

**Work Order** : **WT2309350**

**Client** : McClymont & Rak Engineers Inc.

**Contact** : Richard Sukhu

**Address** : 111 Zenway Blvd. Unit 4  
Vaughan ON Canada L4H 3H9

**Telephone** :

**Project** : 5822

**PO** : ----

**C-O-C number** : 17-620765

**Sampler** : BR 416 675 0160

**Site** : ----

**Quote number** : 2022 Price List

**No. of samples received** : 1

**No. of samples analysed** : 1

**Page** : 1 of 15

**Laboratory** : Waterloo - Environmental

**Account Manager** : Emily Smith

**Address** : 60 Northland Road, Unit 1  
Waterloo, Ontario Canada N2V 2B8

**Telephone** : +1 519 886 6910

**Date Samples Received** : 13-Apr-2023 17:30

**Date Analysis Commenced** : 14-Apr-2023

**Issue Date** : 25-Apr-2023 18:00

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	Waterloo LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario

Page : 2 of 15  
Work Order : WT2309350  
Client : McClymont & Rak Engineers Inc.  
Project : 5822



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## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

# = Indicates a QC result that did not meet the ALS DQO.

## Workorder Comments

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Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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### Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Physical Tests (QC Lot: 901162)</b>											
WT2309547-001	Anonymous	Solids, total suspended [TSS]	----	E160	30.0	mg/L	2330	2390	2.37%	20%	----
<b>Physical Tests (QC Lot: 901441)</b>											
WT2309388-001	Anonymous	pH	----	E108	0.10	pH units	7.64	7.75	1.43%	4%	----
<b>Anions and Nutrients (QC Lot: 901447)</b>											
WT2309367-001	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 901448)</b>											
WT2309367-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	70.7	70.2	0.644%	20%	----
<b>Anions and Nutrients (QC Lot: 901840)</b>											
WT2309288-014	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0067	0.0055	0.0012	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 901841)</b>											
HA2300138-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.137	0.144	0.007	Diff <2x LOR	----
<b>Cyanides (QC Lot: 903588)</b>											
EO2302909-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0050	mg/L	0.0074	0.0074	0.00002	Diff <2x LOR	----
<b>Inorganics (QC Lot: 901104)</b>											
WT2309350-001	BH 102	Chlorine, total	7782-50-5	E326	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
<b>Microbiological Tests (QC Lot: 897728)</b>											
WT2309350-001	BH 102	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 897737)</b>											
BF2300013-008	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 898147)</b>											
WT2309350-001	BH 102	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.357	0.392	9.20%	20%	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00102	0.00108	0.00006	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00119	0.00121	0.000020	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.136	0.141	2.96%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Total Metals (QC Lot: 898147) - continued</b>											
WT2309350-001	BH 102	Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0278	0.0292	5.08%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	0.000566	0.000556	0.000011	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	0.00844	0.00832	0.00012	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
<b>Speciated Metals (QC Lot: 897519)</b>											
WT2309024-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
<b>Aggregate Organics (QC Lot: 897340)</b>											
WT2309319-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
<b>Aggregate Organics (QC Lot: 897569)</b>											
WT2309340-002	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
<b>Aggregate Organics (QC Lot: 906864)</b>											
WP2304935-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0026	0.0024	0.0002	Diff <2x LOR	----
<b>Volatile Organic Compounds (QC Lot: 901718)</b>											
WT2309668-001	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	0.75	0.76	0.01	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	3.32	3.42	2.97%	30%	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	5.9	6.0	0.04	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	119	120	1.58%	30%	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	103	113	10	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	0.51	0.58	0.07	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	1.22	1.27	0.05	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	231	236	2.06%	30%	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	4.31	4.37	1.38%	30%	----
<b>Nonylphenols (QC Lot: 897632)</b>											



Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Nonylphenols (QC Lot: 897632) - continued</b>											
WT2309182-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
<b>Nonylphenols (QC Lot: 897633)</b>											
WT2309182-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	10.0	µg/L	<10.0	<10.0	0	Diff <2x LOR	----



## Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Physical Tests (QCLot: 901162)</b>						
Solids, total suspended [TSS]	---	E160	3	mg/L	<3.0	---
<b>Anions and Nutrients (QCLot: 901447)</b>						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 901448)</b>						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
<b>Anions and Nutrients (QCLot: 901840)</b>						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	---
<b>Anions and Nutrients (QCLot: 901841)</b>						
Kjeldahl nitrogen, total [TKN]	---	E318	0.05	mg/L	<0.050	---
<b>Cyanides (QCLot: 903588)</b>						
Cyanide, strong acid dissociable (Total)	---	E333	0.002	mg/L	<0.0020	---
<b>Inorganics (QCLot: 901104)</b>						
Chlorine, total	7782-50-5	E326	0.05	mg/L	<0.050	---
<b>Microbiological Tests (QCLot: 897728)</b>						
Coliforms, Escherichia coli [E. coli]	---	E012A.EC	1	CFU/100mL	<1	---
<b>Total Metals (QCLot: 897737)</b>						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	---
<b>Total Metals (QCLot: 898147)</b>						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	---
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 898147) - continued</b>						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	---
<b>Speciated Metals (QCLot: 897519)</b>						
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	<0.00050	---
<b>Aggregate Organics (QCLot: 897340)</b>						
Biochemical oxygen demand [BOD]	---	E550	2	mg/L	<2.0	---
<b>Aggregate Organics (QCLot: 897569)</b>						
Carbonaceous biochemical oxygen demand [CBOD]	---	E555	2	mg/L	<2.0	---
<b>Aggregate Organics (QCLot: 905682)</b>						
Oil & grease (gravimetric)	---	E567	5	mg/L	<5.0	---
<b>Aggregate Organics (QCLot: 905683)</b>						
Oil & grease, mineral (gravimetric)	---	E567SG	5	mg/L	<5.0	---
<b>Aggregate Organics (QCLot: 906864)</b>						
Phenols, total (4AAP)	---	E562	0.001	mg/L	<0.0010	---
<b>Volatile Organic Compounds (QCLot: 901718)</b>						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	---
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	---
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	---
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	---
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	---
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	---
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	---
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	---
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	---
Styrene	100-42-5	E611D	0.5	µg/L	<0.50	---
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	---
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	---
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	---
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	---
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	---
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	---
<b>Polycyclic Aromatic Hydrocarbons (QCLot: 900959)</b>						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	---
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	---
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Polycyclic Aromatic Hydrocarbons (QCLot: 900959) - continued</b>						
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
<b>Phthalate Esters (QCLot: 900969)</b>						
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	<2.0	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	<1.0	----
<b>Nonylphenols (QCLot: 897632)</b>						
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
<b>Nonylphenols (QCLot: 897633)</b>						
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----
<b>Polychlorinated Biphenyls (QCLot: 900975)</b>						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----



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Work Order : WT2309350  
Client : McClymont & Rak Engineers Inc.  
Project : 5822

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## Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Physical Tests (QCLot: 901162)</b>									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.0	85.0	115	----
<b>Physical Tests (QCLot: 901441)</b>									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
<b>Anions and Nutrients (QCLot: 901447)</b>									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
<b>Anions and Nutrients (QCLot: 901448)</b>									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.0	90.0	110	----
<b>Anions and Nutrients (QCLot: 901840)</b>									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.845 mg/L	99.2	80.0	120	----
<b>Anions and Nutrients (QCLot: 901841)</b>									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.6	75.0	125	----
<b>Cyanides (QCLot: 903588)</b>									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	95.6	80.0	120	----
<b>Inorganics (QCLot: 901104)</b>									
Chlorine, total	7782-50-5	E326	0.05	mg/L	0.28861 mg/L	100	75.0	125	----
<b>Total Metals (QCLot: 897737)</b>									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.1	80.0	120	----
<b>Total Metals (QCLot: 898147)</b>									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	94.9	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	98.0	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	103	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	98.4	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	107	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	93.5	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	99.0	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 898147) - continued</b>									
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	101	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	98.4	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	98.4	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	95.1	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	98.8	80.0	120	----
<b>Speciated Metals (QCLot: 897519)</b>									
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	0.025 mg/L	98.8	80.0	120	----
<b>Aggregate Organics (QCLot: 897340)</b>									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	99.2	85.0	115	----
<b>Aggregate Organics (QCLot: 897569)</b>									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	104	85.0	115	----
<b>Aggregate Organics (QCLot: 905682)</b>									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	98.4	70.0	130	----
<b>Aggregate Organics (QCLot: 905683)</b>									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	94.8	70.0	130	----
<b>Aggregate Organics (QCLot: 906864)</b>									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	95.7	85.0	115	----
<b>Volatile Organic Compounds (QCLot: 901718)</b>									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	98.4	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	99.8	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	94.4	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	81.0	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	100	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	108	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	93.7	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	# 148	70.0	130	LCS-H
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
Tetrachloroethane, 1,1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	115	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	89.4	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	88.5	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	98.2	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	89.0	70.0	130	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Volatile Organic Compounds (QCLot: 901718) - continued</b>									
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	96.4	70.0	130	----
<b>Polycyclic Aromatic Hydrocarbons (QCLot: 900959)</b>									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5263 µg/L	107	50.0	140	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5263 µg/L	96.3	50.0	140	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5263 µg/L	95.5	50.0	140	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5263 µg/L	108	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5263 µg/L	98.2	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5263 µg/L	109	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5263 µg/L	102	50.0	140	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5263 µg/L	110	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5263 µg/L	104	50.0	140	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5263 µg/L	111	50.0	140	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5263 µg/L	86.3	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5263 µg/L	114	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5263 µg/L	91.8	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5263 µg/L	94.5	50.0	140	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5263 µg/L	92.9	50.0	140	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5263 µg/L	107	50.0	140	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5263 µg/L	111	50.0	140	----
<b>Phthalate Esters (QCLot: 900969)</b>									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	6.4 µg/L	110	50.0	140	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	6.4 µg/L	102	50.0	140	----
<b>Nonylphenols (QCLot: 897632)</b>									
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	105	75.0	125	----
<b>Nonylphenols (QCLot: 897633)</b>									
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	95.4	75.0	125	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	112	75.0	125	----
<b>Polychlorinated Biphenyls (QCLot: 900975)</b>									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Polychlorinated Biphenyls (QCLot: 900975) - continued</b>									
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	97.2	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	102	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----

### Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.



## Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Anions and Nutrients (QCLot: 901447)</b>										
WT2309367-001	Anonymous	Fluoride	16984-48-8	E235.F	9.67 mg/L	10 mg/L	96.7	75.0	125	----
<b>Anions and Nutrients (QCLot: 901448)</b>										
WT2309367-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	912 mg/L	1000 mg/L	91.2	75.0	125	----
<b>Anions and Nutrients (QCLot: 901840)</b>										
WT2309288-014	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.102 mg/L	0.1 mg/L	102	70.0	130	----
<b>Anions and Nutrients (QCLot: 901841)</b>										
HA2300138-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.73 mg/L	2.5 mg/L	109	70.0	130	----
<b>Cyanides (QCLot: 903588)</b>										
EO2302909-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.229 mg/L	0.25 mg/L	91.7	75.0	125	----
<b>Inorganics (QCLot: 901104)</b>										
WT2309350-001	BH 102	Chlorine, total	7782-50-5	E326	0.250 mg/L	0.28861 mg/L	86.6	70.0	130	----
<b>Total Metals (QCLot: 897737)</b>										
BF2300013-009	Anonymous	Mercury, total	7439-97-6	E508	0.0000975 mg/L	0.0001 mg/L	97.5	70.0	130	----
<b>Total Metals (QCLot: 898147)</b>										
WT2309355-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0998 mg/L	0.1 mg/L	99.8	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0534 mg/L	0.05 mg/L	107	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00510 mg/L	0.005 mg/L	102	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0129 mg/L	0.0125 mg/L	104	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Copper, total	7440-50-8	E420	0.0122 mg/L	0.0125 mg/L	97.9	70.0	130	----
		Lead, total	7439-92-1	E420	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0126 mg/L	0.0125 mg/L	101	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0248 mg/L	0.025 mg/L	99.3	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		Silver, total	7440-22-4	E420	0.00474 mg/L	0.005 mg/L	94.8	70.0	130	----
		Tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0132 mg/L	0.0125 mg/L	106	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Total Metals (QCLot: 898147) - continued</b>										
WT2309355-001	Anonymous	Zinc, total	7440-66-6	E420	0.0237 mg/L	0.025 mg/L	94.8	70.0	130	----
<b>Speciated Metals (QCLot: 897519)</b>										
WT2309024-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
<b>Aggregate Organics (QCLot: 906864)</b>										
WP2304935-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0199 mg/L	0.02 mg/L	99.5	75.0	125	----
<b>Volatile Organic Compounds (QCLot: 901718)</b>										
WT2309668-001	Anonymous	Benzene	71-43-2	E611D	99.9 µg/L	100 µg/L	99.9	60.0	140	----
		Chloroform	67-66-3	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	96.0 µg/L	100 µg/L	96.0	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	83.9 µg/L	100 µg/L	83.9	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Dichloromethane	75-09-2	E611D	106 µg/L	100 µg/L	106	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	104 µg/L	100 µg/L	104	60.0	140	----
		Ethylbenzene	100-41-4	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Styrene	100-42-5	E611D	98.2 µg/L	100 µg/L	98.2	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	116 µg/L	100 µg/L	116	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	91.9 µg/L	100 µg/L	91.9	60.0	140	----
		Toluene	108-88-3	E611D	92.8 µg/L	100 µg/L	92.8	60.0	140	----
		Trichloroethylene	79-01-6	E611D	99.2 µg/L	100 µg/L	99.2	60.0	140	----
Xylene, m+p-	179601-23-1	E611D	ND µg/L	200 µg/L	ND	60.0	140	----		
Xylene, o-	95-47-6	E611D	101 µg/L	100 µg/L	101	60.0	140	----		
<b>Nonylphenols (QCLot: 897632)</b>										
WT2309182-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	12.6 µg/L	10 µg/L	126	60.0	140	----
<b>Nonylphenols (QCLot: 897633)</b>										
WT2309182-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.92 µg/L	1 µg/L	91.5	60.0	140	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	15.2 µg/L	20 µg/L	76.0	60.0	140	----





ALS Environmental  
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Affix ALS barcode label here  
(lab use only)

COC Number: 17 - 620765

Page 1 of 1

Telephone: +1 519 986 8910

Report to: Contact your company name below will appear on the final report

Report Format / Distribution

Select Service Level Below - Contact your AM to confirm all E&P TATS (ensure...)

Company: MCR  
Contact: Richard Suter  
Phone: [blank]  
Company address below will appear on the final report

Select Report Format:  PDF  EXCEL  EDD (DIGITAL)  
Quality Control (QC) Report with Report:  YES  NO  
Compare Results to Criteria on Report - provide details below if box checked  
Select Distribution:  EMAIL  MAIL  FAX

Regular [R]  Standard TAT if receive  
4 day [P4-20%]   
3 day [P3-25%]   
2 day [P2-50%]   
EMERGENCY  
1 B: [blank]  
2 B: [blank]

Street: 111 Zenway Blvd  
City/Province: Vaughan  
Postal Code: [blank]

Email 1 or Fax: rsuter@mcrcat.com  
Email 2: [blank]  
Email 3: [blank]

Date and Time Required for all E&P TATS:  
Indicate Filtered (F), Preserved (P) or Filt

Invoice to: Same as Report To  YES  NO  
Copy of Invoice with Report:  YES  NO

Select Invoice Distribution:  EMAIL  MAIL  FAX  
Email 1 or Fax: [blank]  
Email 2: [blank]  
Email 3: [blank]

Environmental Division  
Waterloo  
Work Order Reference  
WT2309350

Company: [blank]  
Contact: [blank]

Project Information  
ALS Account # / Quote #: [blank]  
Job #: 5822  
PO/A/E: [blank]  
LSD: [blank]

Barcode  
Telephone: +1 519 986 8910

ALS Lab Work Order # (lab use only): WT2309350

ALS Contact: [blank]

Peel Region /  
Mississauga Storm  
Sanitary Sewer  
Bylaw

Sample Identification and/or Coordinates  
(This description will appear on the report)  
BH 102

Date: 4/13/23  
Time: 9:00 AM  
Sample Type: GW

SAMPLES ON HOLD  
Sample is hazardous (please print)

NUMBER OF CONTAINERS

Table with columns for Sample #, Date, Time, Sample Type, and other details. Row 1: BH 102, 4/13/23, 9:00 AM, GW.

Table with columns for Date, Time, Sample Type, and other details. Row 1: 4/13/23, 9:00 AM, GW.

Table with columns for Frozen, Ice Packs, Cooling Initiated, SIF Observations, Custody seal intact, Yes/No, and Final Cooler Temperatures.

Drinking Water (DW) Samples (client use)  
Are samples taken from a Regulated DW System?  YES  NO  
Are samples for human consumption/ use?  YES  NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)  
SIF Observations: Yes  No   
Custody seal intact: Yes  No   
Final Cooler Temperatures: 6.4

Released by: MCR  
Date: 4/13/2023

INITIAL SHIPMENT RECEPTION (lab use only)  
Received by: [blank]  
Date: [blank]

FINAL SHIPMENT RECEPTION (lab use only)  
Received by: EK  
Date: Apr 13, 23  
Time: 5:30 PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION  
WHITE - LABORATORY COPY  
YELLOW - CLIENT COPY  
If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.